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The Real Huawei Story and the 5G Era

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Abstract
Huawei Technologies Co., Ltd, a Chinese telecommunication technology company and the second largest telecommunication equipment company in the world by revenue, is about to become the largest and the leader in the newest 5G telecommunications era (Sin 2017). For the past year of 2018, Huawei has been reported widely in the media for the detainment of its CFO Meng Wanzhou, who is being suspected of stealing technology from United States companies and illegally trading devices to Iran. However, Huawei's true story of development remains unheard among the controversies and conspiracy theories around Meng's detainment. This article will not expand on those controversies but will use this opportunity to unveil Huawei's incredible path of growth, from being a marginal player to becoming one of today's frontier companies in the telecommunications industry, as well as how Huawei will impact the industry's future with its 5G technology.

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Huawei Technologies Co., Ltd, a Chinese telecommunication technology company and the second largest telecommunication equipment company in the world by revenue, is about to become the largest and the leader in the newest 5G telecommunications era (Sin 2017). For the past year of 2018, Huawei has been reported widely in the media for the detainment of its CFO Meng Wanzhou, who is being suspected of stealing technology from United States companies and illegally trading devices to Iran. However, Huawei's true story of development remains unheard among the controversies and conspiracy theories around Meng's detainment. This article will not expand on those controversies but will use this opportunity to unveil Huawei's incredible path of growth, from being a marginal player to becoming one of today's frontier companies in the telecommunications industry, as well as how Huawei will impact the industry's future with its 5G technology.

I. WINNING THE CHINESE MARKET (1987-1996)

Ren Zhengfei, the founder and the current CEO of Huawei, retired from the Chinese People's Liberation Army (PLA) and joined Shenzhen South Sea Oil Corporation in 1983. At the end of 1987, Ren started Huawei Technologies Co., Ltd in Shenzhen and began his first project: the telecommunication switch technology (Ahrens 2013). In the 1990s, under Reform-and-Opening-up, which was designed to unleash China's development potential by a series of policies, including encouraging foreign investments and trading the domestic market share for technology, China allowed international telecommunication firms to fill in the gaps of the market due to its weak infrastructures. Companies like Alcatel, Ericsson, Nokia, Motorola, and Nortel entered China's market as International Joint Ventures (IJV). Facing new competition of advanced technologies, unlike other Chinese telecommunication firms who chose to rely on importing foreign technology, Huawei decided to develop a more complicated switch system on its own. Hence, developing its own technology has become one of Huawei's core strategies (Ahrens 2013).

In 1993, Huawei launched its first self-designed C & C08 Program-Controlled Switch and got a contract directly from the PLA. In the early 90s, due to the gaps in technology, the domestic market of China was mostly dominated by IJVs. Contracting with the government was a typical Chinese way of securing a foothold in the domestic market for the Chinese firms. The first contract offered by the PLA enabled Huawei to continue its R&D spending on network transmission and mobile communication systems. Other than developing its own technology, Huawei also targeted its sales on Chinese rural areas where most IJV ignored. Ren Zhengfei quoted Mao Zedong to describe his selling strategy as "surrounding the city with the countryside". By 1996, Huawei's domestic market share of switch system had increased to 20%, standing right next to the IJV Shanghai Bell. A year before achieving this accomplishment in 1995, Huawei had established another R&D center in Shanghai. This move indicated Huawei's success

and confidence in the capitalization of the domestic market. Also, Huawei's success in the domestic market provided an example of a growth model for other Chinese firms (Ahrens 2013).

II. EXPANDING TO INTERNATIONAL MARKETS: COMPETITIVE PRICING AND CUSTOMER-ORIENTED ATTITUDE (1996-2006)

After becoming a major player in the domestic market, Huawei started to put its eyes on international markets. However, expanding to international markets was considered nearly impossible for Chinese firms in the late 90s because of the negative impression on poor-quality Chinese products and the competition from local firms abroad. Recognizing those difficulties, Ren Zhengfei warned that his company must be "Wolf-like" in order to avoid being "eaten" by the advanced and ambitious competitors (Ahrens 2013). Ren Zhengfei provided extremely competitive prices that could be considered aggressive, while also fortifying a "customer-first" attitude in his company. For those who were looking for cheaper prices, accordingly, Huawei offered very low prices with nearly 30% off from its original sale price and good after-sale customer services to build rapport for the long run. This has helped Huawei reduce the number of competitors in international markets (Farhoomand 2006).

