

## Focus: (Not) made in China

America's tech giants are starting to move production away from the People's Republic as a new breed of robots cancel out the advantage of cheap labour  
**Simon Duke** Published: 30 December 2012



For the creator of the Raspberry Pi, there was one business decision that did not call for much soul-searching. When it came to finding a factory to build the stripped-down computer — one of 2012's most hyped gadgets — Eben Upton concluded it could not be built in Britain. Only China could offer the rock-bottom production costs needed to slash the price of the credit-card-sized machine to just £15.

That has started to change, however. The latest batch of the lo-fi device designed to get kids into computer programming have the words "Made in Britain" etched on the side. In September, production was shifted to a site operated by Sony in south Wales, where most Raspberry Pis are now assembled.

"When we were setting up, China was cheaper all round," said Upton. "Labour costs were lower and manufacturers had greater proximity to where the components are made."

With between 100,000 and 200,000 Raspberry Pi units now being shipped every month, the business has enough clout to secure a more cost-effective deal with a British-based manufacturer.

Upton is not the only technology guru looking to move his production out of China, in spite of its reputation as the workshop of the world. Apple, the world's biggest technology company, is also beating a retreat after switching production of its new iMac computers back to America for the first time in a decade. The Silicon Valley giant is also considering moving the assembly line for its Mac Mini computer back home. Google, meanwhile, is making its Nexus Q internet television player in America.

It may not yet be a stampede, but experts believe that an exodus of western firms from the world's most populous nation is under way. In years to come, far fewer of the gadgets we pull from our Christmas stockings will have been made in China.

The seismic shift has nothing to do with a desire to bolster debt-laden home economies. For the likes of Apple and Google it comes down to cold, hard cash. The harsh truth is that China is steadily losing its competitive edge.

The typical Chinese worker still earns between 10% and 20% of what his counterpart would take home in developed nations such as America and Britain. However, the gap is closing rapidly. Chinese wages have doubled over the past decade, while take-home pay in the developed world has stagnated, according to the International Labour Organisation (ILO).

"China's huge attraction to western companies hasn't worn off totally, but it is already being undermined by rising labour costs," said George Magnus, an economic adviser to UBS investment bank, in a recent research paper.

Rocketing energy prices are also forcing the hand of profit-hungry gadget makers. The crude oil price has more than trebled since 2003, making it more expensive for firms to ship finished products back from the Far East.

Advances in robotics and other innovations such as 3D printing are likely to further erode the advantages of a cheap and compliant workforce.

Right now the factories where more than 100 million Chinese workers labour to produce digital cameras, laptops and millions of other gadgets are in the ascendant. However, the technological tide could soon be potent enough to swing the balance of power back towards America and Europe.

"THIS is a machine that's made in America," bragged Steve Jobs, Apple's co-founder, nearly 30 years ago. It was a boast he repeated again and again as the technology pioneer toured his homeland in 1984 to promote the Macintosh, one of the world's first mass-market personal computers.

*Chinese labour accounts for just 2% of the cost of an iPad, according to studies into Apple's supply chain* Apple had just opened a \$20m plant in Fremont, California to manufacture the machines. Jobs, ever the sharp salesman, wasted no opportunity to wrap himself in the Stars and Stripes. By 2004, 20 years after that fanfare launch, Apple had joined the rush of electronics firms in fleeing to Asia. Most took their manufacturing operations to China which, after spending decades in purdah, had opened up to foreign investment under the reformist regime of Deng Xiaoping.

It lured in overseas firms by offering generous grants, a cheap and plentiful labour force and light-touch regulation. Crucially, Beijing kept its currency weak so it remained attractive to foreign firms.

The policies have been a huge success. In 2010, China leapfrogged America as the world's biggest manufacturing economy with nearly one-fifth of global production, according to a report by Deloitte. At the same time its annual economic output overtook Germany's, making China the second-biggest economy on the planet.

Bearing the standard for the Chinese industrial revolution is Foxconn, a Taiwanese electronics manufacturer and mainland China's largest private sector employer. In a vast plant outside Shenzhen, an industrial metropolis just north of Hong Kong, Foxconn assembles millions of gadgets a week, from iPads, iPhones and MP3 players to the Wii U and PlayStation 3 games consoles.

Known as Foxconn City and iPod City, the enormous facility employs an estimated 230,000 workers, many of whom put in a 12-hour day at the plant for a daily salary of less than \$20 (about £12.50). Nearly a third of staff live in crowded dormitories at the factory, which is run with ruthless military precision. Catering staff are said to slaughter about 3,000 pigs each day to feed employees.

It is clear that working conditions are of a standard that would barely have been tolerated in 19th-century Britain. In early 2010, nine Foxconn workers committed suicide at the Shenzhen site, forcing the company to drape nets around the base of every building on the campus to break the fall of any other desperate employees.

Such Victorian practices have not deterred overseas electronics firms from flocking to Foxconn and its competitors. Thanks to the hunger for ever quicker and sleeker phones, tens of millions of jobs have been created in China, which in turn has driven both an economic boom and a population flight from the countryside to the big cities.

