Henry Ford and the Model T: A Case Study in Productivity

INTRODUCTION

People often credit Henry Ford with inventing the automobile and the assembly line. In fact, he did neither! What Mr. Ford actually did was change the way manufacturers operate. Henry Ford brought together many innovative ideas that helped revolutionize mass production.

The Early Days of Ford Motor Company and the Model T

When Henry Ford incorporated the Ford Motor Company in 1903, automobiles were expensive, custom-made machines purchased as a luxury item by the wealthy. Workers at the Ford factory in Detroit produced just a few cars a day.

Henry Ford's ambition was to make “a motor car for the great multitude.” He wanted to build a high-quality automobile that would be affordable to everyday people. He believed the way to do this was to manufacture one model in huge quantities.

Ford and his company's engineers designed a car named the Model T. First offered for sale in 1908, the Model T was produced like other cars—one vehicle at a time. But the Model T was more sturdy and powerful than other cars. Considered relatively simple to operate and maintain, the auto offered no factory options, not even a choice of color. The Model T was also less expensive than most other cars. At an initial price of $950, 10,000 autos were sold the first year—more than any other model.

Vanadium Steel. Henry Ford searched the world for the best materials he could find at the cheapest cost. During a car race in Florida, he examined the wreckage of a French car and noticed that many of its parts were made of a metal that was lighter but stronger than what was being used in American cars. No one in the U.S. knew how to make this French steel—a vanadium alloy. As part of the preproduction process for the Model T, Ford imported an expert who helped him build a steel mill. As a result, the only cars in the world to utilize vanadium steel in the next five years would be French luxury cars and the Model T.
The Moving Assembly Line

Like parts for other cars of the time, parts for the Model T were initially purchased made-to-order from other businesses. Teams of two or three skilled mechanics in the factory would gather these parts and put them together at a workstation, using everyday tools. When parts did not fit together as needed, workers used files and hammers to make them fit.

Henry Ford realized that a more efficient production process was needed to lower the price and meet increasing consumer demand for his popular new car. He needed to improve productivity—the amount of goods and services produced from a given amount of productive resources. Economists refer to goods and services as output. Henry Ford's output was the Model T. The productive resources used in production—natural resources, capital resources and human capital—are inputs. Ford's inputs were the steel, workers, and other resources required to manufacture the car.

Ford looked at other industries and found strategies that he could apply to making the Model T. Take a look at Interchangeable Parts and the Assembly Line to learn more about two of the first strategies he adapted.

Using interchangeable parts required making the individual pieces of the car the same every time. All pieces would fit with all others. Any valve would fit any engine and any engine would fit any frame. The standardization of parts made it possible to break down assembly of the Model T into distinct steps. Each worker was trained to do just one step or a very few steps. Economists refer to this practice as specialization or the division of labor.

Ransom Olds is the first manufacturer to have used interchangeable parts and the assembly line in the U.S. auto industry. He used these ideas in the production of the 1901 Curved Dash Oldsmobile also referred to as “the runabout”.

In 1913, the Ford Motor Company established the first moving assembly line ever used for large-scale manufacturing. On a trip to Chicago, Henry Ford observed meat packers removing cuts of beef from a carcass, as it was passed along by a trolley, until nothing was left. He was inspired to reverse the process for the production of his automobile.

Parts were attached to a moving Model T chassis in order, from axles at the beginning to bodies at the end of the line. As vehicles moved past the workers on the line, each worker would do one task. Some components took longer to put together and attach than others. Subassemblies were established for these. For example, each radiator with all its hose fittings...
was put together on a separate line feeding into the main assembly line. The interval between delivery of the car and its components was carefully timed to maintain a continuous flow.

The home for this new production system was the Highland Park Plant near Detroit, Michigan, which Ford opened in 1910. Assembly wound downward in the factory starting on the fourth floor where body panels were hammered out. On the third floor workers placed tires on wheels and painted auto bodies. After the assembly was completed on the second floor, the autos moved down a ramp past the first-floor offices. Test your comprehension of this lesson in the following activity.

CONCLUSION

Critical to the success of the Model T was Henry Ford’s ability to increase productivity—output per unit of input. Specialization and division of labor helped Henry Ford and his company increase Model T productivity. Assembly line production was more efficient than having individual workers making complete products. Interchangeable parts made this new way to organize production feasible.

This lesson printed from:
Henry Ford and the Model T: A Case Study in Productivity (Part 2)

STUDENT'S VERSION

This lesson printed from:

INTRODUCTION

In Part I, you learned how specialization and division of labor on the assembly line helped Henry Ford and his company increase Model T productivity. Another significant way Ford reduced input and increased output was through investments in capital.

TASK

In the activities that follow, you will read about some of the capital investments that Ford made and analyze how they improved productivity.

