CHAPTER 11: INDUSTRY & MANUFACTURING

- Where did the Industrial Revolution Begin? How did it diffuse?
- How have the character and geography of industrial production changed?
- How have deindustrialization and the rise of service industries altered the economic and geography of production?
**FIELD NOTE:**
CONTAINING THE WORLD-ECONOMY?

**Containerization:** Using standard size containers to ship goods from port to port. Cranes instead of people are used to move containers quickly.

- the container ship is the backbone of globalization
WHERE DID THE INDUSTRIAL REVOLUTION BEGIN?

HOW DID IT DIFFUSE?
**BEFORE THE INDUSTRIAL REVOLUTION:**

**COTTAGE INDUSTRIES:** families in a community worked together, each creating a component of a finished good or the good itself.

- **Example:** a small town in England, a few families would receive a shipment of wool from a merchant. One family would prepare the wool then pass it on to other family, who would spin the wool into yarn. The family who made the wool into yarn then passed the yarn to weavers, who made blankets and other wool products.

India, China, and Japan possessed a substantial industrial base of cottage industries long before the Industrial Revolution.

The transition from cottage industries to the Industrial Revolution happened in the context of changing **ECONOMIES OF SCALE** [increasing production of a good so that the average cost of the good declines].

- Europeans sought to capitalize on economies of scale, to generate a greater profit by producing larger quantities and lowering the cost to the consumer.
**THE INDUSTRIAL REVOLUTION:**

The hearth of the Industrial Revolution was **ENGLAND** in the 18th century.

The wealth brought to Europe through the colonization of and trade with South Asia, Southeast Asia, the Americas, and Africa funded inventions, including the **SPINNING JENNY** and the **STEAM ENGINE** [ran on coal].

Manufacturing was located close to coal fields and needed to be near ports [raw materials could arrive and finished products could depart].

**Railroads** were essential to the development of the Industrial Revolution [connection of nodes]. Major use of iron and steel.

Steam Engine made its mark on sea transportation, as the first powered vessel to cross the Atlantic Ocean in 1819 [steamship].

Main energy source: coal

**MISLEADING:**
1. The transformation was far more than industrial; it resulted in new social, economic, and political inventions, not just industrial ones.
2. The changes involved gradual diffusion of new ideas and techniques over decades rather than an instantaneous revolution.
Early 1800s, as the innovations of Britain’s Industrial Revolution diffused into mainland Europe, the same set of locational criteria for industrial zones applied: sites needed to be near resources and connected to ports by water.

- Coal and iron ore are heavy, which means transportation is costly.

When industry developed in one area, economic growth had a spillover effect on the port cities to which they were linked by river or canal.

Once railroads were well established in Great Britain and continental Europe, the factors that determine where to locate, or site, manufacturing facilities changed.

- Transportation is a major cost in the production of goods, and railroads lowered the cost of transporting bulk and heavy goods.
- Allowed companies to locate manufacturing in major urban areas [London] because major cities could import the raw materials, produce goods drawing form the larger labor supply, and sell goods to a larger population of consumers.

  - Urbanizaiton
  - Major cities usually have a major river or water source.
  - Example: London and the Thames River
Western Europe’s early industrialization gave it a huge economic head start, or A FIRST MOVER ADVANTAGE, putting the region at the center of a quickly growing world-economy in the 19th century.

- Industrialization began to diffuse from Europe to the Americas and Asia in the 19th century, and SECONDARY HEARTHs of industrialization were established in eastern North America, western Russia, and Ukraine, and East Asia.
- All were close to coal, connected by water or railroad to ports, and heavily invested in by wealthy people in those regions.
**North America**

- Beginning of the 20th century, the only serious rival to Europe.
- Predominantly settled by Europeans with close links to Britain, which provided access to capital and innovations that fueled industrialization there.
- Manufacturing began in New England during the colonial period.
- Northeastern U.S. is not rich in minerals; relied on trade.
- Industry developed along the Great Lakes [water sources] and railroads.
- U.S. has very large coal reserves

**East Asia**

- 1868: Japan opened its economy through a change in government policy.
- Industrialization began with its military sector and encouraged Japanese men to study sciences in universities abroad so they could bring their knowledge back to Japan and create industries.
- Limited natural resources so Japan is dependent on raw materials imported from other parts of the world.
- 1800s-1900s: Japan colonized Korea, Taiwan, and portions of mainland China.
- Special Industries: steel mills, chemical industry, automobiles, shipbuilding, textiles, and more.

