

The origins of the Industrial Revolution

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Pollution from copper factories in Cornwall, England, during the Industrial Revolution. Engraving from History of England by Rollins, 1887, private collection. Courtesy of Leemage/Corbis. Chart below taken from Cohen, Sharon.

Global changes do not happen overnight. Usually, several factors or conditions all have to come together to make change possible.

There were many factors that allowed the Industrial Revolution to transform the world. The Industrial Revolution changed how goods were made and traded. It also changed how governments supported large businesses.

Don't forget: humans have been manufacturing — making — things for a very long time. The Industrial Revolution of the mid-1700s brought factories and mass production. Now, goods could be manufactured in huge quantities. Before that, products were often created by individual men and women working in their homes.

Some regions of the world gained a reputation for producing high quality items. These items were both sold at home and exported abroad. Belgium was known for its woolen products during Europe's medieval period. India had a reputation for producing high-quality cotton fabrics. China

had been the center of silk production for a long time. What made production different during the Industrial Revolution?

Between 1750 and 1914, there was a global shift in how goods were manufactured. Many regions of the world saw at least some changes: from Europe, to the Americas, to Asia. These regions became more industrialized during this time. They built more factories and started producing many more goods.

In their book *The Human Web*, historians J. R. and William H. McNeill argue that several factors made the Industrial Revolution possible.

First, fossil fuels such as coal provided huge amounts of energy. Second, some people were gathering more capital — more money. This allowed them to start large businesses. Finally, trade connections were growing stronger through transportation innovations such as canals, turnpikes (like highways today), and later, steamships.

More efficient transportation changed the way goods were produced and moved, especially in the Northern Hemisphere. These factors — fossil fuels like coal, money to support innovations, and new transportation technology — were present in Europe, the Americas, and Asia.

Coal, for example, was mined in Europe, East Asia, and North America. According to the McNeills, "Song China had used (coal) on a large scale in its iron industry. London had burned coal for home heating from at least the thirteenth century."

The northeastern United States and central China had many waterways that provided cheap transportation. And throughout the sixteenth and seventeenth centuries, hundreds of ships loaded with goods and raw materials made the journey from South America to China, providing China with plenty of capital (cash).

Still, the Industrial Revolution began in Great Britain. Why? And why did it happen in the eighteenth and nineteenth centuries? What changed in Europe — particularly in Great Britain — that created the Goldilocks Conditions for such a massive change in how people produced goods and services?

Sugar plantations as a blueprint for industrialization

One change was how the Europeans thought of labor: the work done, and the workers who did it. The ways people worked were changing in big ways. This first happened in the Americas and later spread all over the world.

We can see how work was changing by looking at the sugar industry on the Caribbean islands and Brazil. Making sugar was a hot, noisy industry that required many workers. It had to stick to strict deadlines.

Making sugar also required a lot of capital. You need cash up front to build sugar plantations and mills. Cheap workers were also important to sugar production.

Historians Kenneth Pomerantz and Steven Topik argue that the "scale, complexity, and social organization of the sugar mills," made them the first modern factories. The sugar mills were a blueprint for other factory systems, they wrote.

Two things made the sugar mills unique at the time. The first was strict time schedules. Once sugar cane was cut, it had to be processed quickly, or else it would rot. To do this, workers in the mills had to work around the clock. The mill was designed around one goal: to produce as much sugar as possible.

The second was how workers were treated. The workers who made sugar were mostly slaves. They were seen almost as parts of a machine. One could easily be replaced by another. This way of looking at workers would eventually be adapted to many industries around the world.

Cotton, coal, colonies, and cheap labor

We can see how labor changed during the Industrial Revolution. Still, we have not answered some basic questions: How did the Industrial Revolution come about? Why did it start in Great Britain?

Great Britain did not grow sugar cane. It did not have a large number of slaves either.

Yet it did have three key features that eventually transformed the British economy: access to raw materials, trade routes, and cheap labor. However, Great Britain still needed something else to bring these factors together.

Look at the chart on global manufacturing output below. This chart shows how much stuff each country was producing by 1750. We can see that at this point, Great Britain (and all of Europe) was producing far less than Asia.

Remember, by the late 1700s and through the 1800s, Great Britain became the leader in producing and trading goods. There must have been a large leap for Britain to catch up with production in Asia.

Why was Europe behind Asia in the first place? One reason is that the Europeans did not wear cotton clothing. They usually wore either wool or cloth made from flax. In Africa and Asia, cotton and silk were preferred.

Wanting to compete in the global economy, Great Britain decided to get into the cotton business. This was not as easy as it sounds. Still, the British had a few advantages: colonies in North America, the Caribbean, and India; extensive trade routes between these colonies; and access to raw materials like cotton and coal.

