

A REPORT OF THE CSIS HILLS
PROGRAM IN GOVERNANCE

China's Competitiveness

Myth, Reality, and Lessons for the United States and Japan

CASE STUDY: *Huawei*

February 2013

Author

Nathaniel Ahrens



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Center for Strategic and International Studies
1800 K Street, NW, Washington, DC 20006
Tel: (202) 887-0200
Fax: (202) 775-3199
Web: www.csis.org



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CASE STUDY: HUAWEI

By Nathaniel Ahrens

Introduction

The growth of the Chinese economy, particularly in the last 20 years, has been staggering. Until recently, most of this growth had come from producing labor-intensive, low-value-added goods. Today, however, Chinese competitiveness is no longer confined to lower-end production. In fact, Chinese policymakers are laser focused on helping Chinese firms move up the industrial value chain. Moreover, policymakers have made explicit the goal of assisting the international expansion of Chinese firms in a desire to “go global” and have made efforts to build internationally recognizable brands commensurate with China’s growing global clout. These policy goals have at times struck decidedly nationalistic and protectionist tones, raising concerns globally in both corporate and government sectors. Government encouragement of international expansion is also driven by the desire to reduce China’s foreign exchange reserves, which have become a subject of heated domestic and international criticism.

Now, a number of Chinese companies have emerged to challenge traditionally dominant international firms. This overall study looks at the cases of five such firms, examining the factors that led to their rise, their current state of competitiveness in relation to their international peers, and the policy implications. It is not meant to be an academic discussion of the nature of competitiveness, nor an investment analysis with latest-quarter data—all of these companies are growing rapidly and present moving targets. We take a relatively straightforward approach to what it means to be competitive, looking at traditional metrics of corporate performance such as sales growth, profitability, and market share trends and comparisons over the last few years. We acknowledge that individual companies may determine competitive success differently and over varying periods of time; some are more market driven and concerned with quarterly results, while others may be less concerned with the short-term traditional indicators of success.

Market involvement by the Chinese government may also result in misleading competitiveness indicators. Firms may be more concerned with initial market share gain than with near-term profitability. While this is not an atypical strategy for new market entrants, government policies can play an outsized role in encouraging this type of strategy when viewed as part of the competitive landscape. Since long-term success is a flexible concept that is difficult to measure, we are focusing on the current competitiveness of these firms. But in doing so we are also investigating the factors that led to the rise of these companies and the likely sustainability of these competitive advantages. We also examine the influence of government

policies on competitiveness and their longer-term implications. Finally, we look at the relationships these companies have with the United States and Japan to give an indication of the interconnected nature of their operations and history.

About Huawei

Huawei, with offices in 140 countries, is the second-largest telecommunications equipment company in the world by revenue, and is poised to become the largest. Founded in 1988 as a distributor for phone switches, Huawei is now a comprehensive telecommunications company with network equipment, mobile broadband devices, handsets, and convergence devices. In addition to developing products, the company has moved into offering customer solutions. Its founder and current president is Ren Zhengfei, a former member of the People's Liberation Army (PLA) engineering corps who was able to parlay the skills he acquired in the military into laying the groundwork for this successful telecommunications company. Huawei is a private enterprise, ostensibly owned by employees, with Ren directly owning a 1.42 percent stake in the company.¹

Huawei's Rise

At the commencement of China's opening up and reform, the country's telecommunications infrastructure was exceptionally weak. Recognizing this, the government adopted a three-pronged strategy of importing foreign equipment, encouraging joint venture (JV) equipment manufacturing, and promoting indigenous research and development (R&D).² One of the key initial product foci was stored program-controlled switches (SPC switches). In 1988 there was a flurry of activity by a few core Chinese research groups, including the Chinese military, to develop these switches. It was in this environment in 1988 that Ren Zhengfei and several of his colleagues founded Huawei.

Ren had been working in the engineering corps of the PLA, rising to the level of deputy director, but left in 1983 after the corps was disbanded.³ Ren, 39 years old, moved to Shenzhen South Sea Oil Corporation, a state-owned enterprise (SOE). At the end of 1987, as the push for telecommunications switch technology became more of a priority, Ren left to start Huawei Technologies.

¹ See later discussion on shareholdings.

² Aleya Smith-Gillespie, "Building China's High-Tech Telecom Equipment Industry: A Study of Strategic Technology Acquisition for Competitive Advantage," M.S. thesis, Massachusetts Institute of Technology, 2001, 45.

³ An earlier version of this case study placed Ren at the Information Engineering Academy of the PLA's General Staff Department. The accuracy of this is now in doubt, and seems to have originated from a report from 2000 that was used as a source for a large number of subsequent press, think tank, and government publications. There are also a variety of accounts of when Ren left the engineering corps, but currently the most dependable version has him leaving in 1983.

Accounts vary on initial investment, ranging from RMB 21,000 to 24,000 in registered capital, and there was even an account of an initial loan from a state-owned bank of \$8.5 million.⁴ Huawei denies the existence of the loan, but the exact circumstances of the initial funding remain a bit unclear.

At the time of Huawei's founding, China "relied on 100 percent of its acquisition of telecom equipment through imports,"⁵ and most major international telecommunications companies (Alcatel, Ericsson, Motorola, Nokia, and Nortel) already had a presence in the country. With this mind, Ren's vision was to create a domestic competitor to the international telecommunications equipment companies. In its first few years of operations, Huawei focused on reselling public branch exchange switches and fire alarms imported from Hong Kong, initially from a company named Kangli.⁶ By 1990, Huawei had begun to develop its own simple switches. They were not the only ones to do so; there were at least 200 other domestic firms with the same strategy.⁷ At this point, according to a researcher, Feilei Pan, "to survive and distinguish itself from other domestic manufacturers, Huawei was determined to develop a large-scale switch system—a much more complicated technology, which no MNE [multinational enterprise] was willing to transfer to Chinese firms."⁸

The most significant strategic decision that Huawei made at this time was to develop its own technology in house, as opposed to taking the international joint-venture (IJV) route that was chosen by so many of its competitors. This is a rare case that flew in the face of conventional strategy. Most companies, like Shanghai Bell, the leading company at the time, focused on the traditional IJV structure to import and absorb as much of the foreign technology as possible. Ren believed that foreign companies were unlikely to transfer their cutting-edge technology, and that Huawei would be better served by performing its own R&D. Ren saw these IJVs as unwisely handing an advantage to the larger international partners.

⁴ Bruce Gilley, "Huawei's Fixed Line to Beijing," *Far Eastern Economic Review*, December 28, 2000, 94–98, at 95 for the source that reports the existence of an \$8.5 million loan. This is a sole source, so should be viewed cautiously. Typical reports quote the registered capital at either RMB 21,000 or RMB 24,000. In China, however, registered capital is more of a legal placeholder than an indication of a firm's true investment. It is unclear what the source and exact amount if this initial investment was. While the initial investment has little bearing on the current competitiveness of the company, it would be helpful in understanding the early development and decisionmaking of the company. Such a large initial investment seems unlikely given the scale and scope of Huawei's business at the time, yet there was clearly additional investment needed for scaling the initial R&D team.

⁵ Peilei Fan, "Catching Up through Developing Innovation Capacity: Evidence from China's Telecom-Equipment Industry," *Technovation* 26 (2006): 359–68, at 361.

⁶ "[1987]华为之兴：如何离冬天远些" ([1987] The Flourishing of Huawei: How they moved somewhat out of winter), *Diyi Caijing* via People.com.cn, October 10, 2007, <http://mnc.people.com.cn/GB/54849/69894/104887/6361336.html>.

⁷ Peilei Fan, "Innovation, Globalization, and Catch-Up of Latecomers: Cases of Chinese Telecom Firms," *Environment and Planning A* 43 (2011): 830–49, at 835.

⁸ *Ibid.*

Thus, with a very low technological base and little outside technology, Huawei emphasized R&D from the start, initially reengineering relatively simple switches and then developing the more complex large-scale switch. The company had a high R&D/employee ratio at this time, with 500 R&D staff to only 200 production staff. Ren summarized the goals and orientation of his company in 1990 as “to develop national industry, keep pace with advanced technology, develop based on its own research; the goal is to capture the China market, open overseas markets, and compete with foreign counterparts.”⁹

According to some sources, Huawei had a difficult time raising capital due to the fact that it was not an SOE and thus had to borrow at high rates. According to Harwit, “as a private company, Huawei also faced the formidable task of raising capital. Unlike SOEs, which could rely on loans from the government-owned banking system, private companies in the early 1990s had few sources of funds. Huawei was forced to borrow from other large enterprises at interest rates as high as 20–30 percent. But Ren and his cohorts invested wisely, spending as much as 100 million yuan (then about \$20 million) on research and development.”¹⁰

Gaining a Foothold in the China Market, Expanding Product Focus

In 1993, Huawei released its first major product developed in house: the C&C08 program-controlled switch, a large-scale switch that they had begun developing in 1991. It had the capacity to switch 10,000 circuits, an unheard-of capacity in China, making it a clear leader among Chinese companies.¹¹ The product was deployed across China, and despite the lack of details on sales at this time, the *Far Eastern Economic Review* reported that at this time Huawei received a key contract to supply the PLA’s first national telecommunications network. The *Far Eastern Economic Review* quotes a Huawei employee as explaining that “[the contract] is small in terms of our overall business, but large in terms of our relationships.”¹² The proceeds from this project enabled Huawei to scale up R&D on newer areas, like optical network transmission systems and, later, mobile communications systems.

Huawei’s sales focus was also evolving. At this time, foreign telecommunications firms had already penetrated the market for large corporations in China and the more economically advanced major cities. They had neglected rural areas, where conditions were poor and profit margins were thin, and here Huawei saw an opportunity. Ren followed Mao Zedong’s strategy of surrounding the city with the

⁹ Qie Yongzhong and Li Xia, “华为出海” (Huawei goes out to sea), 《经济导刊》, *Economic Herald*, May 2004.

¹⁰ Eric Harwit, “Building China’s Telecommunications Network: Industrial Policy and the Role of Chinese State-Owned, Foreign and Private Domestic Enterprises,” *China Quarterly*, June 2007, 311–32, at 326.

¹¹ Juan Pablo Conti, “Profile Huawei: From China with Love,” *Communications Engineer*, August 2007, 26–31, at 27.

¹² Gilley, “Huawei’s Fixed Line,” 95.

countryside.¹³ In 1992, for example, Ericsson only had three or four employees who worked on telecommunications networking systems in Heilongjiang Province. By contrast, Huawei had over 200 people who not only focused on servicing the province's telecommunications market but also lived and worked in the counties, towns, and small cities across the province.¹⁴ This was not just a sales strategy but also a product one. Significant levels of customization were necessary to deal with issues that one only encountered in the rural areas, such as variable power supplies and rats.¹⁵ Some of the sales methods were unorthodox, bordering on corrupt. Huawei established JVs or other forms of partnerships with local bureaus of posts and telecommunications in order to encourage the purchase of Huawei equipment and funnel some of the profits back to managers via "dividends."¹⁶ According to Cheng Li of the Brookings Institution, "this business practice by Huawei, though controversial, was not banned. Due to their shared business interest, these local governmental institutions helped promote the sale and maintenance of telecom equipment made by Huawei."¹⁷ These local companies eventually became simple corporate branches, as shares were bought back from some local partners.¹⁸

In 1995 Huawei established research centers in Shanghai and Beijing to focus on data communication (routers) and mobile communications equipment.¹⁹ For the routers, they reverse engineered the basic parts from disassembled foreign equipment.²⁰ They also began research in India, where they learned from the likes of Infosys about critical knowledge for software development, both in general and as it related to routers.²¹ For some of the microchips and related key components, Huawei purchased products from Motorola.²²

By the mid-1990s, Chinese leadership had taken notice of Huawei. Government support, although largely absent at the founding, played a role in the company's early survival. In 1994 Ren met Jiang Zemin, then the Chinese president and secretary general of the Communist Party. Ren claimed to have said "that switching equipment technology was related to international security, and that a nation that did not have

¹³"华为总裁任正非：企业家中的学毛标兵" (Huawei CEO Ren Zhengfei: Entrepreneurs Study Mao Model), *Fenghuang Wang* (Phoenix News Network), December 27, 2010, http://tech.ifeng.com/telecom/special/huaweifeichangdao/detail_2010_10/27/2918621_1.shtml.