**Russia & Ukraine**

- St. Petersburg is one of Russia’s oldest manufacturing centers.
- Capitol and industrial core.
- Peter the Great encouraged net-in migration from Western European artisans with skills and specializations.
- He imported high-quality machine building equipment to fuel industrialization.
- Special industries: shipbuilding, chemical production, food processing, and textiles.
- After WWI, the newly formed Soviet Union (Russia) annexed Ukraine and took advantage of its rich resources.
GLOBALIZATION: a set of processes that are increasing interactions, deepening relationships, and heightening interdependence without regard to country borders.

- Includes the set of outcomes that are felt from global processes
- Example: advancement in transportation and communication.
Fordist system encompassed a set of political-economic structures (corporations and political institutions working together) and financial orders that supported mass production by corporations.

- **GOAL**: grow the world-economy

**The BRITTON WOODS arrangement**: 1944: countries adopted the gold standard, which they pegged the value of their currency to the price of gold.

**The RESULT**: created stability in international exchange that encouraged global mass production of goods.

**VERTICAL INTEGRATION**: “Self-Sufficiency Factory” – owning, operating, and coordinating all the resources needed to produce a complete product.

Example: River Rouge Ford plant pg. 356
The increase in time and cost that usually comes with increased distance over which commodities (or people) must travel.

If a heavy raw material (coal or iron ore) is shipped thousands of miles to a factory, the friction of distance increases.

The friction of distance accounts for the raw materials that go into a product and prompts manufacturers to locate their factories close to raw materials.

**Bulk-Reducing Industry:** An industry in which the inputs weigh more than the final products.

Goal: Minimize transport costs, locates near its sources of inputs.

**Distance Decay** suggests that manufacturing plants should be concerned with serving the markets of nearby places than more distance places.

**Bulk-Gaining Industry:** makes something that gains volume or weight during production.

Example: Fabricated Metals/Beverage Production

Assumes the impact of a function or an activity will decline as one moves away from its point of origin.
LOCATION THEORY

Economist Alfred Marshall argued that a particular industry, whether automobile or furniture production, clusters in an area. The process is known as localization, or agglomeration.

LEAST COST THEORY

Economic geographer Alfred Weber wrote the Theory if the Location of Industries, where he focused on specific factors that pull industry to particular locations.

Weber’s theory focuses on a factory owner’s desire to minimize three categories of cost.

1. **Transportation**: site where transportation cost is the lowest or the place where it is least expensive to bring raw materials to the point of production and to distribute finished products to consumers.

2. **Labor**: higher labor costs tend to reduce the margin of profit, so a factory farther away from raw materials and markets might do better if cheap labor compensates for the added transport costs.

3. **Agglomeration**: similar to Alfred Marshall’s localization theory – can make a location more attractive for a company, potentially overcoming higher transportation or labor costs.
M = MARKET
W(M) = WEIGHT OF PRODUCT
W(S1) & W(S2) = TONS OF MATERIAL
P = OPTIMAL FACTORY LOCATION
D(M), D(S1), D(S2) = DISTANCE FROM FACTORY

1950-2009: 2 million jobs were added in the South and West.
- South has cheaper labor force than North
- Textile Production has moved Southward for cheap labor

Civil War: South was not industrialized nor recovered from the loss.
- Government policies were used to reduce disparities between the North and South.
- Gulf Coast: important industrial area due to the access to oil and natural gas.
Right-to-Work Laws: requires a factory to maintain a so-called “open shop” (union optional) and prohibits a “closed shop” (union required).

- Union: an organized association of workers formed to protect and further their rights and interests; a labor union:

- Union Responsibilities

- Union members lower in the South than North
As the global-economy became more integrated and transportation costs decreased, the advantages of concentrating production in large-scale complexes has declined.

Later part of the 20th century many enterprises began moving toward a post-Fordist, flexible production model.