The first five years of Huawei's international push were rough with only $12,000 sales but with persistence in giving low prices and good after-sale services, Huawei was eventually rewarded. By 2001, Huawei's sales of its switch system in Russia had increased to $100 million (Farhoomand 2006). In the same year, China entered the World Trade Organization (WTO), enabling the country to join the global labor and supplies networks. Along with the globalization of China's economy, Huawei also entered more developing countries like Thailand, Brazil, and South Africa. From 2003 to 2005, Huawei had several deals including one that was worth $20 million in Ethiopia, and a $200 million code-division multiple access project in Nigeria (Kuo 2006).

2001 was also a significant year for Huawei's marketing efforts in developed countries. As a newbie in the developed market, strategically, Huawei did not simply transplant the low-pricing model into developed countries. It was being very locally oriented and especially paid attention to quality standards. In 2001, Huawei made the first sales to Germany and the Netherlands by introducing a wireless station that complied with multiple communication standards. Huawei designed this station after noticing the demand for more compact base stations that are easier and greener to be installed in Europe (Cremer & Tao). This example reflects Huawei's customer-first attitude. Moreover, it also reflects the efficient and flexible management of Huawei in targeting customers' demands and executing its plans. Domestically, by 2002, Huawei had officially overtaken the most dominant IJV Shanghai Bell and also passed Cisco by 12% in internet data communications. By the end of 2005, Huawei had had even more income from abroad than any domestic players. Those achievements, however, could mostly be credited to low prices and good customer service (Farhoomand 2006).

III. FROM "MADE IN CHINA" TO "INNOVATED IN CHINA" (2006-2016)

Ren Zhengfei knew that simply offering low prices and products would not be sustainable, especially in a competitive business like telecommunications. While providing its products to meet customers' demands, Huawei has been consistently catching up with new technological trends. According to the

company's documents, from 2003 to 2006, Huawei entered the business of mobile equipment with a series of technological breakthroughs:

2003, July: Huawei established its handset department

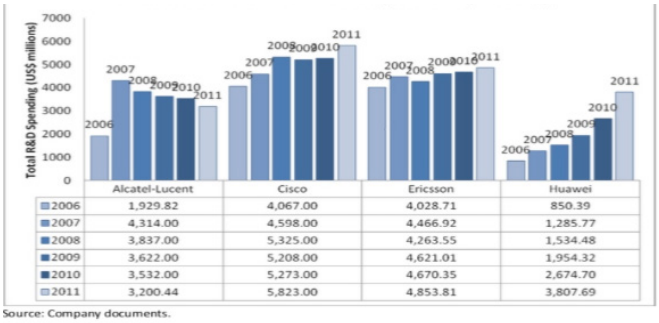
2004, February: Huawei exhibited China's first Wideband Code Division Multiple Access mobile phone at the 3GSM Conference in Cannes, France

2005, June: Huawei's first 3G mobile phone, the U626, was awarded the 'Best 3G Smartphone' by the Charlton Media Group

2006, June: Huawei launched the world's fastest and most compact High-Speed Downlink Packet Access USB Modem, the E220, in Singapore.

These breakthroughs were just the beginning. As mentioned earlier, Huawei puts building the technology in its own house at its core after receiving benefits from building its own switch system and outperformed Shanghai Bell in the 90s. Huawei stayed with this strategy even during the economic recession, which can be seen from the chart below:

Figure 1: R&D Spending of Huawei (rightmost) and other top international players in 2006-2011

