How the iPhone is Made: Apple's Global Production System

In its early days, Apple usually didn't look beyond its own backyard to manufacture its devices. A few years after Apple started making its Macintosh computer back in 1983, Steve Jobs bragged that it was "a machine that was made in America." As late as the early 2000s, Apple still manufactured many of its computers at the company's iMac plant in Elk Grove, California. Jobs often said that he was as proud of the Apple's manufacturing plants as he was of the devices themselves.

By 2004, however, Apple had largely turned to foreign manufacturing. The shift to offshore production and assembly reached its peak with the iconic iPhone, which Apple first introduced in 2007. The iPhone contains hundreds of parts, an estimated 90 percent of which are manufactured abroad. Advanced semiconductors come from Germany and Taiwan, memory from Korea and Japan, display panels and circuitry from Korea and Taiwan, rare metals from Africa and Asia, and gyroscope used for tracking the iPhone's orientation comes from Switzerland. Apple's major subcontractor, the Taiwanese multinational firm, Foxconn, assembles half of all the iPhones sold in the world today at a huge factory in China. Foxconn also has factories devoted to iPhone assembly at several other locations, including Brazil and India. Another Taiwanese-based company, Pegatron, also assembles iPhones for Apple at a factory in China.

Apple still employs some 80,000 people in the United States, and it has kept important activities at home, including product design, software engineering, and marketing. Furthermore, Apple claims that its business supports another 450,000 jobs at U.S.-based suppliers. For example, the glass for the iPhone is manufactured at Corning's U.S. plants in Kentucky, Analog Devices in Massachusetts produces chips that enable the iPhone's touch display, and a Texas Instruments plant in Maine makes electronic components that go in the iPhone. However, over 1.5 million people are involved in the engineering, building, and final assembly of its products *outside* of the United States, many of them working at subcontractors like Foxconn.

When explaining its decisions to assemble the iPhone in China, Apple cites a number of factors. While it is true that labor costs are lower in China, Apple executives point out that labor costs only account for a small portion of the total value of its products and are not the main driver of location decisions. Far more important, according to Apple, is the ability of its Chinese subcontractors to respond very quickly to requests from Apple to scale production up and down. In a famous illustration of this capability, back in 2007 Steve Jobs demanded that a glass screen replaces the plastic screen on his prototype iPhone. Jobs didn't like the look and feel of plastic screens, which at the time were standard in the industry, nor did he like the way they scratched easily. This last-minute change in the design of the iPhone put Apple's market introduction date at risk. Apple had selected Corning to manufacture large panes of strengthened glass but finding a manufacturer that could cut those panes into millions of iPhone screens wasn't easy. Then, a bid arrived from a Chinese factory. When the Apple team visited the factory, they found that the plant's owners were already constructing a new wing to cut the glass and were installing equipment. "This is in case you give us the contract," the manager said. The plant also had a warehouse full of glass samples for Apple, and a team of engineers available to work with Apple. They had built

onsite dormitories so the factory could run three shifts seven days a week to meet Apple's demanding production schedule. The Chinese company got the bid.

Another critical advantage of China for Apple was that it was much easier to hire engineers there. Apple calculated that about 8,700 industrial engineers were needed to oversee and guide the 200,000 assembly-line workers involved in manufacturing the original iPhone. The company had estimated it would take as long as nine months to find that many engineers in the United States. In China, it took 15 days.

Also important is the clustering together of factories in China. Many of the factories providing components for the iPhone are located close to Foxconn's assembly plant. As one executive noted, "The entire supply chain is in China. You need a thousand rubber gaskets? That's the factory next door. You need a million screws? That factory is a block away. You need a screw made a little bit different? That will take three hours."

All this being said, there are drawbacks to outsourcing to China. Several of Apple's subcontractors have been targeted for their poor working conditions. Criticisms include low pay of line workers, long hours, mandatory overtime for little or no additional pay, and poor safety records. Some former Apple executives say there is an unresolved tension within the company: Executives want to improve working conditions within the factories of subcontractors, such as Foxconn, but that dedication falters when it conflicts with crucial supplier relationships or the fast delivery of new products. Furthermore, Apple's outsourcing decisions have been criticized by President Trump, who argues that the company is guilty of moving U.S. jobs overseas. While Apple disagrees with this assessment, it has responded by increasing its investment in U.S. facilities. In 2018, for example, the company announced it would invest $30 billion over five years to create 20,000 new Apple jobs in the United States. Most of these jobs, however, are expected to be in software development and data center operations, not manufacturing and assembly. Finally, in early 2020 a new risk associated with a globally dispersed supply chain emerged when a highly infectious novel coronavirus, COVID-19, emerged in China, forcing a temporary shutdown of many suppliers, limiting production of the iPhone in China and threatening to depress the company's global revenues and profits.

Case Discussion Questions

1. What are the benefits to Apple of outsourcing the assembly of the iPhone to foreign countries, and particularly China? What are the potential costs and risks to Apple?
2. In addition to Apple, who else benefits from Apple's decision to outsource assembly to China? Who are the potential losers here?
3. What are the potential ethical problems associated with outsourcing assembly jobs to Foxconn in China? How might Apple deal with these?
4. On balance, do you think that the kind of outsourcing undertaken by Apple is a good thing or a bad thing for the American economy? Explain your reasoning.
5. How can a company like Apple, with a global supply chain, hedge against the risks of significant supply chain disruption due to the emergence of a new virus such as the SARS virus that appeared in 2003 and the COVID-19 virus that appeared in 2020?

global companies should enforce a certain standard in their supply chain
but most of the time they dont do
company does not make bad players, but bad players bring bad reputation