

The Industrial Revolution

Modern life as we know it, with mass production, mass urbanization, high economic standards, social disparity, business cycles, and pollution are a product of the industrial revolution which began in the late 18th century and developed during the 19th century. Industrialism developed with breathtaking speed. It began in England and spread to the continent. You may be surprised to learn that the first continental country to which the industrial revolution extended was Belgium, which became highly industrialized. Beginning especially after 1830, the industrial revolution took off in France, and then—at various periods—in the rest of the other European countries. Industrialization took hold much more slowly in Eastern Europe, where social conditions such as the survival of serfdom slowed down its progress. Russia, for example, remained the most backward major country with regard to industrialization. However, during the early 20th century, the industrial revolution made major inroads there and if the Bolshevik Revolution had not taken hold Russia most likely would have developed into one of the most advanced capitalist powers.

The first product to revolutionize the mode of production, modernizing it, was cotton, because the first machines worked that product. Governments opposed this development because they considered cotton to be inferior. In fact, it is when compared to wool, which was the major textile before the industrial



revolution. Why did governments care? They cared because they subsidized manufacturers, and in return for their economic support they set rules and standards for the quality of goods. The idea was that only quality goods could be sold to an international market, thus bring wealth to the country. When manufacturers turned to cotton and the governments objected, entrepreneurs rebelled because they were making more profits on cotton. They argued for freedom from government interference, an idea that soon became transmuted into an ideology of liberty. This was the origin of economic liberalism, which soon enough spread to the political sphere. (Now Americans identify people who want the government to keep out of economic affairs as conservatives; that is because of American developments in the 1930s. In other words, American conservatives of the 21st century are 19th century liberals.)

Another factor to keep in mind while looking at the spread of industrialization is the crucial role of the railroad, something that many people do not pay much attention to now. But the railroad used a lot of iron (rails and cars), spurred the mechanical industry (locomotives), and stimulated building (big stations, generally built of iron). Everywhere you see the building of a railway network in 19th century Europe, you see economic development and industrialization, usually with massive government investment.

What were the most important factors in the industrial revolution?

Population Growth



Before 1800, Europe had been overwhelmingly agrarian. By 1815, Western Europe had witnessed major alterations, with the development of sizable cities and a thriving trade (Eastern Europe East of the Elbe River in general did not see these developments).

Population increased dramatically. It has been estimated that from 1650 to 1750, Europe's population increased 3%; between 1750 and 1850, it doubled. In 1800, Europe counted 188 million people.

What explains this dramatic increase, which was seen most clearly in France? Infant mortality decreased greatly while advances in hygiene extended life expectancies. For example, in France it went from 28 years to 50 between 1800 and 1900. In 1800, the average height for a French male was 5 feet, but a better diet added six inches to his stature. Better sanitation, the drainage of swamps (thus curbing mosquito borne diseases such as malaria), and increased control against diseases coming from the East cut the influx of plagues and also helps explain the increased life expectancy of Western Europeans.

In addition, increases in peasant population accompanied and promoted land reform and new methods of agriculture. The French Revolution had been concerned with property rights and touched off the peasant's gradual emergence to personal liberty and economic improvement, a process that occurred over the course of a century.

After a first phase of rapid population growth, the rate of increase slowed down, primarily for social reasons. Many family units began controlling the



number of births in the interest of assuring a reasonable inheritance and family continuity in property holdings. This phenomenon concerned primarily middle class family in areas such as France.

Industrialization

In 1815, about three quarters of Europe's inhabitants still gained their livelihood from the soil. New techniques for farming had been introduced, such as the use of ploughs and other instruments of all-iron construction, the seed drill, the substitution of root crops and clover for fallowing, and selective breeding of cattle. While the growth of industry was the most noteworthy feature of this period, it is important to remember that industry grew where agriculture flourished.

In the field of industrialization, Britain had surpassed France even though the degree of industrialization now seems great only by comparison. In relation to the present day, industrialization was minimal, but the industrial revolution had begun and the process would eventually spread all over the world.

In textiles, despite earlier inventions, cotton spinning was the factory industry par excellence, even though water power and hand looms were mostly used. In iron-smelting, a number of improvements appeared during this period (e.g., puddling). There is a historical debate as to whether the inventions of this period were the results of trial and error by workers and managers of the early industrial era or whether people we might call early engineers sat down, thought



about problems, and designed more efficient machinery. This debate has not been settled and is likely to continue.

Besides the areas already mentioned, major changes appeared in the crucial field of transportation. Roads at this time were dirt roads. They were muddy and practically impassable in the winter; in the summer they were extremely dusty. During this period (1816), John L. MacAdam redesigned the way roads were made. He made them slightly convex so water could drain off, with a hard surface of crushed stone combined with gravel on a strong base of large stones; this “macadamized system” that revolutionized road making during the early 19th century is still the basis for modern roads. See http://en.wikipedia.org/wiki/John_MacAdam. The average speed of an English mail coach now approached 10 miles per hour. To complement this land revolution, a revolution in transportation on the water took place as well in 1822, with the invention of the first all-iron paddle-wheel steamer.

The key factor in the transportation revolution was the railway. George S. Stephenson’s Rocket appeared in 1829. Now coal and passengers could be transported at speeds exceeding 30 miles per hour. See a history, description, and a picture of the Rocket at <http://www.spartacus.schoolnet.co.uk/RArocket.htm>.

In the 1820s, 1830s, 1840s, and 1850s, iron production and steam production soared, serving as an index of Europe’s industrialization.



Slowly the inventions were perfected and the technology spread to all parts of Western Europe. Between 1850 and 1870, other countries equaled or surpassed Britain in industrial technology.

Remember that it is not enough for something to be invented: it has to be diffused to make an impact. In the 19th century, inventions took a lot longer to spread to other countries (spurred by engineers who left their own country to work abroad) than is the case in the modern world. It took many years for a dense railway network to be constructed in Europe (as in the United States), and this work was not substantially completed until the 1870s. In addition to economics, this development had major political impacts. For example, since railway travel was an efficient way to move goods, including wheat, it became possible at the end of the 19th century to grow wheat in Kansas or Russia and to sell it in Western Europe for less than Western European farmers could grow it. The logical economic result of this development would be that the West European farmers would go out of business because it became uneconomical for them to grow wheat. But if the governments allowed this to happen, the countries would be easily starved out in case of war. For this reason, governments did not allow this to occur (with an interesting exception: Denmark). Instead they adopted policies that had momentous internal and foreign policy results.

We will discuss these developments when we come to the late 19th century. For now, we will take a closer look at the shape the most important



areas of Europe assumed following the Congress of Vienna—the period known as the Restoration.