Yet private enterprises in China get to keep a surprisingly small share of the spoils.

The typical smartphone or tablet computer contains hundreds of parts, about 90% of which are sourced from outside China. In the case of the iPhone, advanced semiconductors based on designs from British firms such as ARM and Imagination Technologies are shipped in from Germany and Taiwan. Memory chips are imported from Korea and Japan and touchscreen and display panels and circuit boards are flown in from Korea and Taiwan, along with rare metals from Africa and Asia. Workers in China merely weave together these components from a blueprint dreamt up in Silicon Valley.

As a result, Chinese labour accounts for just 2% of the cost of an iPad, according to studies into Apple's supply chain (see illustration below). The bulk of the profits accrue to the masterminds in California.

But this sliver of the massive iPhone pie is now under threat.



Even after factoring in transport costs, it is at the moment still cheaper for electronics firms to base production in China because of the rock-bottom wages offered by Foxconn and its kind. But, thanks to rampant wage inflation of between 15% and 20% a year, the comparative advantage is slowly fading away.

After adjusting for America's superior productivity rate, wages in Shanghai will be just 40% below US levels within a few years, according to the Boston Consulting Group.

Further pressures lie in wait from China's one-child policy. Designed to prevent a population explosion, its malign effects will see the labour force begin to shrink by 2015, increasing "demand, competition and pay for workers", according to the ILO.

A GREATER long-term threat for China will come from the unrelenting march of technology, which is also likely to undermine its advantages. Humans are becoming increasingly obsolete in the manufacturing process. In future, machines will be able to stitch together the hundreds of minuscule parts that make up a modern gadget — a task that today can only be performed by a nimble-fingered worker.

On top of that, machines don't recognise wage inflation or make uncomfortable demands on their controllers, such as demanding improved working conditions.

A raft of innovations is already revolutionising the process of manufacturing electronic goods, making it a far less labour-intensive business than it used to be. Robots, once the stuff of science fiction, are becoming more sophisticated thanks to exponential growth in computing power.

They can already perform myriad human tasks, from chopping noodles and milking cows to driving trains and flying aeroplanes, and are becoming an ever more integral part of the production of electronic goods.

"You have some human involvement upfront in loading the components and taking them out of the machines and packaging them for shipment. Otherwise the process is completely automated," said Upton of Raspberry Pi.

Technology such as 3D printers, which produce plastic and metal goods directly from computer designs, are hastening the mechanisation of manufacturing.

Over the past century, manufacturers have shunted the production of finished goods around the world, often thousands of miles away from consumers, in a remorseless drive to slash overheads.

All the while, China and other developing nations transformed themselves into hubs of manufacturing activity serving consumers in the developed world. But globalisation, as we currently understand it, could be stopped dead in its tracks by this robotic revolution. As the march of the machines gathers force, the attraction of cheap labour will wither away.

Without sophisticated robots it would be impossible, for instance, for the Tesla Model S, the world's most advanced electric car, to be built in a factory in Silicon Valley.

Foxconn admitted as much earlier this year when it unveiled plans to install one million robots within three years to replace some of its Chinese workers.

But even that might not be enough for Beijing to regain its advantage. In an era when machines make the bulk of our everyday devices, China is less likely to be seen by the likes of Apple as the workplace of the world.

#### Clash of the digital giants

The fight for supremacy in the technology industry is set to intensify in 2013 as the four big beasts of the sector plot further raids into one another's territory.

Apple, Google, Amazon and Facebook have been butting up against each other for many years, but the maker of the iPhone and iPad is facing the biggest threat yet to its hugely lucrative business model.

The seemingly insatiable demand for its sleek devices helped Apple to earn a £500m a week profit last year. However, the shares are down more than a third from their record in September because of fears that the company will struggle to stay ahead of the pack.

Google's Android operating system has grabbed a commanding 75% share of the smartphone market. Google is also carving out a niche in the tablet computer arena, where the iPad has until now reigned supreme.

Amazon's Kindle Fire tablet is also winning a loyal following and the online retailing colossus is said to be planning to launch its own smartphone in 2013.

Google's main moneyspinner, its dominant position in internet search, is set to come under increased attack. Facebook is looking to harness the power of its 1bn-strong user base and is expected to set up its own search service, based on members' recommendations.

Apple, meanwhile, continues to pour cash into its voice-activated “intelligent personal assistant”, called Siri, which provides location-based information for iPhone and iPad users on the move.

Amazon’s pre-eminent position in internet retailing is also under threat with Google planning alliances with a raft of big retailers.

### **Best Comment:**

Mr John Broom:

Yes , but the most important point is contained in the almost throw-away mention of Foxconn planning to install One Million robots into their production processes! So not just a couple of dozen then.

China is moving from the phase of people-intensive production into the next phase, of automation. And they'll do it faster, bigger, and better than anyone else . As someone who has worked with Chinese factories, I have total confidence in their ability to accomplish this change.

Watch this space!