Development and Future Forecast of China's Mobile Phone Industry

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ABSTRACT
This paper studies the development of China's smartphone industry through data collation and chart analysis. In the context of tense Sino-US relations, all Chinese mobile phones are affected by the Sino-US trade war. Among Chinese local mobile phone brands, Huawei, the only company that can design its chips, has been sanctioned and is most affected by the international situation. It is precise because of the turmoil of Huawei's sanctions and the Chinese government's encouragement of technology companies to conduct chip research and development in recent years, other technology companies are investing in their industrial chains, developing their core components, reducing their dependence on the US companies and reducing the impact of being sanctioned. This article predicts that due to the influence of Sino-US relations, the core components of the Chinese smartphone market will still rely on US suppliers in the short term, but in the long run, with the upgrading and improvement of China's industrial chain, this dependence will gradually decrease until the final core components can be produced entirely locally in China.

Keywords*: China, Mobile phone, Chips, Huawei, USA*

1. INTRODUCTION

As one of the most popular mobile devices and an indispensable product for some people, the production of a smartphone involves the cooperation of many suppliers around the world. This kind of supply chain cooperation between countries around the world is also one of the representatives of current economic globalization. But now, due to political factors, China and the United States have many direct conflicts, and the Sino-US conflict has further escalated due to the epidemic, from trade wars to sanctions on various technology companies. Because of this, this has greatly affected the Chinese mobile phone market, and the Chinese mobile phone market and the supply chain manufacturers behind it are also constantly changing. This article will study the problems of China's mobile phone market through data and chart analysis, and predict the development trend of China's mobile phone market.

According to Daniel's market statistics and research, China is the world's largest mobile phone market, with a quarter of the world's shipments in China, and China has the largest number of users in the world. China also has the largest number of mobile phone manufacturers and the fiercest competition. Apple and Samsung cannot maintain the best shipments. Chinese users are approaching global users, and the time spent on mobile phones is increasing year by year [1]. Capone et al. followed the evolutionary methodology and history-friendly model research. The first stage of the development of the mobile phone industry is not easily competed by multinational companies. Low-end ones can accumulate technology, but they cannot create higher-end mobile phones without sufficient technology, which coincides with the market in China twenty years ago. The second stage is the stage of technology accumulation, but there are also new companies that use marketing methods to not accumulate technology, resulting in the inability of technology to catch up with companies that have accumulated. Old companies with technology accumulation only benefit from new marketing-driven companies, destroying the possibility of technology accumulation in the low-end market [2]. According to Maximize industry analysis and forecast, the major players in China's mobile phone market are Huawei, Apple, Oppo, Vivo, and Xiaomi. Thanks to the rapid construction of 5G infrastructure in China, 5G accelerated the sales of mobile phones, and the emergence of 5G broke the previous market saturation. As live streaming sales in China are growing rapidly and gradually becoming an important part of foundry

production, this will also drive the growth rate of online distribution, while Huawei mobile phones further lead the Chinese market [3].

According to the research report of Li and Yi, the user experience of the mobile phone system has an impact on the user's purchase intention. The mobile phone industry is showing a Matthew effect, and people pay more attention to user experience, not just mobile phone brands. The user-centered and people-oriented design concept has attracted more and more attention from the market. What people need is a mobile phone that is user-friendly and pays attention to the user experience [4]. Li, et al.'s research shows that Chinese mobile phone industry enterprises benefit from the globalization of the industrial chain, focus on China, carry out market innovation, and maintain growth advantages, but there are also structural uncertainties. Due to the constraints of the institutional environment, non-state-owned enterprises have chosen the incremental innovation model when seeking competitive advantage in China [5]. Sun et al. concluded from the perspective of the global value chain and found that in the Chinese market, emerging economic companies in the mobile phone industry should focus on R&D and marketing, and be upstream in the industry chain to improve competitiveness and strengthen the National innovation system [6].

Through comparative research design, Park conducted an in-depth analysis of the different determinants of first-mover advantage and late-mover advantage. Comparing Samsung and Apple, he found that market and company-level determinants are more related to first-mover advantage, and product-level determinants are more closely related to first-mover advantage. The late-mover advantage is more relevant [7]. According to Liu's analysis, this comparative case study of Huawei represents China's view as a rising power in the context of tense Sino-US relations: a red threat to hegemony in the eyes of China and the US, resulting in entrenched hostility and mistrust; Complicated by the mix, Huawei's presence on the tech front represents China's cultural divide, but "politicization" is a problem Chinese companies face overseas [8].