¹⁴ Cheng Li, "China's Telecom Industry on the Move: Domestic Competition, Global Ambition, and Leadership Transition." *China Leadership Monitor*, no. 19 (2006): 7.

¹⁵ Nick Mackie, "Innovation in China: Huawei—the Secretive Tech Giant," BBC News, July 25, 2011, <http://www.bbc.co.uk/news/business-14238345>.

¹⁶ Harwit, "Building China's Telecommunications Network," 128–29. Sichuan Huawei returned 60–70 percent of the investment back to the local partners.

¹⁷ Li, "China's Telecom Industry," 7.

¹⁸ Harwit, "Building China's Telecommunications Network," 129.

¹⁹ Fan, "Innovation, Globalization, and Catch-Up of Latecomers," 835.

²⁰ Smith-Gillespie, "Building China's High-Tech Telecom Equipment Industry," 85.

²¹ *Ibid.*, 84.

²² *Ibid.*

its own switching equipment was like one that lacked its own military. Secretary Jiang replied: Well said.”²³

In 1996, the Chinese government began explicitly supporting domestic Chinese telecommunications firms, ending special import policies for telecoms equipment, and both the government and military began touting Huawei as one of their national champions.²⁴ Also in 1996, both Liu Haiqing, the vice chairman of the Central Military Commission, and Wu Bangguo, the vice premier, made high-profile visits to the Shenzhen headquarters.²⁵ Huawei was making great strides in terms of product development and sales. Sales were no longer just relegated to the countryside, and according to the *Far Eastern Economic Review*, Huawei won large contracts with the national railway system, the state body in charge of infrastructure development in the Yellow River Valley, and in major cities such as Beijing and Guangdong.²⁶ Again according to the *Far Eastern Economic Review*, “that helped unlock more finance. In 1998, for example, the Beijing headquarters of China Construction Bank lent the company 3.9 billion renminbi [RMB] in buyer’s credit—representing 45 percent of the total credit it extended that year.”²⁷ Anecdotal reports also suggest that the government made these loans in order to cover for government-affiliated institutions that were not paying Huawei for its services. Whether this money was ever repaid is unclear; it may have essentially been a government transfer, adding to worries about present-day government leverage.

Although it is impossible to know the extent or exact nature of state support, by the company’s own admission, Huawei’s relationship with the government was crucial for a fledgling company playing catch-up against established competitors. In Ren’s words, “Huawei was somewhat naive to choose telecommunications equipment as its business domain in the beginning. Huawei was not prepared for such an intensified competition when the company was just established. The rivals were internationally renowned companies with assets valued at the tens of billions of dollars. If there had been no government policy to protect [nationally owned companies], Huawei would no longer exist.”²⁸

By 1996, Huawei had 20 percent of the Chinese switch market, second only to Shanghai Bell.²⁹ Domestic China revenues that year for Huawei were RMB 2.6 billion.³⁰ A couple of years later, Huawei was able to overtake Shanghai Bell through an aggressive campaign of undercutting prices (even offering product for free) combined with the Chinese government’s buy local campaign.³¹ Huawei continued to use the

²³ Harwit, “Building China’s Telecommunications Network,” 128.

²⁴ Gilley, “Huawei’s Fixed Line,” 95.

²⁵ Ibid.

²⁶ Ibid.

²⁷ Ibid.

²⁸ Fan, “Catching Up through Developing Innovation Capacity,” 364.

²⁹ Harwit, “Building China’s Telecommunications Network,” 128.

³⁰ Qie and Li, “华为出海.”

³¹ Ibid.

proceeds from its switch and optical businesses to fund its mobile business R&D. As GSM networks started to receive major investment in the middle to late 1990s, Huawei was well positioned with its own technology. Moreover, it was able to provide customized solutions for value-added products that worked seamlessly with existing networks. They were especially strong in short message centers, gateways, and GPRS technology. Huawei's mobile intelligent network equipment dominated the market.³²

First Internationalization Push—Other Developing Markets

While business was booming in China, competition in advanced technologies from international competitors was still fierce, and Huawei looked abroad for continued growth. Ren said:

We should not wait to expand abroad until everything is ready. Instead we will get familiar with the markets, and then conquer them in the process of learning from our international competitors. When domestic markets will eventually get saturated, Huawei will die unless we can build an international team in three to five years. Of course, we must realize that we have no competitive advantage, and that we can only gain the market through advanced technology, reliable quality, and superb service.³³

Ren likened Huawei's situation to that of a mountain goat, needing to run faster and climb higher than a lion so as to avoid being eaten.³⁴ Ren would later change his tune to say that Huawei needed to be a wolf, a metaphor he used for years. In some ways this international push was a modified version of "using the countryside to surround the cities," except in this case it was developing countries instead of the countryside, and developed markets instead of the cities. Huawei, while technically quite capable, still faced the stigma of poor quality Chinese products, and needed to offer prices that were significantly lower than their competitors. For those countries that were looking for affordable technologies, Huawei was an eager partner. This push for internationalization led to growth such that by 2004 their international revenues were higher than their domestic revenues.³⁵

Huawei's first international customer was Hutchison Telecommunications (owned by Li Ka-shing) in Hong Kong in 1996, which purchased switches and related equipment for its fixed-line network. Hong Kong was a well-developed telecom market, yet was close to Shenzhen, providing Huawei with an excellent first test case. Then, the following year, Huawei formed a JV in Russia with the Beto Corporation to produce switching equipment, essentially assembling Huawei switches in Russia.³⁶ Huawei was able to

³² Fan, "Catching Up through Developing Innovation Capacity," 364.

³³ Yadong Luo et al., "Entrepreneurial Pioneer of International Venturing: The Case of Huawei," *Organization Dynamics* 40 (2011): 69.

³⁴ Qie and Li, "华为出海."

³⁵ Conti, "Profile Huawei," 24.

³⁶ Harwit, "Building China's Telecommunications Network," 128.

undercut international prices by around 12 percent, but its after-sales service was what really impressed the Russians. Its first sale amounted to only \$12, but by 2001 its sales had reached \$100 million.³⁷

Soon after entering Russia, Huawei made sales in Thailand, Brazil, and South Africa. Its pricing became more aggressive, often undercutting rivals by 30 percent.³⁸ With its status as a national champion, Huawei was able to follow the government's lead in developing countries. According to Ren:

Our government has a successful diplomatic policy which mandates winning a lot of international friends. Huawei's international marketing strategy is to follow China's diplomatic route, and I believe this strategy will be successful as well.³⁹

In November 2000 China's vice premier, Wu Bangguo, traveled together with Ren Zhengfei during a trip to Africa, laying the foundation for future business deals, including a \$20 million contract in Ethiopia in 2003,⁴⁰ and a \$200 million CDMA project in Nigeria in 2005.⁴¹ Ghana, Mauritius, Morocco, Congo, and Kenya followed in 2006, along with another large Nigerian contract.⁴²

Second Internationalization Push—Advanced Markets

Following successes in Russia and a number of developing markets, Huawei started to turn its attention to developed markets. In 2001 Huawei made its first major sales in Europe, to the Netherlands and Germany. The wireless station product sold to the Dutch enabled multiple communications standards to be run, and upgrades were done by software rather than hardware.⁴³ The product was a good example of “cost innovation,” in that it provided advanced features at low cost, while saving the carrier money on hardware.⁴⁴ The Germans purchased optical network (SDH) products. Soon after, Huawei made a sale to Neuf, the French operator, not only offering rock-bottom pricing but also actually building part of it free

³⁷ Qie and Li, “华为出海.”

³⁸ Ali Farhoomand and Phoebe Ho, “Huawei: Cisco's Chinese Challenger,” University of Hong Kong Case HKU599 (available through Harvard Business School), 2006, 9.

³⁹ Luo et al., “Entrepreneurial Pioneer,” 69.

⁴⁰ Qie and Li, “华为出海.”

⁴¹ Kaiser Kuo, “China Pursues Africa Deals,” *Red Herring*, December 11, 2006, <https://www.siemens.be/cmc/newsletters/index.aspx?id=13-621-17892>.

⁴² Ibid.

⁴³ John Pomfret, “History of Telecom Company Illustrates Lack of Strategic Trust between U.S., China,” *Washington Post*, October 8, 2010, http://www.washingtonpost.com/wp-dyn/content/article/2010/10/07/AR2010100707210.html?wprss=rss_business.

⁴⁴ See Ming Zeng and Peter Williamson, *Dragons at Your Door* (Boston: Harvard Business School Press), 2007

of charge and allowing the operator to run it for three months to test it before purchase.⁴⁵ A subsequent sale to the United Arab Emirates made that country the first Arab state with 3G.⁴⁶

In 2004, Huawei made sales to a Danish company (in Portugal) and then made a major sale to the Netherlands for building out the 3G network. In 2005, British Telecom (BT) included Huawei as a preferred supplier for its massive next-generation network. Some analysts believe that this was a crucial factor in raising Huawei's international profile, because soon after it signed a global supplier agreement with Vodafone.⁴⁷ According to Farhoomand, in 2004 Huawei was involved in 14 out of the 19 3G network build-outs globally.⁴⁸

On Valentine's Day in 2001, Huawei entered the U.S. market, setting up an office in Plano, Texas. Three years later, Huawei was still without a single American customer.⁴⁹ Huawei has since had success, however, and its Plano office is now its U.S. headquarters, overseeing its 12 other offices and 7 R&D centers. In the United States it has 1,100 employees, of whom 900 or so are Americans.⁵⁰ It has yet to get a tier one customer, but in middle markets it is gaining traction. Its North American sales were \$765 million in 2010, with customers including Leap (equipment and devices), Best Buy, and, purportedly, Level3 Communications.⁵¹

Meanwhile, Huawei was also entering the emerging Internet data communications market. The giant in this area had been Cisco Systems, with 80 percent of the Chinese router market.⁵² Three years later, Huawei had chipped away at Cisco's share, and had captured 12 percent to Cisco's 69 percent. While lower prices certainly helped, Cisco claimed that Huawei had stolen its software (as well as user interface and manuals), and parts of Cisco's code were found in Huawei's products.⁵³ By the time Huawei settled with Cisco, Huawei had about a third of the market.⁵⁴

By 2002 Huawei had also overtaken Shanghai Bell, the dominant China-based IJV at the time. In 2004 Huawei amped up its second major international push, with extensive credit backing from the China Development Bank (CDB), which provided a credit line of \$10 billion, and the Export-Import Bank of

⁴⁵ Farhoomand and Ho, "Huawei," 9.

⁴⁶ Ibid.

⁴⁷ Conti, "Profile Huawei," 29.

⁴⁸ Farhoomand and Ho, "Huawei," 10.

⁴⁹ Sheridan Prasso, "What Makes China's Telecom Huawei So Scary," *Fortune*, July 28, 2011, <http://tech.fortune.cnn.com/2011/07/28/what-makes-china-telecom-huawei-so-scary/>. Much of this section is based on this article.