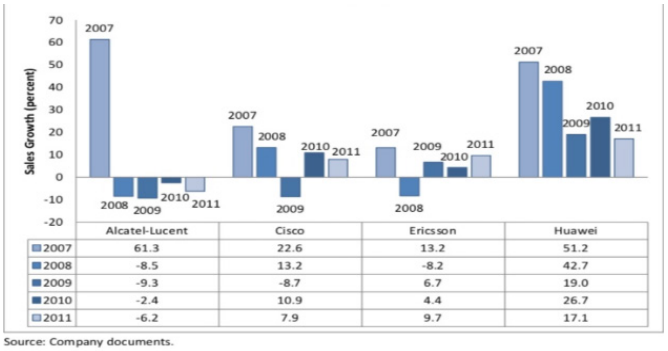


	Alcatel-Lucent	Cisco	Ericsson	Huawei
2006	1,929.82	4,067.00	4,028.71	850.39
2007	4,314.00	4,598.00	4,466.92	1,285.77
2008	3,837.00	5,325.00	4,263.55	1,534.48
2009	3,622.00	5,208.00	4,621.01	1,954.32
2010	3,532.00	5,273.00	4,670.35	2,674.70
2011	3,200.44	5,823.00	4,853.81	3,807.69

Source: Company documents.

Additionally, despite of suffering from the financial crisis from 2007 to 2010, Huawei's sales growth remained positive and moved closer to those of the giant international players. This can be seen from the following chart:

Figure 2: Sales Growth of Huawei (rightmost) and other top international players in 2007-2011



	Alcatel-Lucent	Cisco	Ericsson	Huawei
2007	61.3	22.6	13.2	51.2
2008	-8.5	13.2	-8.2	42.7
2009	-9.3	-8.7	6.7	19.0
2010	-2.4	10.9	4.4	26.7
2011	-6.2	7.9	9.7	17.1

Source: Company documents.

Although the financial crisis from 2007 to 2010 hurt Huawei's sales growth, the company still maintained the growth in R&D spending and delivered other technological breakthroughs:

2007: Huawei achieved global recognition for its mobile Wi-Fi design, receiving the Red Dot Design Award for the E270, and the IF Product Design Award for the E172

2008, November: Huawei E180 was named the "Best Mobile Broadband Product" at the Asia Mobile Awards

2009, February: Huawei debuted its first Android smartphone and announced its cooperation with T-Mobile at the Mobile World Congress in Spain

2010, August: Total shipments of Huawei's mobile broadband products reached 100 million units

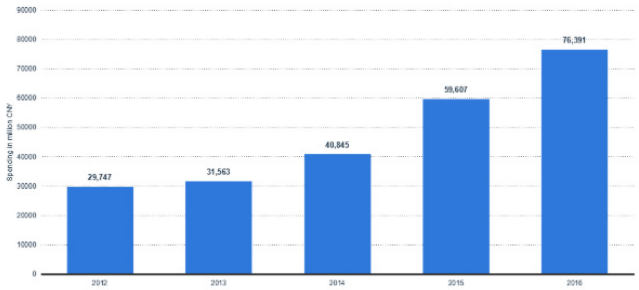
2010, September: Huawei launched its first "IDEOS" smartphone with Google's Android 2.2 at the IFA conference in Germany.

2011, August: Huawei debuted its cloud service, and introduced the world's first cloud-enabled smartphone, Huawei Vision (Huawei).

Along with the technological leaps, Huawei also innovated its own style of management which is

internally called "The silver handcuff". Unlike other technology companies, Huawei does not issue common stocks. Instead, the shareholders of Huawei are Ren Zhengfei and his employees. Based on internal documents from Huawei, Ren Zhengfei owns 1.4% of the total shares and the 82,471 employees own the other 98.6% (Huawei Technology Inc. 2014). Basically, employees can be reward directly from company's growth and thus were motivated at work. Moreover, centralizing all the shares internally allows Huawei to be consistent in its long-term planning without the disturbance from outside shareholders, which is commonly seen in companies issuing common stocks. Here, Huawei again sets another example for a model for management. While most companies favor decentralizing their managerial structure for better functioning and financing, Huawei, on the contrary, is able to mobilize all resources and human power to accomplish its goals. Otherwise, it would not have been able to maintain its positive sales growth and research and development spending during financial crisis in 2010.