Flexible Production: describe this state of affairs because firms can pick and choose among a multitude of suppliers and production strategies all over the world, and then quickly shift where they manufacture their products in response to adjustments in production costs or consumer demand.

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 assemble the final product in response to customer demand.

For the consumer who wants the newest/best/greatest offering or and to enable manufacturers to lower cost of production
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 the price of the good, in order to compete.

Changes in production of a good over time takes place as part of a PRODUCT LIFE CYCLE.

Product Life Cycle of the Television
1. Introduction Stage: few supply
2. Growth Stage: economies of scale due to Japan & Europe
3. Maturity Stage: small changes made to product and moved production closer to consumers.
4. Decline Stage: improved technology and new product development (ex. HD tv)
THE GLOBAL DIVISION OF LABOR

"mass production" is concentrated in periphery and semi-periphery countries to take advantage of "cheap labor".

"research and development" of products is concentrated in core countries.

- Methods of assembly and products change and industry is now looking at three new advantages: infrastructure, skilled labor, and accessible markets.

Time-Space Compression is based on the idea that developments in communication and transportation technologies have accelerated the speed with which things happen and have made the distance between places less significant.

Shapes the Global Division of Labor because we are SO CONNECTED that we no longer need to locate near raw materials OR consumers.

Just-in-Time Delivery: eliminates large-inventory of components or products, companies NOW keep just what they need for short-term production and new parts are shipped quickly when needed.

This allows corporations (owners) to find the cheapest labor/items around the world.
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 the calculations of the ‘New Place-Based Cost Advantages’ also known as the spatial fix.
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<th>Site Factors:</th>
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<td><strong>Labor:</strong></td>
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<td>- minimizing labor costs is important for some industries</td>
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<td>- Varies from country to country</td>
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<td>- ½ billion people work in industry</td>
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<td>- Labor intensive: industry in which wages and other compensation paid to employees constitute a high percentage of expenses (measured in percentage)</td>
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<td>- High-Wage Industry: measured in dollars (higher hourly rate)</td>
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<td><strong>Capital:</strong></td>
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<td>- Funds borrowed to establish new factories or expand existing ones.</td>
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<td>- US motor vehicle is concentrated in Michigan because that region's financial institutions were more likely to lend money to the industry's pioneers.</td>
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<td>- California's Silicon Valley (clustering of high-tech industries) – availability of capital AND skilled labor. Very risky loans; however, ¼ of all capital in the US is spent on new industries in Silicon Valley.</td>
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<td>- Ability to borrow money has become critical factor.</td>
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<td><strong>Land:</strong></td>
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<td>- Needs to be suitable for constructing a factory.</td>
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<td>- Combination of site and situation factors</td>
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<td>- Early factories in cities: multistory</td>
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<td>- Contemporary factories: one-story building (raw materials at one end and final product shipped out the other). Usually in rural or suburban areas because of cheap land.</td>
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<td>- New transportation and construction has allowed factories to move farther away from the city.</td>
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Where to produce or assemble a good is only a small aspect of decisions made in a commodity chain.

Outsourcing: a company moving production or services abroad.

[Examples]: manufacturing to China or call centers to India.
Transportation: has decreased from 50% to 5% of total production cost. Producers need to consider alternative routes in case of an emergency. Increase in intermodal connections (connection of 2 or more modes of transportation).

Regulatory Circumstances: Regional trade organizations including the Association of Southeast Asian Nations (ASEAN), North American Free Trade Agreement (NAFTA), and the European Union (EU) have trade agreements that influence where imported goods are produced. In addition the WTO (World Trade Organization), enforces trade amongst member nations. State and local regulations influence the location of industrial operations due to tax regulations to environmental and safety standards. Governments actively seek to enact incentives such as tax breaks, subsidies, and Export Processing Zones.

Energy: the definition of energy changes (wood to coal to oil to petroleum to natural gas)
DEINDUSTRIALIZATION: a process by which companies have industrial jobs to other regions, leaving the newly deindustrialized regions to work through a high period of high unemployment and, if possible, switch to a service economy.

Newly Industrializing Countries (NIC)
- Asian Tigers
  - South Korea: cars, pianos, calculators, computers
  - Taiwan: personal computers, telecommunications, high-tech products.
  - Hong Kong: Textiles and Light
  - Singapore: rubber, timber, oil (entrepot – transshipment point).