⁵⁰ Ibid.

⁵¹ Ibid.

⁵² Much of this is taken from Harwit, "Building China's Telecommunications Network," 132.

⁵³ Farhoomand and Ho, "Huawei," 10.

⁵⁴ Ibid.

China, which provided an additional \$600 million. With this robust backing, Huawei started to make a major global push. It slashed prices well below that of its competitors, purportedly sometimes by as much as 70 percent, and provided vendor-financed loans to the customers. Sales in the first half of 2005 skyrocketed to more than \$4 billion, an 85 percent increase on the previous year. More than 50 percent of this value came from abroad.⁵⁵ Sales growth in 2007 was over 50 percent, and in 2008, when most suppliers saw negative sales growth, Huawei's sales still grew over 40 percent. In 2011, Huawei and Ericsson recorded approximate net revenues of \$32.9 billion and \$32.4 billion, respectively. By July 2012, Huawei's sales had bested those of Ericsson by \$500 million (based on half-year sales). It is likely that Huawei will take over top spot by the end of the fiscal year.

Huawei currently has around 110,000 employees worldwide, with 30 percent or so in Shenzhen. Approximately two-thirds of its revenues come from international markets, and, according to Huawei, it works with 45 of the 50 largest carriers globally. Huawei has also filed over 49,000 patents, as its focus on R&D continues. It has also played a leading role in standards development, both in China and abroad. It is the leading contributor to LTE core specifications, and it holds 83 positions in various standards bodies.⁵⁶ According to Huawei's Web site, it participates in 3GPP, APT(Asia-Pacific Telecommunity), ARIB (Association of Radio Industries and Businesses), ETSI (European Telecommunication Standards Institute), IEEE (Institute of Electrical and Electronics Engineers), IETF (Internet Engineering Task Force), ITU (International Telecommunication Union), TIA (Telecommunication Industry Association), and WWRF (Wireless World Research Forum).⁵⁷ Aside from allegations of intellectual property impropriety, Huawei has undoubtedly become a technology leader.

It is important to keep in mind that the Chinese government's support for Huawei was not just an effort to bolster a single company, but rather part of a drive to develop an entire robust and self-sustaining indigenous telecommunications industry.⁵⁸ Alongside Huawei, several telecommunications companies were fostered by the Chinese government to build the country's domestic telecommunications capacity—most noticeably, Julong (Great Dragon) and the Zhongxing Telecommunications Equipment Group (ZTE). Although both are officially SOEs, Great Dragon and ZTE have had very different paths. The key distinction here is that ZTE's "state-owned, privately managed" (*guoyou siying*) approach gave that company an edge over the slow-moving and strategically misguided Great Dragon, which implemented a centralized management structure traditionally associated with Chinese SOEs. Today, ZTE is a global

⁵⁵ "The Huawei Way," *Newsweek*, January 15, 2006, <http://www.thedailybeast.com/newsweek/2006/01/15/the-huawei-way.html>.

⁵⁶ "Huawei Is the Leading Contributor to LTE Standards," Huawei press release, November 29, 2011, <http://www.huawei.com/en/about-huawei/newsroom/press-release/hw-104732-huaweiltestandards.htm>.

⁵⁷ *Ibid.*

⁵⁸ This paragraph draws on the case studies of Great Dragon and ZTE given by Harwit, "Building China's Telecommunications Network," 322–28.

player with a capacity for innovation and regarded as a success, whereas Great Dragon remains largely a domestic player and has a small market share, even at home. Indeed, the successful choices of Huawei and ZTE largely mirror each other. Besides the obvious parallel in receiving extensive state support, both companies focused heavily on rural areas in their early days, aggressively competed on price against established foreign rivals, and have expanded internationally, especially in emerging markets. One significant way in which these two companies differ is how they raised capital for their rapid expansions in the late 1990s and early 2000s. ZTE was listed on the stock market in Shenzhen in 1997, whereas Huawei drew on directed lending. The irony that the SOE turned to equity markets while the private company relied on state funds indicates the blurred lines between the public and private sectors in China's creation of industries considered to be strategic. At any rate, despite their continued ties to the state, the Chinese government appears to have had a relatively hands-off attitude with regard to management, which is considered a key part of their successes.

Shareholder Composition

Officially, Huawei is an employee-owned company, a fact the company emphasizes to distance itself from allegations of government control. What "employee-owned" means in practice at Huawei, however, is quite complex—so much so that according to the Chinese media company Caixin, "even longtime employees admit the [employee shareholding] system is nearly impossible to understand."⁵⁹

Ren retains a direct 1.42 percent share of the company. The remainder of the shares is held by "a trade union committee tied to the affiliate Shenzhen Huawei Investment Holding Co."⁶⁰ This body represents Huawei's employee shareholders. About 64 percent of Huawei staff participate in this scheme (approximately 61,000 Chinese employees; the 50,000-plus foreign employees are not eligible⁶¹), and hold what the company calls "virtual restricted shares." These shares are nontradable and are allocated to reward performance.⁶² When employees leave Huawei, their shares revert back to the company, which compensates them for their holding.⁶³ Although employee shareholders receive dividends, it is reported that they have no information on their holding.⁶⁴ Unlike conventional shareholding structures, the virtual

⁵⁹ Hejuan Zhao, "Why Huawei Doesn't Get Its Way," *Caixin Online*, August 11, 2010, <http://english.caixin.com/2010-08-11/100169742.html>.

⁶⁰ Hujuan Zhao, "Staff Churns Stirs Huawei Management Circle," *Caixin Online*, February 2, 2010, <http://english.caixin.com/2010-11-02/100194766.html>.

⁶¹ Claude Barfield, "Telecoms and the Huawei Conundrum," American Enterprise Institute, November 2011, 5, <http://www.aei.org/article/telecoms-and-the-huawei-conundrum/>.

⁶² Mackie, "Innovation in China."

⁶³ Juha Saarinen, "Analysis: Who Really Owns Huawei?" *IT News*, May 28, 2010, <http://www.itnews.com.au/Tools/Print.aspx?CIID=175946>.

⁶⁴ Zhao, "Staff Churns Stirs Huawei Management Circle."

restricted shares do not give their holders an effective voice in management decisions, which are largely controlled by Ren.⁶⁵

Current Strategy

Since 2010, Huawei has followed what it calls an “ABC” strategy of “growing average revenue per user (ARPU), increasing bandwidth and reducing cost.”⁶⁶ One way Huawei is working toward its ARPU goals is by expanding from a product-driven company to an end-to-end service company, a salient strategic shift that will be the focus of much of the company’s energy over the next several years. This means that Huawei now looks to provide operation and maintenance to its customers in addition to hardware and software. Huawei is keenly aware of emerging technology trends like device computing, cloud computing, video, and information and communication technology convergence, all of which consume bandwidth at a high rate. As a result, Huawei is expanding broadband to accommodate these technologies. To cut costs, one Huawei executive claims that the company intends “to reduce product prices further by cutting profit margins.”⁶⁷

Huawei is updating its strategy in terms of its product focus as well. Historically, the bulk of the company’s sales came from its carrier networks business, which provided products and services to telecommunications operators.⁶⁸ In a trend particularly noticeable since 2011, the company has been increasing strategic emphasis on its enterprise and consumer business groups, bringing them closer to parity with its central business of carrier networks. This emphasis is a natural decision for the company since Huawei has seen rapid sales growth in its enterprise and consumer businesses, whereas the environment for carrier networks is uncertain.⁶⁹

Huawei announced in its 2011 *Annual Report* that it had instituted a rotating CEO system whereby its four deputy chairmen of the Board—Guo Ping, Xu “Eric” Zhijun, Hu “Ken” Houkun, and Ren himself—

⁶⁵ Ibid. Note: According to a Huawei spokesperson, employees do have knowledge of their shareholdings. Huawei explains that employee shareholders are entitled both to elect and be elected as shareholder representatives. Shareholding employees elect 51 shareholders to serve as representatives of the ESOP. These 51 shareholders in turn elect 13 employees to serve as members of the Board of Directors and 5 employees to serve as members of the Supervisory Board. Huawei states that the Board of Directors is the highest decisionmaking body for executive and management decisions and that the Supervisory Board supervises the Board of Directors and the company’s senior executives.

⁶⁶ Huawei, *Huawei Annual Report 2010*, 8, <http://www.huawei.com/en/about-huawei/corporate-info/annual-report/annual-report-2010/index.htm>.

⁶⁷ Interview with Huawei chief marketing officer Xu Zhijun in the “Huawei Way.”

⁶⁸ Interview with Paul Scanlan, Huawei vice president of solution sales and marketing, “CommunicAsia 2011: Huawei’s Asian Strategy Changes.” *TelecomAsia*, October 19, 2011, <http://www.youtube.com/watch?v=qRnWN9GZzug>.

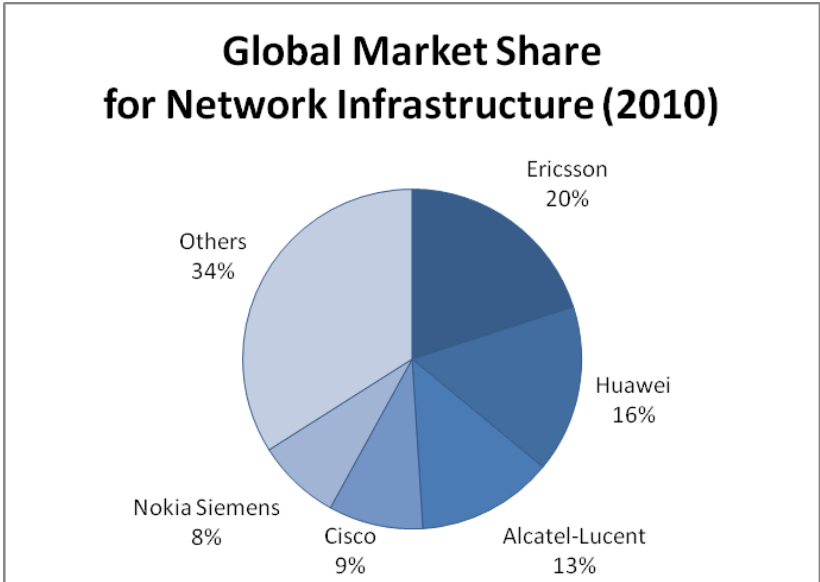
⁶⁹ Huawei, *Huawei Annual Report 2011*.

serve rotating six-month terms as CEO.⁷⁰ Huawei provided no specific explanation as to why it chose such an unconventional leadership structure; however, this management move is clearly priming the company for a succession and part of a strategy to ensure that the company, whose success has been so closely connected to the individual leadership of its CEO, can continue to operate smoothly without Ren. This unconventional management structure, however, may lead to increased concerns about who controls major decisions at the company, as six months is very little time for a CEO to be in his or her position. In light of this, the rotation may be meant to keep core personnel at the company for a certain period of time.

Competitiveness Indicators

One way to compare Huawei’s current competitiveness with that of its peers is to look at the trends of recent performance in terms of market share, sales, and profitability.⁷¹ In this case, we compare Huawei primarily with Alcatel-Lucent, Cisco, and Sony Ericsson.