Figure 3: Huawei's R&D Spending (2012-2016)



Source: Statista

If we say that the financial crisis in 2010 was an elimination shuffle for the telecommunications industry, then Huawei was one of the unicorns that stayed alive and became unstoppable. As shown by the figure 3 above, by the end of 2016, Huawei's R&D spending had reached a historical peak with equivalently 11, 775.79 million dollars. Another significant news in 2016 was that Huawei had overtaken Apple Inc. with the second largest R&D spending next to Intel (Statista 2016). Additionally, Huawei reported a total of 74,307 patents and 48,758 of them were authorized outside of China. This statistic also ranked third next to Samsung Electronics Co Ltd and IBM Corp in 2017 (Huawei Technology Inc. 2017). Those accomplishments indicated Huawei's transformation from "made in China" to "innovated in China". While the world was finally paying attention to this company, Huawei had been ready for a new chapter.

IV. EMBRACING THE FUTURE: 5G NETWORK (2017- Present)

Now, taking a look back at the last decade, the mobile devices industry has been changed greatly due to the decline of giants like Nokia and the rise of companies like Apple, Samsung and Huawei. Some may argue that every successful company is marked with a signature mobile device. I, rather, argue that those mobile devices are the finalized products of the newest generation of data communication and technology designs. The newer one emerges as a bigger picture than the last: products are the carrier of concepts but technology has already taken off. Since the mobile device industry is experiencing an unprecedented outlook where there is no one obvious leader as of now, the one who offers the solution for the next generation's telecommunication needs will be the leader. The most popular topic right now is the upcoming 5G era. As *IEEE Spectrum* describes, compared to our 4G, 5G telecommunications has been forecasted to have these attributes so far:

A. Millimeter Wave. Millimeter waves use higher frequencies than the radio waves commonly used for mobile phones. They can increase wireless networks' service speed and stabilize the service.

B. Small Cells. Small cells are portable miniature

base stations that can be placed every 250 meters or so throughout cities. Thousands of these stations can prevent signaling from failing.

C. Massive MIMO. MIMO stands for multiple-input multiple output. 5G base stations could send and receive signals from many more users at once, increasing the capacity of mobile networks by a factor of 22 or greater.

D. Beam Forming. It reduces communication interference for nearby users. Depending on the situation and the technology, there are several ways for 5G networks to implement it.

E. Full Duplex. With 5G, it could double the speed of communication and the efficiency.

Those five elements insofar have made up the 5G standards. Recognizing this, some companies in the telecommunications industry have initialized the race. So, where is Huawei's position now? How far can it go? The two charts in the Appendix show that 31 years of incredible growth and development have prepared Huawei for the next 5G era, with its technical contributions to the 5G technology and the scale of its infrastructures. We are yet able to predict the future but insofar, Huawei is ready to embrace the future.

V. CONCLUSION

This article has not covered all of Huawei's stories. Their accomplishments speak louder than words. 31 above years of Huawei's growth lends a lens to China to observe a bigger picture of economic development of the next generation: from growth with quantity to growth with quality; from following to innovating.

Based on Huawei's transformation, we can see a unique culture of the company as a technology vendor in which long-term planning, dedication, and down-to-earth decision making are cultivated. Due to the limited length of the article, only a few salient attributes of Huawei's management are introduced and analyzed. Nevertheless, those attributes deeply reflect Huawei's philosophy of treating employees as the most important assets and putting technological development at top priority over financing.

Other than the uniqueness of its culture, Huawei shares a similar attribute seen in other telecommunications giants like Samsung and Apple: they all put an emphasis on building technologies in their own houses. This idea is very easy to understand but can be hard to realize, as it means a company must endure the loss of certain portions of sales and get almost zero returns for the short run.