BRICS:
- Brazil
- Russia
- India
- China
- South Africa

New Place Have:
- Lower labor costs
- Weak environmental laws
- Pro-free-trade laws

New Place Have:
Earth’s average atmosphere is made up of:
- 78% nitrogen
- 21% oxygen
  - Less than 1% argon

Air pollution: concentration of trace substances at a greater level than occurs in average air.
- Damages property and adversely affects the health of people, other animals, and plants.
  - Generated from factories and power plants
  - Produces sulfur dioxide and solid particulates.
### Global-Scale Air Pollution

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<th>Global Warming</th>
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<td>- World's average temperature has increased by 2°F since 1880.</td>
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<td>- Human actions (burning fossil fuels) may contribute</td>
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<tr>
<td>- Concentration of trace gases in the atmosphere can block or delay the return of the heat leaving the surface heading for space (raising the earth’s temperature)</td>
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<td><strong>Greenhouse Effect:</strong> carbon dioxide and other greenhouse gases trapping some of the radiation emitted by the surface.</td>
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<th>Global-Scale Ozone Damage</th>
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<td>- <strong>ozone:</strong> layer absorbs dangerous ultraviolet (UV) rays from the Sun.</td>
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<td>- UV rays would damage plants, cause skin cancer, and disrupt food chains.</td>
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<td>- Earth’s protective ozone layer is threatened by pollutants (<em>Chlorofluorocarbons</em> – Freon were once widely used as coolants in fridges and air conditioners, when they leak from these appliances the CFCs are carried into the atmosphere and breaks down the layer of ozone gas).</td>
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May damage a region’s vegetation and water supply through acid deposition.

- Acid Deposition: tiny droplets of sulfuric acid and nitric form and return to Earth’s surface.
- Acid Precipitation: dissolved in water, the acid will fall (rain, snow, or fog)
  - Damages lakes, killing fish and plants. On land, acid in soil can injure plants by depriving them of nutrients and can harm worms and insects.
  - Buildings and monuments made of marble and limestone have suffered corrosion from acid rain.
Severe in places where emissions are concentrated (urban areas)
- Carbon Monoxide: reduces the oxygen level in blood, impairs vision and alertness, and threatens those with breathing problems.
- Hydrocarbons: presence of sunlight, hydrocarbons form photochemical smog (causes respiratory problems, stinging in the eyes, and ugly haze)
- Particulates: dust and smoke particles. Dark smoke from factories or diesel truck.

Worst urban air pollution occurs on clear days.
Sanitary Landfill:

- Sanitary Landfill: most common strategy for disposal of solid waste in the US.
- ½ is buried under soil or lately burning trash

Hazardous Waste:

- Very difficult
  - Includes heavy metals, PCB oils, cyanides, strong solvents, acids, and caustics.
- 3.93 billion pounds of toxic chemicals were released into the environment in 2010.
  - Risk: soil and groundwater contamination.
WATER POLLUTION

Point Source: enters body of water at a specific location.
- Smaller in quantity, easier to control.
  - Example: specific point like a pipe.

Water-using Manufacturers
- Steel, chemical, paper products, and food processing are major industries that pollute water.

Municipal Sewage
- MDC: sewers carry wastewater from sinks, bathtubs, toilets to a plant, where most pollutants are removed and dumped back into a river/lake
- LDC: sewer systems are rare and wastewater usually drains, untreated into rivers and lakes.

Risk: waterborne diseases – cholera, typhoid

Nonpoint Source: comes from a large, diffuse area.
- Pollute in greater quantities and are much harder to control than point sources of pollution.
  - Agriculture: Fertilizers and pesticides spread on fields to increase productivities are carried into rivers and lakes by irrigation systems or natural runoff.
- Destroys aquatic life
- Example: Aral Sea
Decomposing organic waste consumes the oxygen that aquatic plants and animals depend on.

Biochemical Oxygen Demand (BOD): the oxygen consumed by the decomposing organic waste

- Fertilizers produce too much aquatic plant production and produces algae
  - Leads to dead “streams” or lakes.

Example: Salmon from the Great Lakes became unfit for human consumption because of high levels of DDT that washed in from the farm fields.