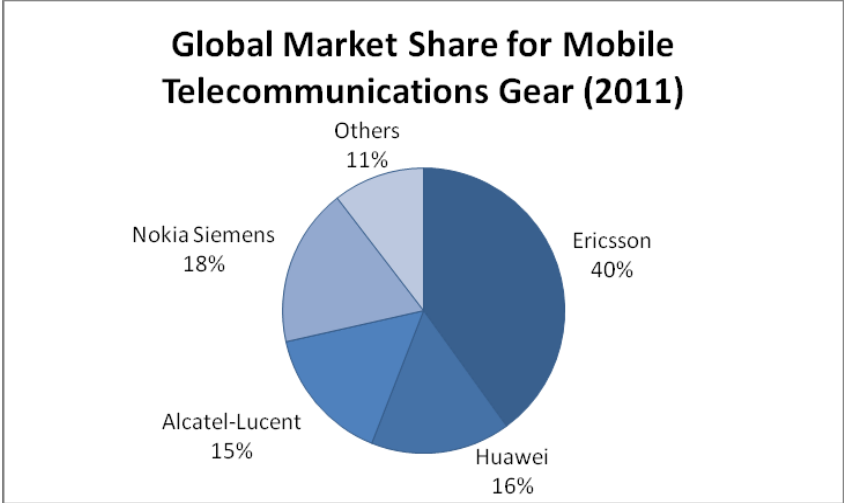
Market Share



Source: Based on Sheridan Prasso, “What Makes China’s Telecom Huawei So Scary,” Fortune, July 28, 2011, <http://tech.fortune.cnn.com/2011/07/28/what-makes-china-telecom-huawei-so-scary/>.

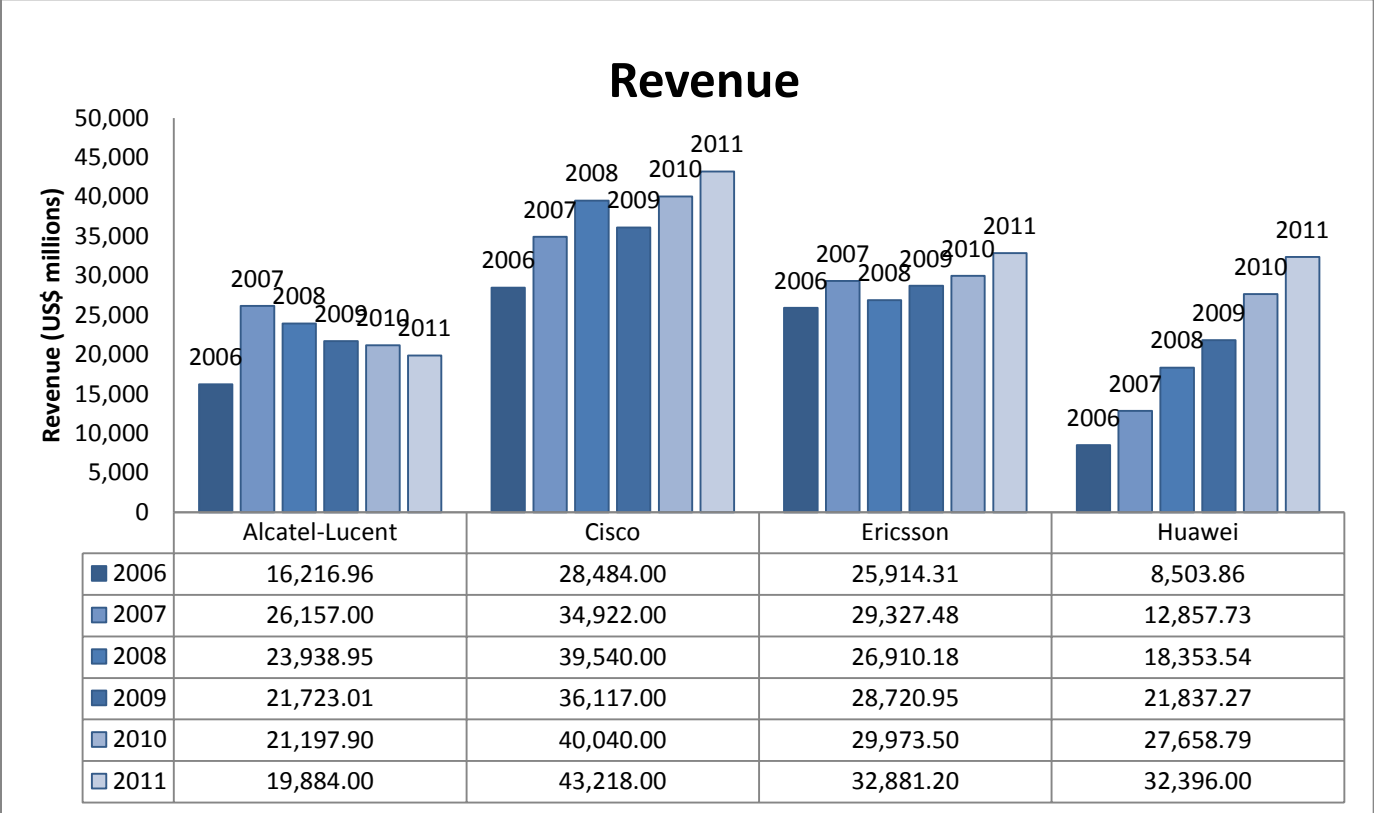
⁷⁰ Ibid.

⁷¹ The figures used in the graphs and tables are based on company documents unless otherwise noted.



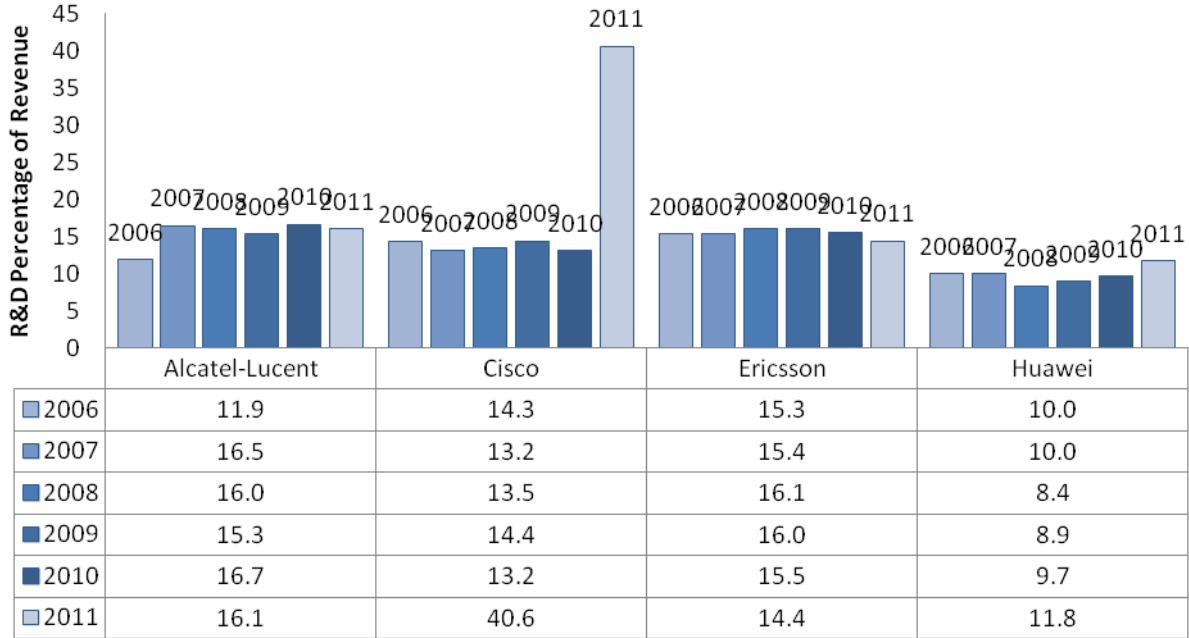
Source: Dell’Oro, as quoted by Tarmo Virki, “Ericsson, Alcatel Gain Mobile Telecom Gear Share,” Reuters, May 9, 2011, <http://www.reuters.com/article/2011/05/19/idUSN199619620110519>.

Sales



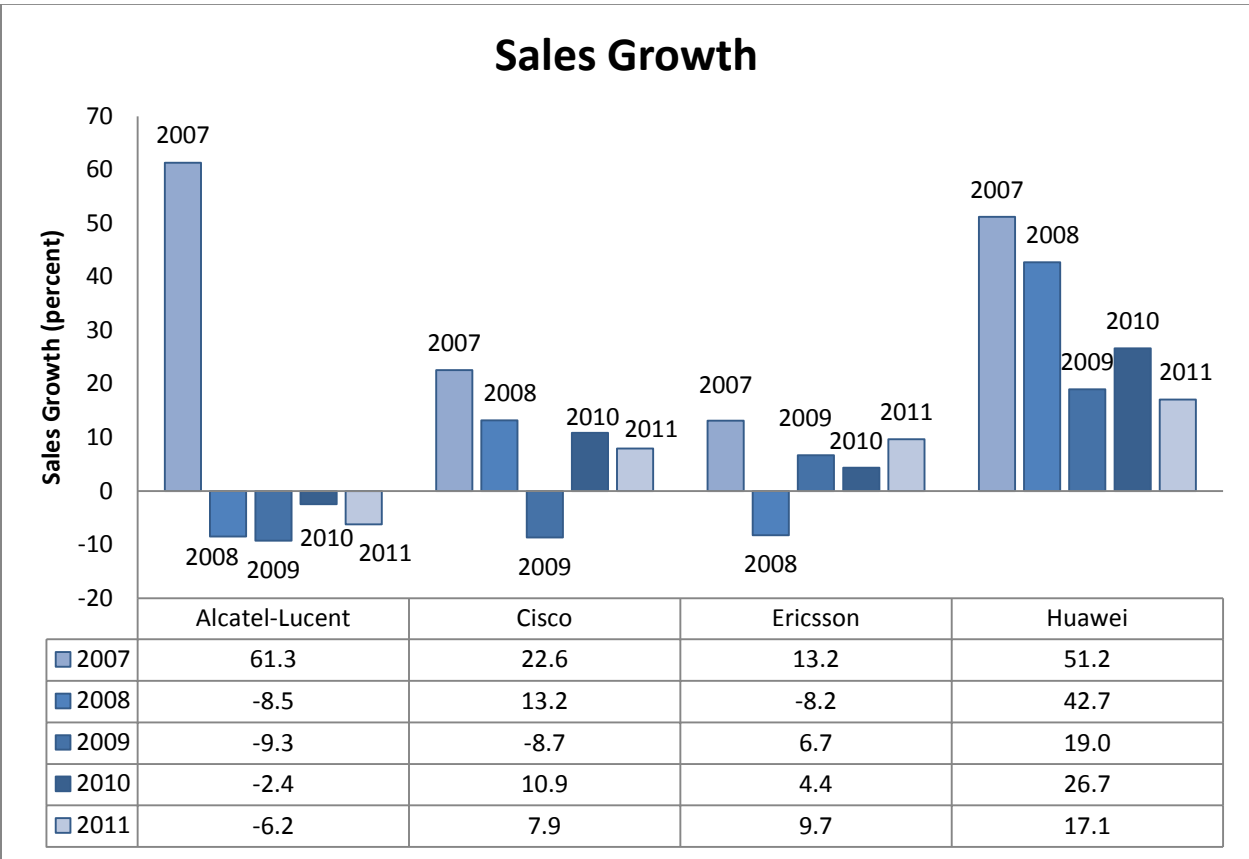
Sources: Based on company documents. The figures for FY 2010 are based on the information in the 2011 earnings report. There were considerable discrepancies in financial information between the 2011 and 2010 annual reports.

Research and Development Percentage of Revenue



Source: Company documents.

Huawei's revenue has steadily increased since 2006. Huawei weathered the 2008 financial crisis and continued to grow, in contrast to its international peers, which have had more difficult times regaining their footing. In 2010 it surpassed Alcatel-Lucent and narrowed the gap with Ericsson, making it the second-largest telecom equipment company by revenue. In 2011, Huawei came even closer to catching up to Ericsson, and surpassed them in half-year sales in July 2012.