APPENDIX

Figure 1:

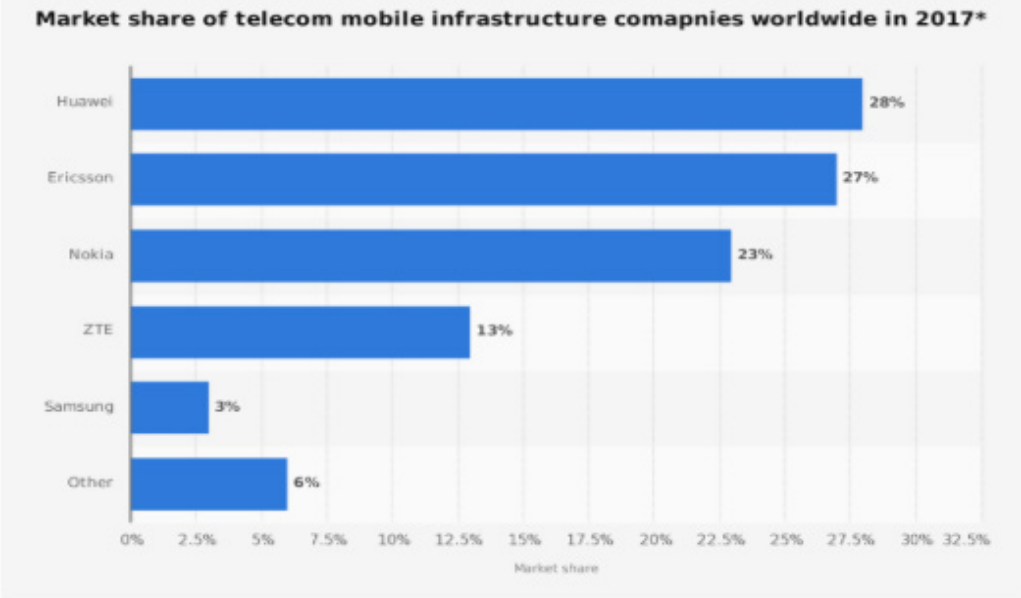
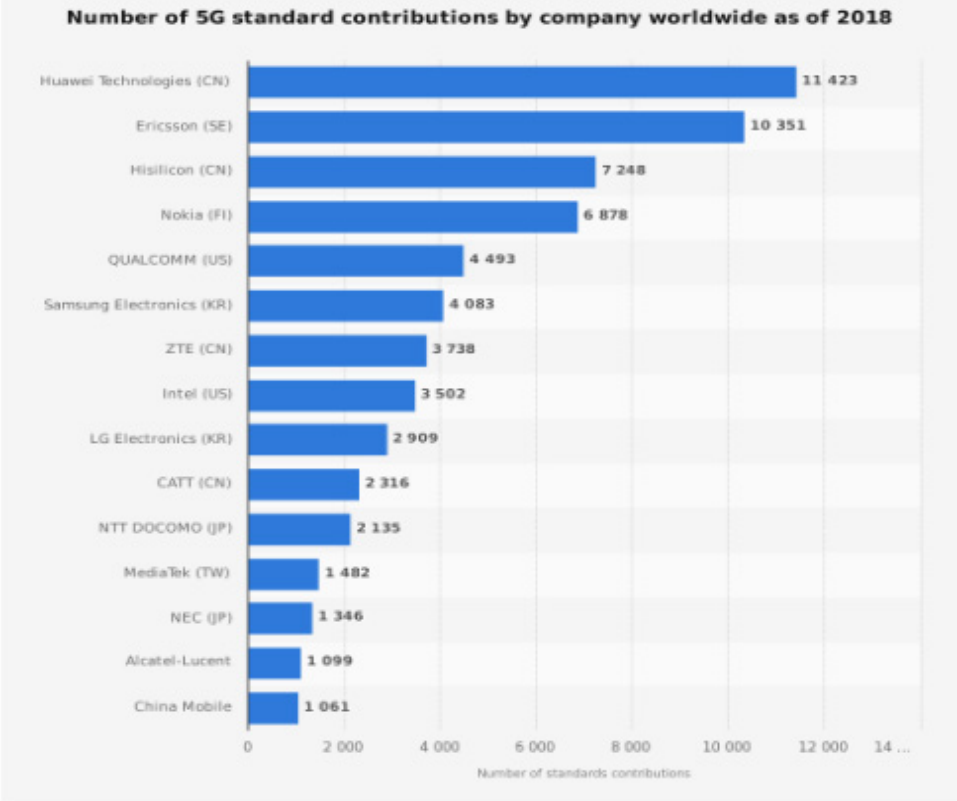


Figure 2:



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