According to the paper by Lee et al. the US allies in Asia also follow the US ban and fight against Chinese technology manufacturers together. Australia and Japan are also worried that Huawei's products will touch national security issues. South Korea found no security problems, but under pressure from the United States, it also took some measures. [9]. The paper by Lamberg et al. sees Nokia as a loser in the mobile phone industry. The changing organizational structure makes multiple incompatible technology platforms and development projects compete for resources at the same time, resulting in Nokia's inability to effectively utilize abundant market resources to maintain its market position. Companies have chosen the worst possible time to implement strategic agility and a high degree of technological development [10].

This paper will analyze the Chinese smartphone market, though the shipment data and charts in recent years, from the shipments of Chinese brands, the level of technology behind it, the impact of U.S. sanctions, the degree of dependence on the United States, and the combination of various manufacturers The research and development situation, analyze the problems of Chinese local brands and forecast the short-term and long-term development in the future.

2. CURRENT SITUATION OF CHINA'S MOBILE PHONE MARKET

There are 6.3 billion smartphone users in the world, of which China is currently the country with the largest number of mobile phone users in the world.[11] As can be seen from the data in Figure 1, the number of users in China is close to 912 million, more than double the number of second-ranked India. At the same time, China also has many mobile phone manufacturers, so China is the most representative of the mobile phone market in the world.

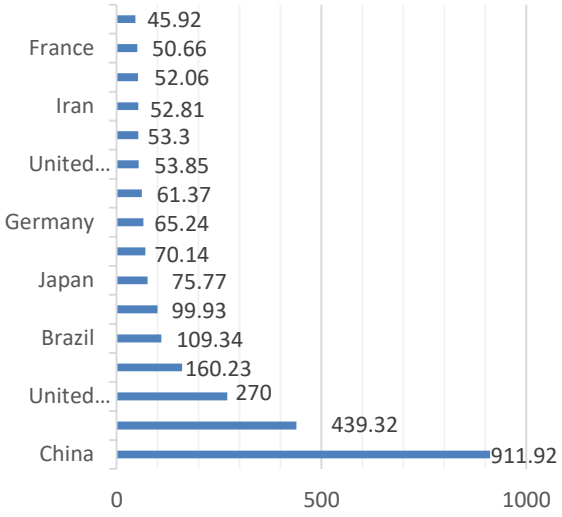

Figure 1. Number of smartphone users by leading countries as of May 2021 (in millions)

As of May 2021, there are 912 million smartphone users in China. The four Chinese manufacturers, oppo, Vivo, Huawei, and Xiaomi, are the top five manufacturers in China in terms of shipments. Mobile phone services in China are provided by the three major domestic telecom network operators, China Mobile, China Unicom, and China Telecom, of which approximately 1.64 billion mobile phone subscribers were registered in China as of November 2021.

2.1 The actual situation and preliminary analysis of the Chinese market.

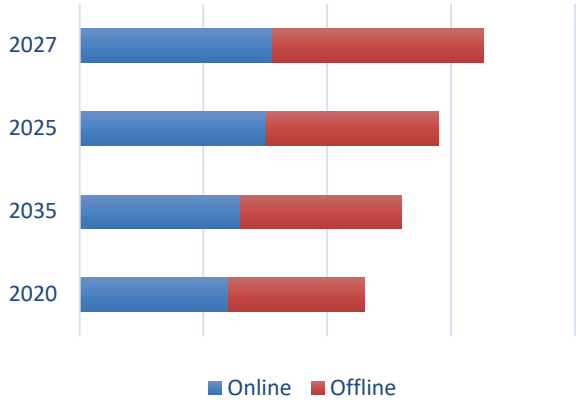

Figure 2. Prediction of the proportion of online and offline sales in the mobile phone market

According to Figure 2, it can be seen that the overall shipment of mobile phones will continue to rise in the future, and the offline advantage will not be replaced by the online, but the overall online shipment will be more.

Table 1. China Smartphone Market Share(%) by Leading Vendor from 2018 to 2020 [3]

	2018	2019	2020
Huawei	26.40%	38.40%	38.30%
Xiaomi	13.10%	10.90%	12.00%
Apple	9.10%	8.90%	11.10%
Vivo	19.10%	18.10%	17.70%
Oppo	19.80%	17.10%	17.40%
Other	12.80%	6.50%	3.50%

According to Table 1, the data can be obtained. China is one of the world's leading smartphone manufacturers and is expected to continue growing rapidly in the future. Xiaomi, OnePlus, Oppo, Realme, Huawei, Honor, Vivo, and in are Chinese smartphone brands. Except for Samsung and Apple, Chinese brands dominate all other markets. Among them, Huawei is the mobile phone brand with the largest market share in China, accounting for more than 38%.