PROCESS

The Highland Park Plant

The Ford Motor Company’s construction of the Highland Park Plant was an investment in capital. At the time it opened in 1910, the four-story factory was the largest building under one roof in the state of Michigan. It was considered the model for factory design. Large, open floors allowed for the efficient arrangement of machinery. To enhance natural lighting and ventilation, there were massive windows. About 75 percent of the wall space was glass, and there were skylights as well.

Vertical Integration

A complex surrounding the Highland Park Plant included a power plant, machine shop, and foundry. Ford was starting to bring together the various stages in the manufacture of automobiles, a strategy called vertical...
integration. By the 1920s, Ford had purchased a rubber plantation in Brazil, coal mines in Kentucky, acres of timberland and iron-ore mines in Michigan and Minnesota, a fleet of ships, and a railroad. These efforts to vertically integrate helped Ford make sure his company would have raw materials and parts when they were needed, guaranteeing a continuously operating assembly line. These efforts also enabled the company to profit from more of the processes involved in producing the automobile.

Single-purpose machines and tools were created for the different steps in the manufacturing process. New power technologies such as electricity were used to run machines more efficiently than humans could run them. Electrical lighting was a key factor in making it possible to operate the factory by day and night, in three shifts.

To facilitate the moving assembly line, an “endless chain-driven” conveyor was built to move each chassis from one workstation to another. Work slides, rollways, trolleys, elevators and other devices were also created to move cars and parts to workers so that workers could repeat their assigned tasks without having to move their feet.

Henry Ford also invested in human capital—that is, he invested in people—to improve productivity. He realized that good health, education, and training all contributed to a worker's productivity. Thousands of immigrants from dozens of countries worked side by side at Highland Park. Many did not read, write, or speak English.

It is almost essential that a workman have a knowledge of English, from a safety standpoint as well as to thoroughly understand the requirements of his work.

*Ford Factory Facts, Ford Motor Company, 1915*

The Ford Motor Company established a school where workers were taught English so they could be safe and more productive on the job. A plant hospital provided health care.

What was the impact of all these changes? Production doubled in each of the first three years the Highland Park Plant operated—from 19,000 cars in 1910, to 34,500 in 1911, to a staggering 78,440 in 1912.

The $5 Work Day

With a new factory, new machines and new ways of organizing production, everything should have been great—but it wasn't.
Spending hours and hours doing the same task over and over was unpleasant for workers. In addition, the work was dangerous. Morale was often low. Workers couldn’t be counted on to show up on a regular basis. Many just quit and looked for jobs elsewhere.

Given these problems, it was difficult to keep the line running smoothly. Making matters worse, new workers required a costly break-in period that reduced productivity. Ford found himself spending $100 to train each new worker, but many of these men only stayed a month or two before quitting. Find out more about Ford’s worker problem and how he solved it by reading Henry Ford’s $5-a-Day Revolution.

Ford's solution? He used an incentive to maintain a stable and productive workforce. He raised workers' pay to $5 a day.

Ford's $5 day sent shockwaves through the auto industry. Many businesspeople, including stockholders in the Ford Motor Company, regarded the pay increase as crazy. Many thought the company would soon go out of business. But Ford believed that retaining more skilled, satisfied employees would increase productivity and lower production costs. He was right! Turnover and absenteeism disappeared almost overnight. In addition, Ford greatly increased the size of his plants by adding new and additional equipment to further raise the productivity of his workforce.

- In 1914, 13,000 workers at Ford made 260,720 cars. By comparison, in the rest of the industry, it took 66,350 workers to make 286,770 cars.
- Between 1914 and 1916, the company's profits doubled—from $30 million to $60 million.

Ford was producing cars at a record-breaking rate. In the early days of Model T production, completing one vehicle required 12 hours. By 1914, vehicles rolled out of the Highland Park Plant at the rate of one every 93 minutes. In 1920, Ford turned out one car every minute, and one out of every two automobiles in the world was a Model T. At one point, the pace picked up to one Ford being manufactured every 24 seconds!

CONCLUSION

Henry Ford believed “Everything can always be done better than it is being done.” He applied this principle to every facet in the manufacture of the Model T. He looked constantly for improvements in product design and manufacturing. The introduction of the $5 day in 1914 was the turning point where all his ideas came together and really started to pay off in terms of productivity and corporate profits.
ASSESSMENT ACTIVITY

Check your understanding of the varied ways Henry Ford increased Model T productivity.

EXTENSION ACTIVITY

1. View the video clip “Cars” located in the Products I section of How Everyday Things are Made (8:54 minutes). Look for ways that auto production today is the same as production for the Model T. Also watch for ways that it is different. Record your responses on this worksheet. [NOTE: Be sure you start the video at the very beginning—a web page featuring a red Mustang car.]