Source: Company documents.

Huawei weathered the financial crisis in stellar fashion. In 2008–10 it led the industry in year-on-year sales growth. The majority of its sales are coming from its international telecom business. This sales growth was also bolstered by the rapid expansion of enterprise and consumer sales.

CNY Million

	2011	2010	YOY(%)
China	65,565	62,143	5.5%
Overseas	138,364	120,405	14.9%
Total	203,929	182,548	11.7%

Source: Company documents.

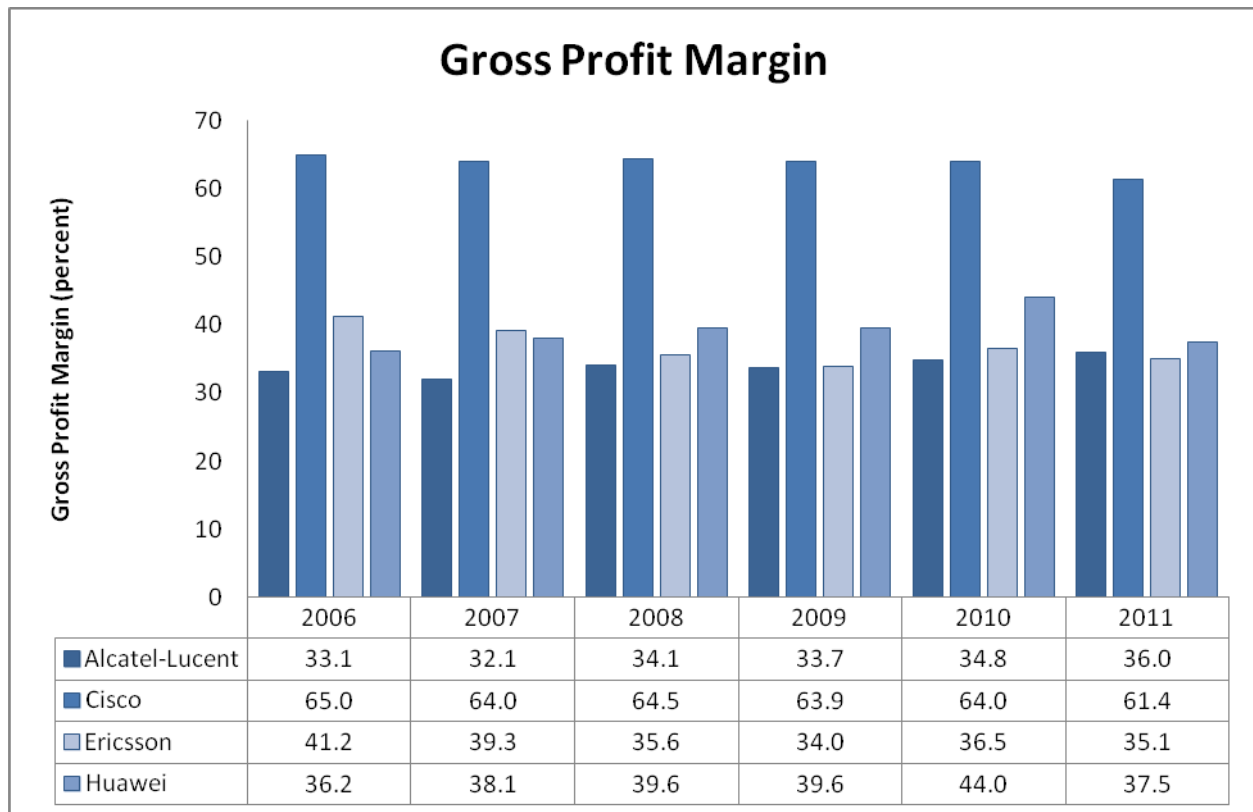
CNY Million

	2011	2010	YOY(%)
Carrier network	150,145	145,800	3.0%
Enterprise business	9,164	5,834	57.1%
Consumer business	44,620	30,914	44.3%
Total	203,929	182,548	11.70%

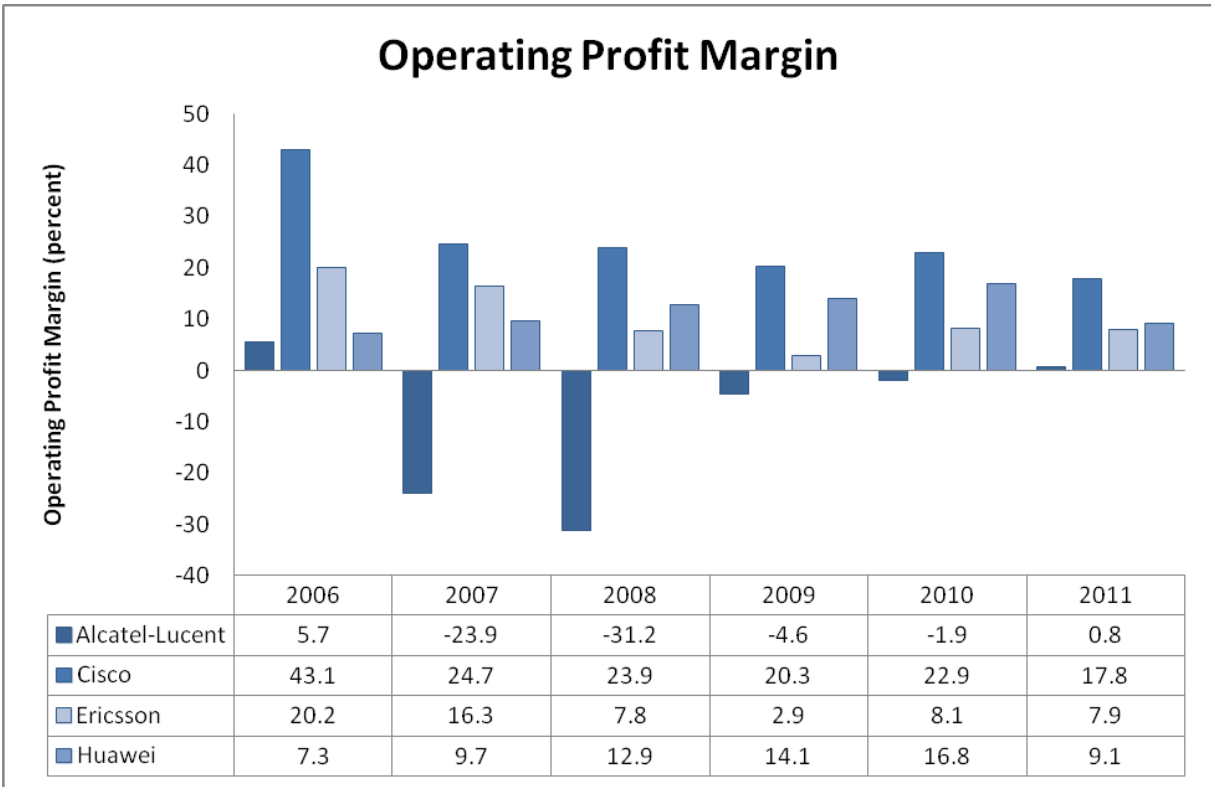
Source: Company documents.

Profitability

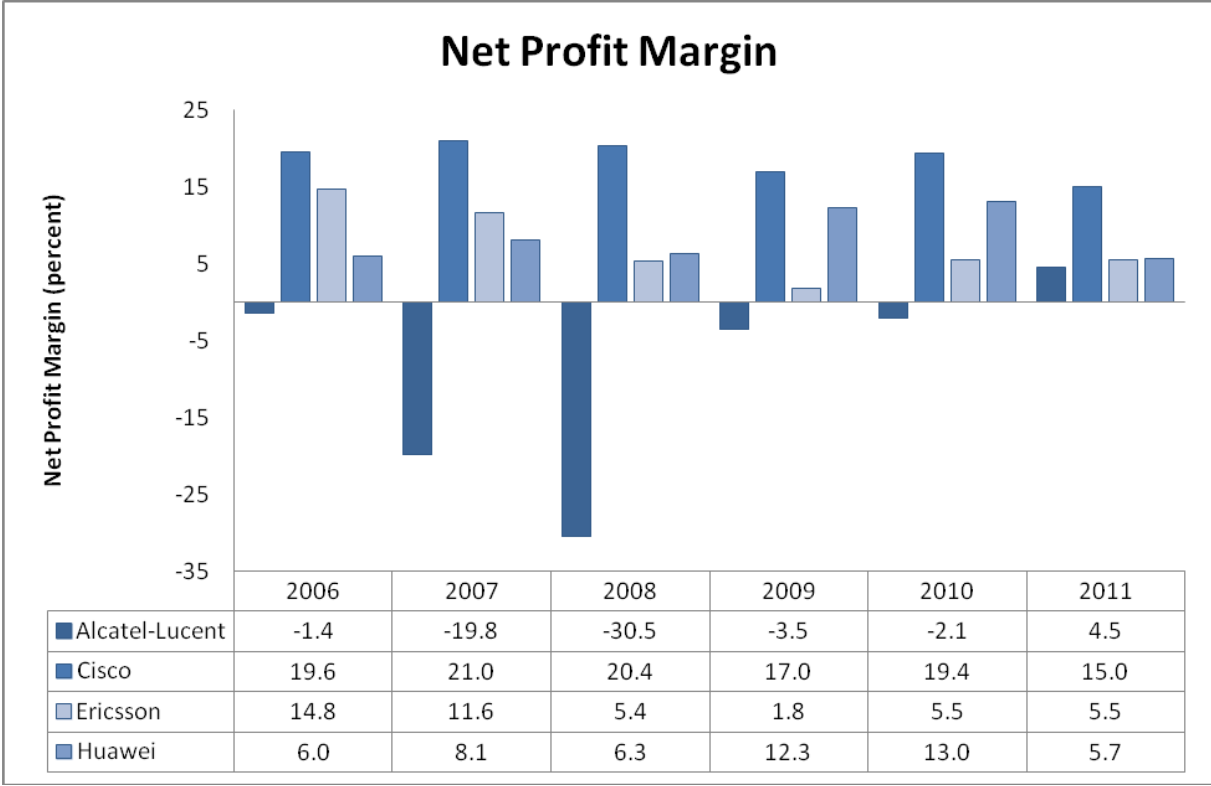
Profit margins have been healthy and increasing.



Source: Company documents.



