

The Industrial Revolution

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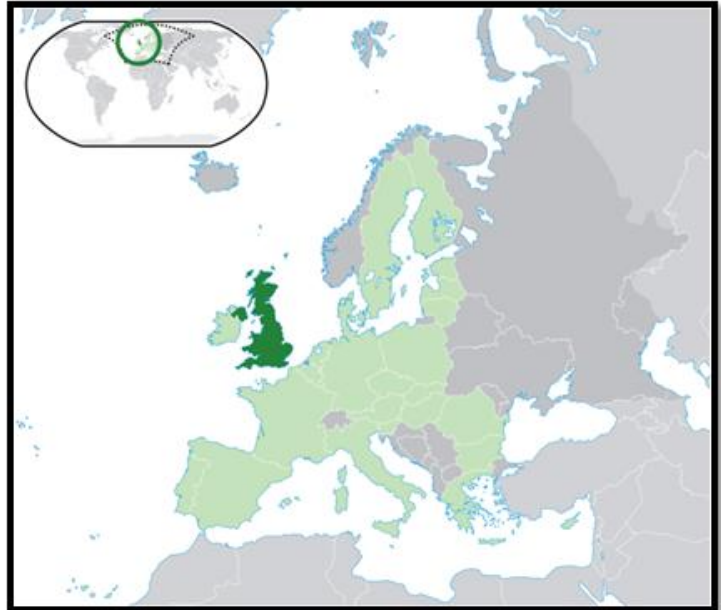
Building upon the accomplishments of the Renaissance, the Age of Exploration, and the Scientific Revolution, Europeans embarked upon another era of economic growth, scientific achievement, and territorial expansion in the eighteenth and nineteenth centuries. This period of European economic growth and territorial expansion coincided with the era of the Enlightenment. The economic power of Europe that facilitated this territorial expansion of the eighteenth and nineteenth centuries was in turn made easier because of the Industrial Revolution.

The British led the way in the process of industrialization. A number of factors influenced the success of the eighteenth and nineteenth century British entrepreneurs.

The geography of Great Britain, the natural and constructed transportation system, the banking system and government, an abundance of necessary natural resources, and an available workforce were all factors in the economic transformation of Great Britain.

The Industrial Revolution dramatically altered where people lived and how they earned a living. Urban populations grew rapidly as people moved from rural areas to the cities of Europe. Entire families became dependent upon earning wages by working in Europe's growing factory system rather than remaining tied to the land as peasant farmers. In Great Britain, the innovations in agriculture contributed to a growing food supply and these changes in the agricultural system led to a system that required fewer agricultural laborers. This increasing food supply contributed to the population growth which in turn supplied the industrial labor work force that was necessary for the new factory system to flourish.

The factory system expanded rapidly based on numerous new technological innovations. Great Britain was also a relatively wealthy nation with the capital available for investment in the new industrial facilities. In addition, the British government was quick to adapt to the



The British Isles



Jethro Tull was an English agricultural pioneer who helped bring about the British Agricultural Revolution.

changing economic system by adopting laws and regulations that encouraged investment and protected property rights. As mentioned, Great Britain benefited as well from an abundance of natural resources—plentiful coal and iron ore was available for exploitation. In fact, the efforts to extract coal from the ground led directly to the creation of the first steam engines that would prove to be so important to the success of the Industrial Revolution. The British also had access to an abundance of raw materials from their colonial possessions. Cheap cotton from the Americas and later from Egypt and India contributed to the rapid expansion of the British textile industry. One could argue that industrialization in Great Britain and later in America benefited tremendously from the slave laborers who provided the cotton for the textile industry. Britain's colonial empire also provided markets for the industrial goods being produced by its booming factory system.



Slaves working on an American plantation

Two of the new technologies that facilitated industrialization were the *spinning jenny* and *power loom*. These inventions allowed Great Britain to create the advanced textile manufacturing industry that was based mostly on the use of cotton. However, the most significant innovation of the late eighteenth century was the steam engine, which was perfected by James Watt. With the steam engine as a new source of power, the industrial process spread rapidly. Coal production in England increased dramatically to fulfill the needs of the burgeoning factory system, and the production of iron ore—necessary for the new machines and facilities—expanded rapidly, as well. The demand for iron ore escalated even more in the early nineteenth century with the creation of the railroad industry. British industrialization had benefited greatly from having plenty of high quality iron ore and coal which were readily available in England for exploitation. In London's Great Exhibition of 1851, the British built the Crystal Palace where they were able to showcase their newly attained industrial might to the rest of the world.



With the development of the railroad industry, along with investments in a canal system, the British had built an efficient transportation network that contributed to the success of industrialization. Because Great Britain was a relatively narrow land mass, no region was far from the coast, and the coastline was blessed with a number of good natural harbors. Each of these factors added to the ease of movement of goods and services at a cost effective ratio—an essential quality of an industrial society. By the late eighteenth century, the British had also developed a vast fleet of merchant ships and the world's most powerful navy that was available to protect its shipping interests around the globe.



The Battle of Trafalgar, 1805

Industrialization spread to the European continent, but it lagged behind that of Great Britain. In France, the government was less sympathetic to the economic interests of prospective entrepreneurs following the upheaval of the French Revolution. France also suffered from internal tolls and tariffs that restricted capitalistic economic development. France is also a larger country than Great Britain, and the French had a relatively inefficient transportation network. Early French industrial efforts focused on the production of expensive luxury items rather than on the relatively cheap items being produced in British factories.