2. Take a field trip to a local factory, office or restaurant. At the site you visit, make observations about strategies used to increase production. Prepare a report on these strategies.

3. Imagine that you have a choice today that is similar to the one faced by Detroit workers in 1914. You can be a craftsperson customizing vehicles in a small shop or a worker on an auto assembly line. What would you choose? Give three reasons for your choice. Also note at least one disadvantage.

4. A controversial element of Henry Ford’s $5 workday was the rules he imposed to govern workers’ personal lives—such as no gambling and drinking. In 2003, Weyco Inc., a medical benefits company, established a policy to encourage employees to become healthier so they could be more productive personally and professionally. The company announced it would no longer employ smokers. Four employees who refused to submit to a breath test were later fired. Debate this policy. Here are links to a few of the many news articles that can support your position.

   • The High Cost of Smoking
   • Whose Life Is It Anyway?
   • Workers fume as firms ban smoking at home

Henry Ford and the Model T: A Case Study in Productivity (Part 3)

STUDENT'S VERSION

This lesson printed from:

INTRODUCTION
Part 1  Part 2  Part 3

At the turn of the 20th Century, automakers thought the best way to maximize profit was to build a car for the rich. But Henry Ford had a different vision. He wanted to produce a car that everyday people—like the workers in his factories—could afford. With lower prices, cars would be more affordable to the general public. He also figured that if he paid his factory workers a better wage, more of his workers would be able to afford the cars they helped make. Henry Ford would make a profit by selling MORE cars.

TASK

In the activities that follow, you will see how Henry Ford's efforts to improve productivity forever changed the market for automobiles. You will analyze the impact of his innovations, applying what you learned to current events that affect the supply and demand for automobiles today. You will also test your economic understanding of what you have learned throughout this three-part lesson.

PROCESS

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* Nominal Prices

Use this chart to plot the information above.
In October 1908, the first Model T Fords were sold for $950. As Henry Ford found new ways to reduce production costs, he passed the savings on to consumers as lower prices. By 1912, the car was selling for $575. It was the first time that a new car had sold for less than the average wage of U.S. workers. The price of the Model T would continue to drop during its 19 years in production, at one point dipping as low as $280. With each price cut, more and more consumers could afford to buy the cars.

This reduction in price meant that the Ford Motor Company had smaller profit margins (on each Model T), but its revenue stayed the same. How was that possible? In 1909 the profit on a car was $220. By 1914, the margin had dropped to $99. But sales were exploding. While profit margins on individual cars were smaller, the added sales volume increased total profits. During this period, the company’s net income rose from $3 million to $25 million. Its U.S. market share rose from 9.4 percent in 1908 to a remarkable 48 percent in 1914.

The Changing Market for Automobiles

Henry Ford permanently changed the auto industry. To remain competitive, other automakers had to adopt his innovations in mass production.

![Supply Curve](image)

Graph came from another EconEdLink lesson: [Economics in the Headlines](#)

Increased productivity made it possible for automakers to increase the number of automobiles they were willing and able to sell at different prices. The supply curve in the auto market shifted right.
Up to this point, the lesson had focused primarily on mass production, but mass consumption was just as important to Henry Ford. His $5 day forced other employers in the auto industry and other industries to follow his lead to attract and keep workers. As a result, wages for many U.S. workers increased.

The increase in wages increased consumer demand for automobiles. The demand curve shifted right as more consumers were willing and able to buy cars.

Fast forward to the automobile market today. Supply and demand for motor vehicles continues to shift. Read the following newspaper headlines and decide whether each event will have an impact on the market supply or demand for cars. If there is likely to be a change, specify whether it will be an increase or decrease.

**CONCLUSION**

By the time Henry Ford halted production of the Model T in 1927, more than 15 million cars had been sold, half the world's output of automobiles. His innovations in the auto industry completely transformed life in the 20th century. Manufacturing productivity soared as other industries adopted his approach to mass production. Wage increases allowed workers to buy goods that were formerly considered luxuries. Volume selling at low prices proved to be a profitable strategy.

1. If this is the case, why is Henry Ford such an important figure in our history books?
2. How did workers benefit from the transition to mass production?
3. How did consumers benefit from mass production?
4. How did producers like Henry Ford benefit from mass production?
5. Are there any costs, or negatives, that come with mass production?

**ASSESSMENT ACTIVITY**

Test your economic understanding of what you have learned about Henry Ford and the Model T.

**EXTENSION ACTIVITY**

1. Gather news stories on events that will affect the market for automobiles. For each event, tell how supply or demand will be changed, and explain the cause of the change.

2. Do more research on the history of the automobile and its manufacture. These articles from About.com provide a good starting point:
   a. [Early Steam Powered and Electric Cars](#)
   b. [The First Gas-Powered Cars](#)
   c. [The Start of the Assembly Line](#)