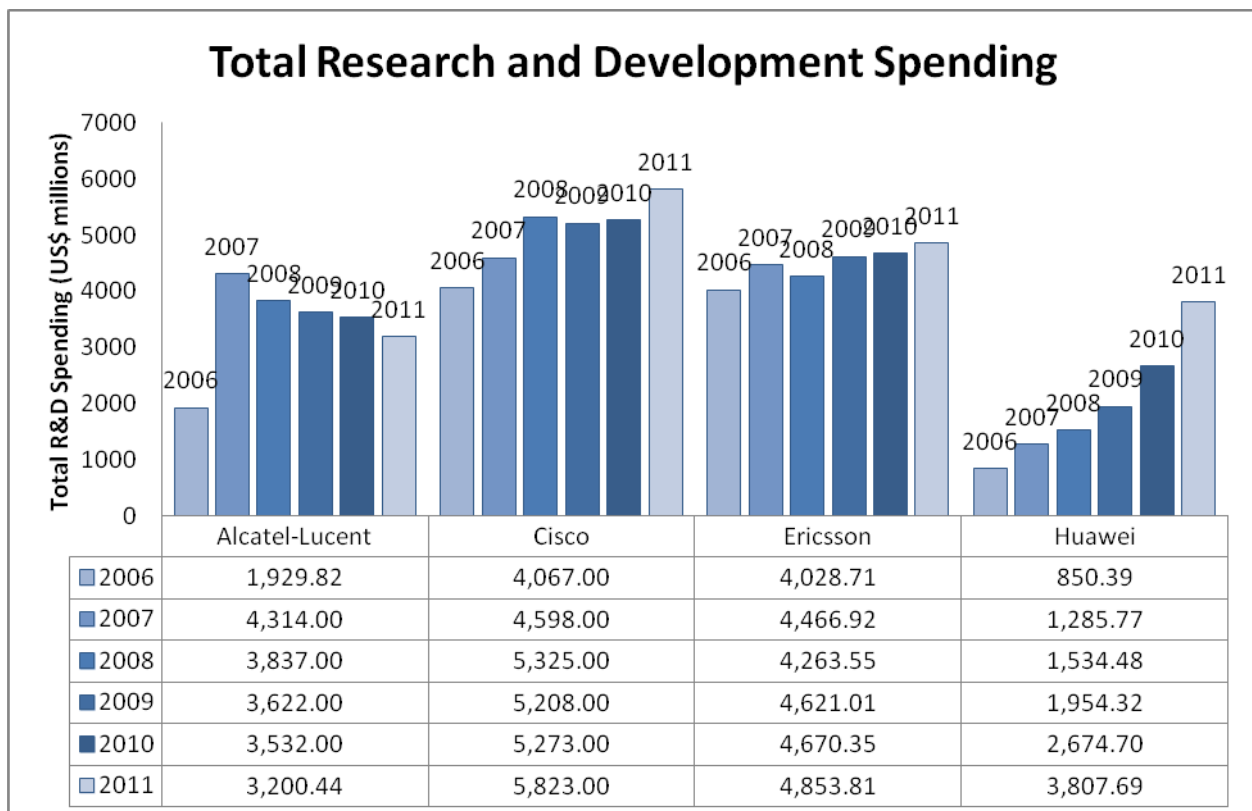
Source: Company documents.



Source: Company documents.

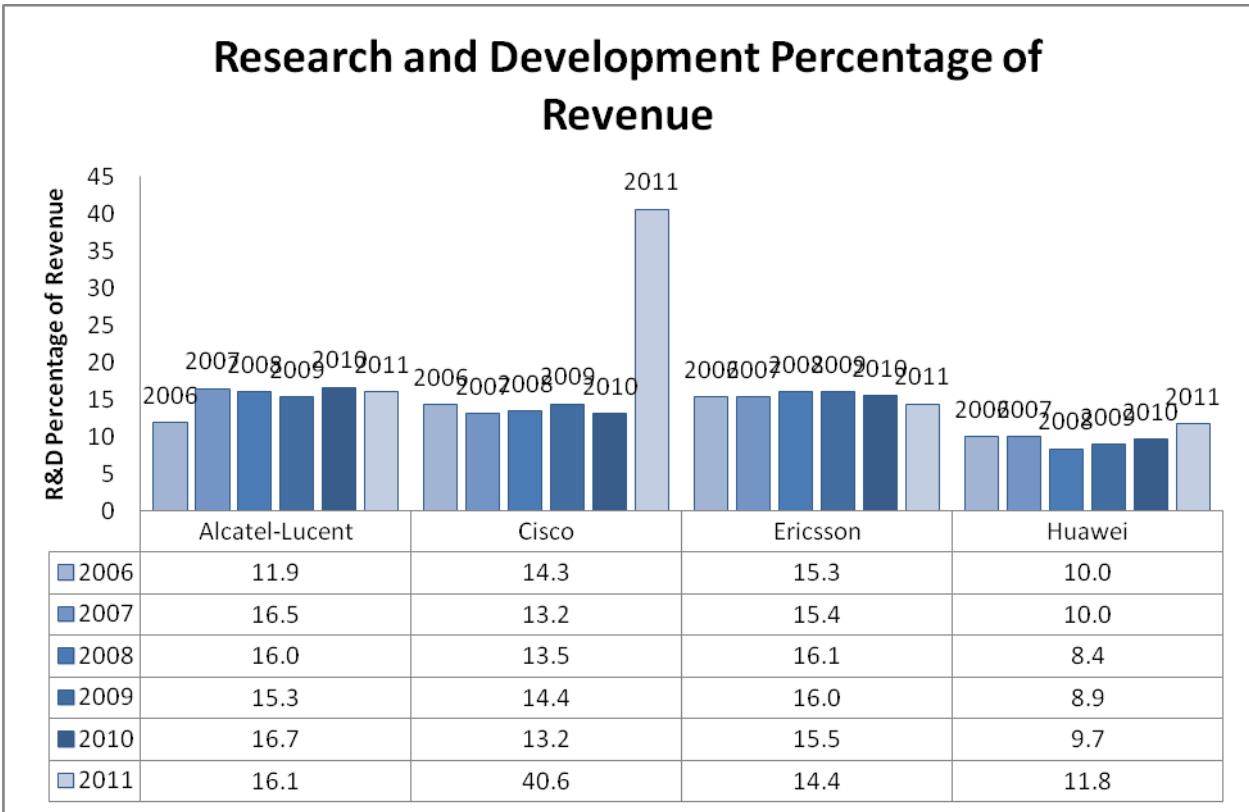
Research and Development

Huawei has consistently focused on R&D as the core of its business. A more detailed discussion of the role the R&D plays in Huawei's strategy follows later in the paper. Huawei tries to allocate 10 percent of its annual revenue to R&D. Huawei's low-cost center of China (along with its presence in India, a CMM level-four facility) gives it a significant marginal cost advantage over its peers. While it spends less than Alcatel-Lucent, Cisco, and Ericsson, Huawei is the global leader in patent applications. As mentioned above, Huawei is also very active in Chinese and international standards-making bodies. Huawei announced plans to increase R&D spending to \$4.5 billion. With the company's predicted growth of 15–20 percent, R&D as a percentage of revenue should see no great changes. Much of this new spending is for projects in Huawei's enterprise and consumer businesses.⁷²



Source: Company documents.

⁷² See <http://www.reuters.com/article/2012/04/25/us-huawei-rd-idUSBRE83O04U20120425>.



Source: Company documents.

Competitive Advantages

Endogenous Innovation

Perhaps Huawei’s most significant sustainable advantage stems from the fact that it consciously chose to develop its technology in house rather than by the more popular (and government encouraged) route of JVs with foreign partners. Huawei learned basic products through reverse engineering, and then used that foundation to attempt more complex products that did not yet exist from Chinese domestic companies. While Huawei could easily have acquired more advanced technology through partnering, Ren Zhengfei recognized what on some levels should be an obvious paradox: to compete with international players, Chinese companies often partnered with them in the hopes of acquiring key advanced technologies and capabilities; this was clearly not in the long-term interests of foreign companies, so they tended to bring older-generation technology into the JV or just an insignificant subset of technology modules. So not only would Chinese companies not get the technology they were after, they would also lose market share to their stronger foreign competitors. Fan quotes Ren Zhengfei as stating the company’s goal as follows:

To develop the national industry, not to set up joint ventures with foreign companies, to closely follow global cutting-edge technology, to insist on self-development, to gain domestic market share, and to explore international market and compete against international rivals.⁷³

Fan points out that even in Huawei's early years, it had a high ratio of R&D staff to other employees: 500:200. Huawei became China's domestic leader in patent applications in 2002, and fourth in the world. It led the world in 2009, was second in 2010, and again led in 2011.

Huawei's development can be contrasted with that of Shanghai Bell, which became Alcatel-Bell in 2001 after Alcatel increased its share to 51 percent of the JV. Shanghai Bell was a government-backed JV, opting for the more popular market-for-technology route. R&D was not a major focus of the company, which spent just over 5 percent on R&D in 2002.⁷⁴ For a number of years, Shanghai Bell was the leading domestic player in the industry in China; but after Huawei's R&D investment started to pay off (its unique sales model at the time also certainly helped), Huawei surpassed Alcatel Bell. In the end, the Alcatel-Bell partnership turned out to be a shortsighted cooperation on the part of both sides.

Yet Huawei's technology development has also been controversial, and there have been accusations that Huawei used improper technology acquisition to accelerate product development. Both Cisco and Motorola sued Huawei over the theft of intellectual property. Huawei claimed that Cisco's code inadvertently made it into Huawei's router and agreed in an out-of-court settlement with Cisco to withdraw the product from the market, change portions of source code, and modify interfaces and manuals. In another case, an employee of Motorola was convicted in federal court and sentenced to prison for the theft of trade secrets that were purportedly being transferred to Huawei via a third-party company. Huawei subsequently filed suit against Motorola, claiming that the sale of one of Motorola's businesses to Nokia Siemens would result in the transfer of Huawei's confidential information. A settlement was eventually reached that resulted in Motorola dropping Huawei from their suit and Huawei dismissing their claims against Motorola, in return for a fee for the right to transfer the intellectual property in question to Nokia Siemens. While reverse engineering and stealing of technology are not unique in this field, these concerns have followed Huawei as the company has sought to increase market penetration in the United States.

R&D and Low-Cost Engineering

Related to Huawei's focus on developing technology capabilities from within is the fact that Huawei is now China's top R&D company and the leading patent applicant worldwide. While patent applications

⁷³ Fan, "Catching Up through Developing Innovation Capacity," 364.

⁷⁴ Ibid., 363.

are not necessarily significant in their own right, Huawei is now recognized in many markets as being a true technology leader, even when compared with its primary international competitors.

Clearly, China is well endowed with highly educated engineers who are available at very cheap relative prices. A telecom engineer with an advanced degree in China receives a salary often a fifth to a fourth of his or her peers in Europe or the United States. Huawei has around 51,000 R&D employees worldwide, representing about 46 percent of its total staff. Aside from its six or so research centers in China, Huawei also has research institutes in Bangalore, Silicon Valley, Stockholm, Texas, Jakarta, and Ireland. It also claims to have over 20 joint innovation centers with leading telecom operators.

This is significant not only because of the sheer scale and cost benefits, but also because the majority of them are physically in China. While the foreign multinational corporations (MNCs) also have large presences in China, their co-located R&D teams tend to be quite limited. R&D is kept away from China for the most part out of fear of intellectual property leakage. This separation from the marketing teams is detrimental to development. Furthermore, Huawei's product marketing teams can collaborate very closely with R&D staff in order to react nimbly to customer demands. In 1999, for instance, China Mobile looked to launch a prepaid mobile phone service. Huawei was able to custom build a product for China Mobile that worked with its existing legacy systems, and by 2002 Huawei had 80 to 90 percent of the market. Foreign companies either did not have the product or were slow to react.⁷⁵ This ability to rapidly respond to customer needs has been a consistent feature of Huawei's strategy, both in China and in foreign markets.⁷⁶ Often this customer-centric development has resulted in products that are developed to work within existing protocols, technology, and equipment constraints rather than requiring the operator to upgrade an entire system. This is especially true in emerging markets that are in the greatest need of low-cost solutions that work within significant operating or equipment constraints. During times of economic contraction, this low-cost, customer-centric innovative approach is also likely to be successful, giving Huawei a big advantage over many of the MNCs. It is important to keep in mind that this is not just a technological change but is also a shift in business models. The traditional approach is to sell individual "big-box" products with extensive service contracts; Huawei's approach reduces the need to rely on long-term service contracts.

Huawei's ability to offer cost innovation is also key. Like the China Mobile example mentioned above, Huawei's European breakthrough came when it was able to offer a system that did not require a whole system upgrade but instead worked with existing protocols and offered upgrades via software instead of equipment.