Most of Great Britain's cotton came from the American South. Even in 1861, just before the U.S. Civil War, Great Britain was purchasing more than half of the cotton the American South produced. Great Britain bought cotton from Egypt and India, too, knowing the Civil War would disrupt trans-Atlantic trade. The mills in Britain needed raw cotton to keep working.

Great Britain was at the center of a web of exchange networks. It was able to ship manufactured cloth around the world. Look at the chart below. We can see Britain began importing more raw cotton and exporting more finished cotton textiles.

Looking at these two charts, we can see that Great Britain went from being an importer of textiles to a major exporter of textiles in a very short time.

Manufacturing Output: 1750

China	32.8%
India	24.5%
Europe (not including Great Britain)	21.2%
Asia (not including China and India)	12.7%
America and Africa	6.8%
Great Britain	2.0%

Coal was also an important raw material that drove the Industrial Revolution. Coal allowed the textile industry to become mechanized — for machines to be used on a large scale. This ultimately allowed Great Britain to become the top manufacturer of textiles. To understand how important coal was to the Industrial Revolution, look at the information below. Here is how much coal was being mined in Great Britain:

1700: 2.7 million tons

1750: 4.7 million tons

1800: 10 million tons

1850: 50 million tons

The amount of coal burned in Great Britain grew by leaps and bounds. It wasn't just cotton mills using this coal — many industries did. Still, the textile (cloth) industry used coal power to become very successful during the Industrial Revolution. In 1850, there were 50 million tons of coal burned. We can see that a lot of factories and industries were using coal by that time.

The third element needed for the Industrial Revolution in Great Britain was cheap labor. During the 1700s, most British people lived and worked on farms. However, beginning in the late 1500s, England began to privatize, or "enclose," public lands. This enclosure movement accelerated during the eighteenth century.

Between 1760 and 1815, 3,600 separate acts or laws by England's Parliament "enclosed more than seven million acres of land, more than one-fourth of the farmlands in England," according to historian John Merriman.

The land was closed off to the public and taken over by individual people. After 1760, Merriman says, "The poorest members of the rural community lost their age-old access to lands on which they had gleaned (collected) firewood, gathered nuts and berries, and grazed animals. Before enclosure, it was said, a 'cottager' was a laborer with land; after enclosure, he was a laborer without land."

These country people who suddenly had no land to live off of became the workers of the Industrial Revolution.

Other factors needed for the Industrial Revolution

Coal and cotton were the raw materials needed to create industry in Great Britain, and Britain had access to both. It also had colonies around the world. These colonies could provide both raw materials and markets for British manufactured goods. Finally, due to the late eighteenth-century enclosure movement, Great Britain had a growing population of people moving from rural to urban areas in need of employment.

Along with these significant factors, there were two more reasons why Britain was able to industrialize: innovation and mercantilism.

Date	Raw cotton consumption in Great Britain	Exports of cotton textiles from Great Britain
1760 to 1769	3.5 million pounds	£227
1820 to 1829	166.5 million pounds	£25,605

Date	British imports of cotton piece goods from India	British exports of cotton from textiles
1772 to 1774	£697	£221
1824 to 1826	£363	£17,375

Thomas Savery's invention of the steam engine in 1698 is seen as an innovation that allowed the Industrial Revolution to happen. At first, the steam engine was used to pump water out of coal mines. Over time the steam engine was improved. It was then used in tugboats (1736), paddleboats (1788), steamships (1814), and railroad engines (1825). We can see that the steam engine made transportation more efficient. It also helped to transform the textile industry.

In the mid-1700s a machine that could turn raw cotton into thread was created. It was called the steam-powered spinning jenny. The machine could produce as much thread in three hours as an expert spinner could produce in 50 hours by hand. It was cheaper, too.

In 1785 the first steam-powered loom was invented. At first it made a coarse, uncomfortable fabric that people did not want. That would soon change, and quickly. By 1797, there were more than 900 cotton mills operating in Great Britain. By 1835, there were more than 106,000 steam-powered looms.

What's the relationship between steam-powered labor and the price of goods and wages? Two pieces of information stand out.

First, between 1800 and 1835, the wages of hand-loom weavers had dropped 60 percent. We know that many steam-powered looms were brought in during this time. We can guess that the steam-powered looms produced textiles much faster than a weaver working by hand.

Second, the price of fabric dropped from 40 shillings to 5 shillings during this time period. It meant textiles were being produced fast and cheaper than ever before thanks to this revolution in fuel, machines, and labor.