Map of Europe - France

Other European countries shared many of the problems that inhibited French industrial development, however by the early nineteenth century a number of regions throughout Western Europe were starting to develop efficient factory systems. By the middle of the nineteenth century, a number of nations were well on their way to becoming highly industrialized, including the United States. French industrialization was concentrated around the city of Paris and in the northeastern section of the country. In the German states the Ruhr River Valley, Silesia, and several other regions were quickly becoming centers of industrial development. The Netherlands and Belgium were also embarking upon industrial

development, and the region around the city of Milan in Northern Italy was an area of industrial expansion as well.

In the non-western world, industrial development was much slower than what occurred in Europe.

Much of the world lacked the social, economic, and political structures that facilitated Western industrialization.

However, industrial development was also inhibited by the British and other colonial powers. The European powers prevented the growth of local

industries in order to maintain a market for their manufactured goods. European colonies in Asia and Africa were forced to concentrate on producing the raw materials necessary for European industrial development.



In the late eighteenth and early nineteenth centuries, the population increased for a variety of reasons. Although the birthrate in some European countries declined, the population increased because of a reduction in epidemic disease. In the nineteenth century, there were also relatively few wars, and with an increase in the food supply, it was only natural that the population grew.

Although much of the excess rural population was relocating to cities or immigrating overseas, overpopulation was becoming a problem in some rural areas. In Ireland, this contributed to a disaster—the potato famine. A shortage of food led to the death of over a million persons between 1845 and 1851 and to the immigration of at least that many to America. Meanwhile, the cities of Europe were growing dramatically. London grew from one million people in 1800 to well over two million in 1850. The rapid growth of the cities led to urban living conditions that were often horrendous. Until well into the twentieth century, most European cities lacked any semblance of sanitary facilities. Although the cities on the European continent were also growing, urbanization was slower than what occurred in Great Britain. Despite rapid industrialization and urbanization, until the twentieth century, a majority of European workers were still engaged in some kind of rural agricultural activity.



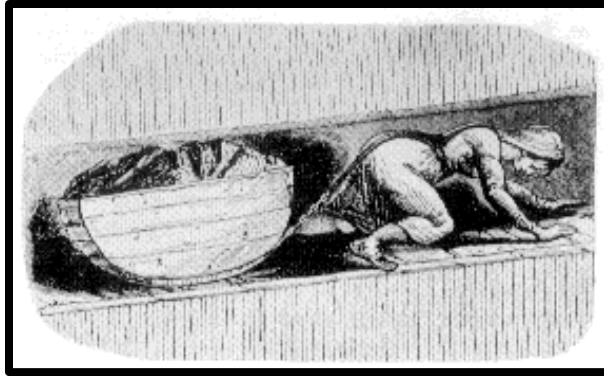
Emigrants leave Ireland

Traditionally, the status and wealth of the European nobility was based in land ownership. However, industrialization began to dramatically change the European class system. In some European countries such as Great Britain, members of the traditional aristocracy became industrial entrepreneurs. Aristocrats who failed to make this transition often became impoverished. With industrialization, Europe experienced the expansion of a new middle-class consisting of manufacturers, bankers, shop keepers, and other entrepreneurs. The new middle class also included: teachers, lawyers, physicians, and members of the political bureaucracy. This growing middle-class element soon began to demand more influence in the European political systems, eventually leading to the spread of democratic institutions in Europe in the twentieth century.

Another new class associated with industrialization was the working class. The work environment in most factories was dreadful. Employees were required to work long hours and often, in unsafe conditions. Child labor was the norm in this era; boys and girls as young as eight-years-old, sometimes, worked ten to twelve hour days. Eventually, laws were passed in Britain in an attempt to improve factory conditions. However, although the *Factory Acts* attempted to improve factory conditions—especially for women and children—these laws also established workhouses for the jobless and homeless. In other words, it basically became illegal to be a poor indigent person living on the streets of British cities. Although the British factory system provided work for many, the wages were often so low that poverty was endemic and entire families had to work to make ends meet.

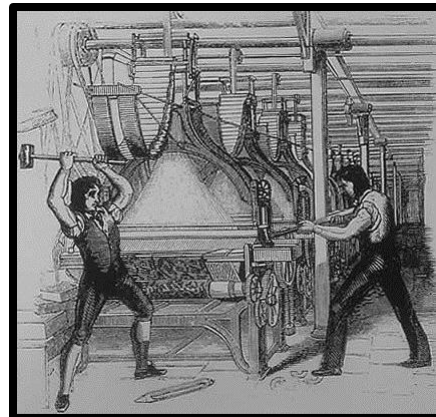


The British House of Lords chamber



A child pulling a coal tub. The Factory Acts in Great Britain prevented children under the age of nine from working and limited children age nine to eighteen to no more than a twelve hour workday.

Improvements in general living conditions for the working poor in England and other European countries were slow to develop; most statistics suggest that although there was gradual increase in real wages, the miserable living and working conditions balanced off these gains. Labor unions were formed in an attempt to improve wages and working conditions, but initially, these unions had limited success. In response, workers sometimes became violent. For example, the Luddites in England protested by destroying factories and machines. Reform in England did not come easy. The Chartist Movement developed and petitioned the English Parliament, demanding reforms, but the politicians rejected their demands. Although these reforms did not always lead to immediate changes, eventually, the dismal poverty and suffering of the working class would bring about even greater demands for change. The political and economic struggles between the aristocracy, the growing middle class, and an expanding working class are a big part of the story of nineteenth and twentieth century Europe. In summary, the Industrial Revolution radically transformed Western Civilization, transforming European social, economic, and political systems adding to the power of Europe relative to the rest of the world. Only now, as we move into a new century is much of the rest of the world beginning to challenge Western dominance.



Luddites destroying a weaving frame