⁷⁵ Ibid., 364.

⁷⁶ Ren attributed this customer centric approach to IBM's Louis Gerstner. See Li, "China's Telecom Industry," 7.

CORE/IN NETWORKS	Packed Switched:	Cisco, Ericsson, Nokia Siemens Networks	Optical:	Alcatel Lucent, Huawei
	Circuit Switched:	Ericsson, Nokia Siemens Networks	SDP:	IBM
	All-IP (Edge, Core):	Alcatel Lucent, Huawei	IMS:	Ericsson, Huawei, Nokia Siemens Networks
	Backhaul:	Alcatel Lucent, Ericsson, Huawei	IN/NGIN:	Alcatel Lucent, Nokia Siemens Networks
NETWORK SERVICES	Network Services (O&M Outsourcing):	Alcatel Lucent, Ericsson		
	Managed Network Services:	Alcatel Lucent, Ericsson		

Source: Arthur D. Little survey, June - November 2010.

Huawei's low-cost innovative approach has directly resulted in eroding margins for MNCs in Europe, with gross margins moving from 45 to 50 percent to 30 to 35 percent right after Huawei's arrival, and a continued fall since.⁷⁷ Aside from shrinking margins, Huawei's products like SingleRAN can work with most major protocols all out of one box, creating major cost savings for its customers.⁷⁸ Physical space for these "boxes" is increasingly limited and expensive for operators, so the space savings can be a real benefit.

International Engagement

While R&D has been mostly preformed endogenously, Huawei has not been working in a black box. Huawei has recognized that international firms would be able to help it with the nontechnology aspects of its operations early on. IBM was brought in to help Huawei organize and manage its R&D processes, the Hay Group for human resources issues, PWC for financial management, and others for a variety of purposes, including Towers Perrin and Fraunhofer. At one point, IBM had 70 consultants at Huawei's headquarters.⁷⁹ A willingness to purchase international consulting services has served Huawei well over the years.

As Huawei's internal technology capabilities matured, it began to establish strategic technical collaborations with international firms.⁸⁰ Huawei partnered with IBM in 2000 on using IBM's next-generation network processors. In return, Huawei got access to IBM's R&D technology centers. Both IBM and Huawei have benefited from this arrangement. Huawei attempted to form a JV with 3COM, aimed at gaining sales channels, and possibly more important, the intellectual property that was the core of the Cisco dispute. This JV was thwarted by the Committee on Foreign Investment in the United States. Huawei also set up a large R&D center with Siemens in 2004 in Beijing, focusing on the 3G standard. In the optical space, Huawei formed a JV with Global Marine, working on subsea optical cable solutions. Texas Instruments, NEC, Motorola, Qualcomm, and a number of other MNCs have also worked with Huawei.

⁷⁷ Prasso, "What Makes China's Telecom Huawei So Scary."

⁷⁸ Ibid. Prasso also notes that Huawei's bid to supply Sprint Nextel would have resulted in \$800 million in savings the first year.

⁷⁹ Farhoomand and Ho, "Huawei," 8.

⁸⁰ Much of this section comes from Luo et al., "Entrepreneurial Pioneer."

While these international collaborations have undoubtedly had value for Huawei, they occurred at a much later stage of development, and only after Huawei had significant internal technology assets and capabilities.

Huawei's customer base is also highly diversified, with products deployed in 140 countries.

Occupying the Countryside First

Ren Zhengfei has famously espoused Mao Zedong's philosophy of occupying the countryside first as a business strategy. Instead of competing with MNCs in major cities like Shanghai and Beijing, Huawei cut its teeth in smaller rural markets where MNCs rarely tread. Huawei had a team of engineers travel to every one of China's 2,800 counties to market its products.⁸¹ These efforts, as noted above, involved large staff presences focusing on customizing product solutions that took into account the unique problems they faced in terms of budget and logistical constraints. Only when Huawei had a strong rural presence did it decide to come to the cities.

This strategy was then extended to developing countries as a way for Huawei to enter the international sphere. It began with markets in Russia, Southeast Asia, Latin America, and Africa. Before making attempts at Europe and North America, however, it was willing to send groups of salespeople and engineers to wherever it thought there might be an opportunity.⁸²

This has resulted in strong, diversified revenue streams, and also in products that are cutting edge while still respecting budget constraints. This is fundamentally different from offering low-value goods in developing markets; these are cutting-edge, next-generation telecom solutions.

As mentioned above, this strategy also jibes well with China's foreign affairs priorities, which involve building political alliances with developing countries. This has also created some issues as Huawei enters the United States and other developed markets, as suspicions of government and military support are enhanced by Huawei's purported sales in places like Iraq, Cuba, Myanmar, and even accusations that they operated from within the Chinese embassy in Libya.⁸³ Sales to Iran have purportedly ceased, but these former sales may still come back to haunt the company.

Government Support

Ren Zhengfei has stated that "if there had been no government policy to protect (nationally owned companies), Huawei would not exist."⁸⁴ The questions revolving around Huawei's government support

⁸¹ Pomfret, "History of Telecom Company."

⁸² Farhoomand and Ho, "Huawei," 9.

⁸³ Gilley, "Huawei's Fixed Line," 96.

⁸⁴ Fan, "Catching Up through Developing Innovation Capacity," 364.

and involvement have dogged the company for years. It has greatly hindered its U.S. (and to a lesser extent European and Australian) sales, partnerships, and acquisition efforts.

Military Relationship. Most analysts point to Ren's former career in the PLA engineering corps as proof of a military relationship. In and of itself, this past career should not be worrying. But as Huawei has tried hard to distance itself from any military involvement, it is well known that in its early days it received contracts to build out military telecommunications networks. A Huawei deputy manager was quoted as saying about the military contract, "It is small in terms of our overall business, but large in terms of relationships."⁸⁵ The *Far Eastern Economic Review* also reported that 70 senior People's Armed Police visited Huawei in 1999, led by a person in charge of telecoms infrastructure purchases.⁸⁶

As of 2000, Huawei was still sending products to the telecommunications bureau of the PLA.⁸⁷ It is likely now, too, that Huawei supplies products to the military. The question remains about the nature of these products. Huawei claims that they are purely civilian, do not differ from other commercially available products that Huawei sells, and made up only 0.16 percent in 2009 and only 0.33 percent of its sales in 2011.⁸⁸

Official Support. From early on, Huawei had the visible support of top leaders in Beijing. Officials who visited Huawei, traveled with Ren, or appeared on Huawei's behalf include Jiang Zemin, Zhu Rongji, Wen Jiabao, Hu Jintao, Wu Jichuan, Wu Bangguo, Li Peng, Liu Huaqing (vice chairman of the Central Military Commission), and others. This is significant, as it is seen as explicit approval for Huawei, both domestically and in foreign markets.

Because Huawei's headquarters are in Shenzhen, the Shenzhen local government has, not surprisingly, been very supportive of one of its top employers and taxpayers. Huawei received preferential construction loans and priority processing, as well as support in hiring.⁸⁹ Local banks have also helped support Huawei through customer financing.

Policy Support. The Chinese government's support of domestic Chinese telecom companies in the late 1990s also helped Huawei's development. In 1998 the State Council and Ministry of Information Industry pushed for the promotion of domestic companies over foreign ones, even setting market share targets.⁹⁰ This was done through investment regulations, import duties, and buy-local campaigns. These policies,

⁸⁵ Gilley, "Huawei's Fixed Line," 95.

⁸⁶ *Ibid.*, 96.

⁸⁷ *Ibid.*, 94.

⁸⁸ Ken Hu, "Huawei Open Letter," Huawei press release, February 25, 2011, http://www.huawei.com/ilink/en/about-huawei/newsroom/press-release/HW_092875; company sources.

⁸⁹ Gilley, "Huawei's Fixed Line," 98.

⁹⁰ Harwit, "Building China's Telecommunications Network," 129.

coming at time of extremely high market growth and demand, certainly gave Huawei an important foundation from which to develop.

Finance. Much of the concern with Huawei's government involvement revolves around its finances. The first issue has to do with the role banks played in Huawei's early days, and the other is the credit terms that have been more recently offered to Huawei's customers.

On the first issue, in Huawei's early days it provided products and services (switches and telephone hookups) to a number of government-affiliated organizations (and reportedly individuals) and rural telecom companies. Many of these clients were unable or, for whatever reason, unwilling to pay.⁹¹ This became a critical concern for Huawei, and it looked to the government for assistance. China Construction Bank and Shenzhen Development bank extended buyer credit to Huawei, which were in essence payments to Huawei for difficult-to-recover debt.

Credit

Access to credit has been critical for Huawei's growth. As discussed just above, buyer credit featured early in Huawei's development, and it has continued to play an important role. Often this credit coincides with diplomatic efforts by the Chinese government, in a loans-for-development arrangement. Banks in China continue to provide huge amounts of buyer credit to Huawei's customers.

In 1998, the Beijing headquarters of China Construction Bank provided Huawei with RMB 3.9 billion in buyers' credit, representing 45 percent of the bank's credit extended that year. The next year, Huawei received another RMB 3.5 billion from the Industrial and Commercial bank of China (ICBC) and the Bank of China, with ICBC lending an additional 200 million for R&D.⁹² In the early 2004, Huawei received a \$10 billion five-year credit facility for international expansion from the China Development Bank and \$600 million from Ex-Im Bank of China.⁹³ This was later bumped up to \$30 billion, and possibly more. Sinosure, the government insurance company, has also supported these sales via export credit financing.⁹⁴

More recently, when pitching Brazil's Tele Norte, Huawei was able to offer access to this \$30 billion credit line from the CDB. In addition there was a two-year grace period on payments and a rate of LIBOR plus 2 percent (which is about 4 percent for the deal, beating market rates of around 6 percent). A similar

⁹¹ This draws from the author's own sources, as well as Pomfret, "History of Telecom Company."

⁹² Gilley, "Huawei's Fixed Line," 96.

⁹³ Farhoomand and Ho, "Huawei," 7.

⁹⁴ Brian Low, "Huawei Technologies Corporation: From Local Dominance to Global Challenge?" *Journal of Business and Industrial Marketing* 22, no. 2 (2007): 138–44, at 140.

situation was presented to Mexico's America Movil for its \$1 billion network upgrade.⁹⁵ While export credit programs are available in many countries, the United States, Sweden, and Japan included, the sheer size of the Chinese loans dwarf comparable programs in other countries.

Huawei explains this situation as follows:

The credit lines made available through Huawei by China's commercial banks are actually designated for Huawei's customers, not Huawei. As an intermediary, Huawei recommends loans to our customers and, once taken, our customers are responsible for paying the principle and interest directly to those banks. It is important to note that these types of loans only represented about 9 percent of Huawei's annual income in 2010, a level that is similar to our industry peers. In 2004, the China Development Bank agreed to offer a US\$10 billion buyer's credit line to our customers and the amount was subsequently increased to US\$30 billion in 2009. As of today, US\$10 billion has been loaned to our customers from the China Development Bank.⁹⁶

One can also understand why, from a commercial perspective, a bank would be eager to finance these deals, as they are familiar and dependable. Additional concerns about this financing, however, is that the financing also serves as an element of broader government objectives in the customer countries (e.g., securing access to natural resources and raw materials).⁹⁷

R&D Grants

Huawei has also received sizable R&D grants from the government. In 1996, Vice Premier Wu Bangguo visited the company and pledged RMB 50 million in loans to develop GSM mobile phone technology. Wu stated "at present, this is a monopoly of foreign companies. I suggest that Huawei make new breakthroughs in the mobile area."⁹⁸ In its 2010 financial statement Huawei lists RMB 433 million (approximately \$66 million) of unconditional government R&D grants, and an additional RMB 545 million (approximately \$84 million) in conditional R&D grants.