This information supports the statistics in the charts. They show that Great Britain's exports increased during this time period while its imports from Asia (India) declined.

It was not just machines and workers. Great Britain also benefited from an economic philosophy that helped it to defeat other countries it competed against in trade. The philosophy was called mercantilism. The main idea of mercantilism is to create a balance of trade that favors your country. It means a nation should export more than it imports in order to make sure there was enough gold and silver in the treasury — basically a nation's savings account.

Great Britain achieved this economic goal by putting tariffs (taxes) on fabrics imported from India. These protective tariffs made Indian imported fabrics more expensive. The tariffs were kept in place until British manufacturers could match the quality and cheaper cost of imported Indian textiles. Once British factories achieved this goal, the tariffs could be reduced or eliminated. But by then the damage to the Indian textile industry was already done.

The Industrial Revolution goes global

As we noted above, the conditions for the Industrial Revolution existed in a number of regions. Still, they first came together in Britain. Great Britain had the Goldilocks Conditions that allowed it to transform to an industrial system. However, Britain's competitive advantage would not last long. Other nations quickly followed suit.

The Industrial Revolution brought advances in transportation and communication. As a result, ideas spread at an accelerated rate during this period.

This allowed other countries to copy what Great Britain was doing and begin to transform their own economies. In the United States, New England became the early center of the textile trade due to its access to cheap energy, good transportation, and capital (money). The same is true for Germany and parts of Asia. Japan became one of the mightiest industrial powers. By the dawn of the 1900s, the balance of power had shifted from the traditional agrarian civilizations that had reigned for thousands of years to those nations that could industrialize the fastest.

Quiz

1 During the Industrial Revolution, production was valued above all else, including the needs of workers.

Which excerpt from the section "Sugar Plantations as a Blueprint for Industrialization" BEST supports the idea above?

- (A) One change was how the Europeans thought of labor: the work done, and the workers who did it. The ways people worked were changing in big ways. This first happened in the Americas and later spread all over the world.
- (B) We can see how work was changing by looking at the sugar industry on the Caribbean islands and Brazil. Making sugar was a hot, noisy industry that required many workers. It had to stick to strict deadlines.
- (C) Historians Kenneth Pomerantz and Steven Topik argue that the "scale, complexity, and social organization of the sugar mills," made them the first modern factories. The sugar mills were a blueprint for other factory systems, they wrote. (227)
- (D) Once sugar cane was cut, it had to be processed quickly, or else it would rot. To do this, workers in the mills had to work around the clock. The mill was designed around one goal: to produce as much sugar as possible.

2 Read the section "The Industrial Revolution Goes Global".

Which selection MOST clearly suggests that the Industrial Revolution changed the types of societies that were most dominant worldwide?

- (A) As we noted above, the conditions for the Industrial Revolution existed in a number of regions. Still, they first came together in Britain. Great Britain had the Goldilocks Conditions that allowed it to transform to an industrial system.
- (B) The Industrial Revolution brought advances in transportation and communication. As a result, ideas spread at an accelerated rate during this period.
- (C) This allowed other countries to copy what Great Britain was doing and begin to transform their own economies. Japan became one of the mightiest industrial powers.
- (D) The balance of power had shifted from the traditional agrarian civilizations that had reigned for thousands of years to those nations that could industrialize the fastest.

3 Read the last two paragraphs from the section "Other Factors Needed for an Industrial Revolution".

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How do the paragraphs MOST contribute to the article?

- (A) by showing how Great Britain's economic policies added to its power in the Industrial Revolution
- (B) by describing how Great Britain ensured there was enough money in the treasury to defeat other countries
- (C) by demonstrating how Great Britain improved its trade by making better cotton than India
- (D) by explaining how Great Britain could export more goods by putting tariffs on its fabrics

Between 1760 and 1815, 3,600 separate acts or laws by England's Parliament "enclosed more than seven million acres of land, more than one-fourth of the farmlands in England," according to historian John Merriman. (361)

The land was closed off to the public and taken over by individual people. After 1760, Merriman says, "The poorest members of the rural community lost their age-old access to lands on which they had gleaned (collected) firewood, gathered nuts and berries, and grazed animals. Before enclosure, it was said, a 'cottager' was a laborer with land; after enclosure, he was a laborer without land." (361)

These country people who suddenly had no land to live off of became the workers of the Industrial Revolution.

What is the purpose of these three paragraphs?

- (A) to support the idea that the profits of the Industrial Revolution were achieved legally
- (B) to build sympathy for people who lost their livelihoods after enclosure
- (C) to show how legal measures altered English society and provided labor for the Industrial Revolution
- (D) to illustrate how most economic development comes at the expense of the poorest people in a community