

Globalization

Who Makes the Apple iPhone?

In its early days, Apple usually didn't look beyond its own backyard to manufacture its devices. A few years after Apple started to make the 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 manufacturing reached its peak with the iconic iPhone, which Apple first introduced in 2007. All iPhones contain 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, chipsets from Europe, and rare metals from Africa and Asia. Apple's major subcontractor, the Taiwanese multinational firm, Foxconn, performs final assembly in China.

Apple still employs some 43,000 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 254,000 jobs in the United States in engineering, manufacturing, and transportation. For example, the glass for the iPhone is manufactured at Corning's U.S. plants in Kentucky and New York. But an additional 700,000 people are involved in the engineering, building, and final assembly of its products *outside* of the United States, and most of them work at subcontractors like Foxconn.

When explaining its decision to assemble the iPhone in China, Apple cites a number of factors. While it is true that labor costs are much lower in China, Apple executives point out that labor costs only account for a very small proportion 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 replace 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 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 on-site dormitories, so that the factory could run three shifts seven days a week in order 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 iPhone. The company had estimated that 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 that 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. ●

Sources: Gu Huini, "Human Costs Are Built into iPad in China," *New York Times*, January 26, 2012; C. Duhigg and K. Bradsher, "How U.S. Lost Out on iPhone Work," *New York Times*, January 22, 2012; "Apple Takes Credit for Over Half a Million U.S. Jobs," *Apple Intelligence*, March 2, 2012, <http://9to5mac.com/2012/03/02/apple-takes-credit-for-514000-u-s-jobs/#more-142766>.