Huawei's Relationship with Japan and the United States

Huawei stands out among Chinese high-technology companies in that it deliberately avoided relying on foreign technology from Japan or the West, largely eschewing JVs with international companies. But this strategic choice does not preclude relationships with Japanese or U.S. firms. Huawei's interaction with

⁹⁵ "Huawei's \$30 Billion China Credit Opens Doors in Brazil, Mexico," Bloomberg News, April 24, 2011, <http://www.bloomberg.com/news/2011-04-25/huawei-counts-on-30-billion-china-credit-to-open-doors-in-brazil-mexico.html>.

⁹⁶Hu, "Huawei Open Letter."

⁹⁷ A discussion of these issues is given by Kevin Gallagher et al., "The New Banks in Town: Chinese Finance in Latin America," *Inter-American Dialogue Report*, March 2012.

⁹⁸ Gilley, "Huawei's Fixed Line," 95.

Japanese and U.S. firms takes on three salient dimensions: (1) management and business guidance, (2) supplier agreements, and (3) technology partnerships.

Although wary of importing foreign technology, Huawei has actively sought out American management techniques. For example, Huawei consulted with the Hay Group on improving human resources management and with KPMG and with IBM on financial management. Accenture and PWC have provided Huawei with customer relationship management and financial advice, respectively.⁹⁹ IBM, whose headquarters Ren visited in 1997, has had a particular influence on Ren's management style. Somewhat tellingly, Ren cites Mao Zedong and Louis Gerstner, the former CEO of IBM, as the two largest influences on his management philosophy. Ren also claims that Huawei's "customer-centric approach" is based on Gerstner's ideas.¹⁰⁰

Huawei has emphasized self-reliance and building internal capacity, but these goals have not overridden basic business considerations, as demonstrated by the company's supplier relationships. A Huawei manager claimed that "one of the factors that decides whether Huawei produces or buys a piece of equipment is the profitability of the product," and that Huawei will buy equipment from another company when those pieces of equipment "no longer have high margins and are correspondingly cheap to purchase." Huawei has also entered into partnerships with foreign firms to gain technology in cases where the company did not have the capacity to develop these technologies by itself. This is why Huawei bought microchips and related circuitry from Motorola in the mid-1990s and high-speed network processors from IBM for high-end routers as of 2001. Outside these noticeable examples, Huawei has also bought platforms—hardware or software components that form part of a piece of equipment—from Texas Instruments and complete products from IBM.¹⁰¹

Huawei makes a similar exception to its policy of self-reliance for some joint R&D JVs and joint laboratory projects. The consideration for Huawei in these circumstances is, according to one of the company's managers, "if Huawei were ever to cooperate on research initiatives it would only do so with companies that offer the latest technology." Huawei has established joint research relationships with IBM, Intel, Lucent Technologies, Texas Instruments, Microsoft, and Qualcomm.¹⁰² Huawei also operates four R&D centers in the United States and has a strong record of technology collaboration with NEC. In 2002, Huawei, NEC, and Matsushita (Panasonic) established a JV company, Cosmobic, to share smartphone

⁹⁹ "Corporate Media Kit: Fact Sheet & Milestones," Huawei corporate Web site, 2009, http://www.huawei.com/en/about-huawei/newsroom/resources/corporate_media_kit/index.htm.

¹⁰⁰ Li, "China's Telecom Industry," 6.

¹⁰¹ Smith-Gillespie, "Building China's High-Tech Telecom Equipment Industry," 82–92.

¹⁰² *Ibid.*; Low, "Huawei Technologies Corporation," 142.

technology.¹⁰³ Later that year, NEC and Huawei opened the 3G Mobile Internet Open Lab in Shanghai to incubate new 3G technologies.¹⁰⁴ NEC originally also did substantial product procurement with Huawei, but claims of reverse-engineering led to a focus on primarily R&D joint development.

Huawei opened its Japan office in 2005, and now has 600 employees there, 80 percent of them local. In September 2011 Huawei's newest lab was opened in Tokyo. Revenues from Japan in 2011 were around \$700 million, with 50 percent from devices and 50 percent from network equipment. Huawei sells to KDDI, NTT Docomo, Softbank, and E-Access. Huawei technology is at the core of Softbank's new AXGP (Advanced eXtended Global Platform), LTE TDD. Japan has also become an important testing ground for piloting new handsets. Japan has a discerning and innovation-embracing consumer culture, and NTT Docomo purportedly spends more on devices than any other operator. Japan is also a key sourcing market for Huawei, with \$750 million in component sourcing. However, this is dwarfed by the \$6 billion that is sourced in the United States. The primary components sourced are chipsets, screens, and DRAM.

As Huawei continues its international expansion, the company hopes to build on its successful business relationships with Japanese and U.S. businesses. Its customers are primarily large international telecommunications operators, and it has not been able to make inroads with major U.S. carriers. Huawei has had more success in Japan, where it sells equipment to SoftBank, a comprehensive telecommunications operator and Japan's largest broadband service provider.¹⁰⁵ Outside the operator market, Huawei's expansion into consumer sales of smartphones has meant opportunities for U.S. companies like Cricket, a low-cost, regional telecommunications carrier that has enjoyed robust sales of Huawei smartphones in its retail operations, and Google, whose Android operating system is used on Huawei tablets.¹⁰⁶

A complicating factor in Huawei's relationship with the United States is the intense attention in the company's presumed ties with the Chinese government. Huawei's expansion into the United States has met with official barriers a number of times—most noticeably when the executive-level Committee on Foreign Investment in the United States reviews prevented Huawei's attempted acquisitions of 3Com in 2007 and 3Leaf in 2010–11. In 2010, Huawei's attempted equipment sales to Sprint Nextel were also

¹⁰³ "Matsushita (Panasonic), NEC and Huawei Announce the Establishment of a Joint-Venture Company in China to Expand 3G Mobile Handset Business," NEC corporate press release, June 3, 2002, <http://www.nec.co.jp/press/en/0206/0301.html>.

¹⁰⁴ "NEC and Huawei Set up 3G Mobile Internet Open Lab in Shanghai," Huawei corporate press release, October 23, 2002. <http://www.huawei.com/en/about-huawei/newsroom/press-release/hw-088227-news.htm>.

¹⁰⁵ "Unlocking the Secrets of Softbank's 3G Success," Huawei corporate communications article, January 2009, http://www.huawei.com/en/about-huawei/publications/communicate/hw-079384-28255-24521-hw_079157-hw_079379.htm.

¹⁰⁶ Anton Troianovski, "Can You Say 'WAH-Wey'? Low-Cost Phones Find Niche," January 11, 2012, <http://online.wsj.com/article/SB10001424052970203733304577102223985134572.html>.

thwarted. In October 2012, a report investigating national security issues posed by Huawei and ZTE was completed by the U.S. House of Representatives' Select Committee on Intelligence. Despite no findings of explicit wrongdoings, the report raised continued concerns about the actual nature of ownership, the role Huawei played in loan provisioning to customers, the nature of its commercial relationships in Iran, and continued suspicions about Huawei's relationship with the Chinese government. The recommendations to block acquisitions by Huawei and not to allow Huawei products in U.S. government systems were quite strong. On balance, the actual findings of the report were rather weak, except possibly for the purported contents of a classified portion of the findings.

The scope of this report does not allow for an analysis of these questions of national security—it is a case study on Huawei's competitiveness. However, these security concerns will continue to plague Huawei's market competitiveness in the United States, and also in parts of Europe and Australia. Regardless of Huawei's actual ties to the government, even when compared with other Chinese businesses, Huawei seems to have much to learn about meeting expectations of transparency, managing its image, and navigating the political landscape in the United States. Huawei is probably the most technically innovative and capable firms in this series of cases, yet Huawei's ongoing competitiveness will continue to be hindered not by innovative capacity but rather by governance issues. Without a public listing to make its governance more fully transparent and the establishment of better global standards for delineating the national security boundaries of information security, Huawei will likely continue to struggle in the United States. These struggles may also extend to those other foreign vendors that use Huawei components and products as they seek to expand in the United States. The rub is that the logistics and risks involved with a public listing by Huawei likely makes this a near-term impossibility.

Key Findings

- Endogenous innovation has been the key to Huawei's success. Instead of trying to absorb technology via JVs with technologically advanced partners, Huawei made a conscious decision to develop its technology internally. This is probably the most important factor in Huawei's current high level of innovation.
- Endogenous innovation does not mean performing research and development in a black box. International engagement was highly important to Huawei's development, not only in learning from international customer needs, but also from working with international consultants and suppliers. JVs were used judiciously where there was clear value-added for both parties and only after Huawei already had significant internal technology assets and capabilities. Interactions with U.S. and Japanese companies are numerous and continue to be important.
- Huawei has a sustainable competitive advantage with their low-cost R&D resources. This allows them to get more “bang” out of their R&D dollars, and also allows them to involve R&D teams

more in customer-centric customization than can many of their international competitors. R&D teams working in close proximity to sales and marketing teams is important. In times of slow or negative economic growth, low-cost, customer-focused, customized solutions are likely to offer a distinct advantage over off-the-shelf products.

- While Huawei is technically advanced and highly innovative, the sustainability of its success depends primarily on governance issues. Accusations, fair or not, that have been levied at Huawei regarding connections to the Chinese military, other parts of the Chinese government, and to sanctioned regimes will continue to fester and provide fodder for those that seek to thwart Huawei's ambitions. The culture of secrecy that surrounds management and shareholdings is also problematic. Without greater transparency, like that which comes from a public listing on an advanced stock exchange, Huawei will likely continue to have difficulties.
- Huawei does not just compete on cost alone, and the company also benefits from creating products that are customized and efficient. Although the company still prices its products aggressively, Huawei is now able to have an edge outside of simply having cheaper versions of its competitors' products. Its clients claim that Huawei is able to provide systems that are customized and easy to upgrade. Moreover, the company's products, like SingleRAN, although not considered disruptive technology, are unique in having a streamlined system that supports multiple telecommunications standards out of a single piece of equipment and solves not only a technology problem but logistical and business challenges as well.
- Industries that align with national goals will receive multiple forms of support. Support for Huawei came initially in industry-wide policy support and then moved to recognition by top Chinese leadership. Huawei is a central part of China's drive to build a domestic telecommunications industry, and the company's activities in the developing world are in line with Chinese foreign policy objectives. As a result, the company reaps the benefits not only of direct support, but also indirect support that takes place in a larger policy context, like the China Development Bank's generous credit to international buyers of Huawei products in developing countries. Finally, access to credit continues to be a key success factor across all our case studies.



ABOUT THE AUTHOR

Nathaniel Ahrens is deputy director and fellow at the Hills Program on Governance at CSIS. Ahrens is also executive director and founder of the American Mandarin Society. He was formerly an adjunct fellow with the CSIS Freeman Chair in China Studies, where he focused on issues relating to China's trade, industrial policy, and innovation. In 2010, Ahrens was a visiting scholar at the Carnegie Endowment for International Peace, where his research focused on climate, energy, and sustainable development issues in China, as well as Chinese national innovation policy and government procurement. Previously, Ahrens worked for 10 years in China. He holds an A.B. from Vassar College, is a M.I.P.P. candidate at the Johns Hopkins School of Advanced International Studies, and studied at Beijing Language and Culture University.



1800 K Street, NW | Washington, DC 20006
Tel: (202) 887-0200 | Fax: (202) 775-3199
E-mail: books@csis.org | Web: www.csis.org