China is one of the global leaders in 5G adoption due to the rapid deployment of the technology. In 2020, the number of 5G connections in the region has exceeded 200 million, accounting for 87% of the world's 5G connections. Aggressive network deployments and a robust device ecosystem are helping drive 5G adoption in China. Despite Covid-19, Chinese operators installed more than 600,000 new 5G base stations in 2020 and plan to install more in 2021. 4G adoption in China has peaked due to the rapid transition to 5G. 4G adoption declined for the first time in 2020 and is expected to continue to decline over the forecast period as consumers switch to richer 5G services. Chinese consumers are more enthusiastic than consumers in any other market to upgrade to 5G. This is due to the growing proportion of 5G equipment sales in mainland China: 163 million 5G mobile phones were sold in 2020, accounting for about 53% of total smartphone shipments.

In the first half of 2021, online retail sales of smartphones in China accounted for 31% of total market shipments. Full-year 2021 online retail sales are expected to be slightly lower than in 2020, but revenue will climb. From the fourth quarter of 2020 to the first half of 2021, 5G-enabled phones conquered the market. However, most target 5G users have already upgraded their phones. The replacement cycle for smartphones in China is 26-30 months, and the market is close to saturation. E-commerce in China is entering a new era. Sales through live streaming and online sales have grown rapidly since the second half of 2020, and are expected to continue to be an important part of smartphone sales in 2022. In today's China, smartphone OEMs must have a modern and complete e-commerce channel plan. The growth of online distribution channels is expected to be the key driver driving the smartphone market in China from 2022-to 2027.

3. THE TECHNOLOGY OF CHINESE MOBILE PHONES AND THE AMERICAN TECHNOLOGY BEHIND IT.

Shipments of Chinese brand mobile phones ranked first in the world. But the technology suppliers behind these smartphones are not primarily from China. Among all the mobile phone parts, the central processing unit is the most critical part. It helps the phone to perform various data operations. Every time the screen is refreshed, all instructions are processed by the central processing unit every time the software is started. In the current mobile market, only a few companies can make smartphone CPUs, Qualcomm, Apple, Samsung, Kirin, and MediaTek. These are the suppliers of mainstream mobile phone processors in the world. In China, Qualcomm and Apple Kirin occupy all of the high-end mobile phone markets.

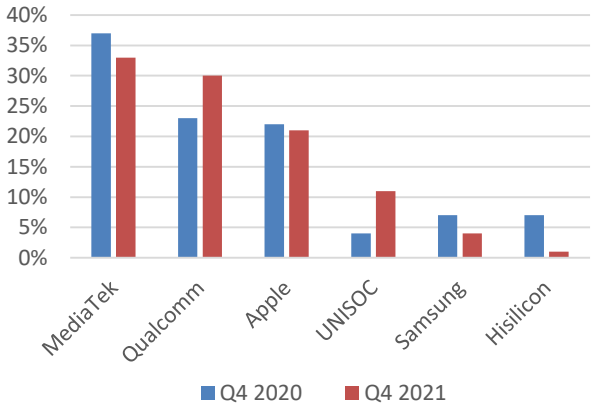

Figure 3. Smartphone SoC（System on Chip） Market in Q4 2021

According to the information in Figure 3, MediaTek occupies the No. 1 position in smartphone SoCs with a market share of 33% in the fourth quarter of 2021, but MediaTek does not have a high-end chip that has shipped on a large scale. Qualcomm ranks second with a market share of 30%. Due to the active promotion of 5G development by various mobile phone manufacturers, Qualcomm dominates the vast majority of 5G high-end SoCs. Although Apple ranks third, all of Apple's chips are their own. For use, not for sale. Chipmaker UNISOC in mainland China has made great progress due to policy support, while HiSilicon has also declined due to international disputes.

4. CHINESE CPU MANUFACTURER

No company in China can manufacture these leading semiconductors of this size. They will have to rely on three companies - Intel in the US, TSMC in Taiwan, and Samsung in South Korea. China's largest chipmaker SMIC is still years behind its company in manufacturing technology. But it's not just manufacturing. Even companies like TSMC and Intel rely on other companies for their manufacturing process equipment and tools. In this area, power is concentrated in the hands of a few: Dutch company ASML is the only company in the world capable of building the machines chipmakers need to make state-of-the-art chips. Huawei designed its smartphone processor, the Kirin. But just by designing the chip, it is still impossible to make them, and it still needs the help of TSMC to complete a chip. Kirin's chips, often based on the latest technology, have helped Huawei become one of the world's largest smartphone makers. However, the United States added Huawei to a trade blacklist known as the Entity List in 2019, severing the Chinese company from some U.S. technology.[12] Last year, Washington introduced a rule requiring foreign manufacturers using U.S. chipmaking equipment to obtain a license before they can sell semiconductors to Huawei.

4.1 China's political situation affects the mobile phone market

As shown in Figure 4, UNISOC is currently the chip manufacturer with the largest mobile chip shipments in mainland China. UNISOC started to develop actively because of 5G. It is the only 5G general-purpose chip supplier in the open market in mainland China. With the continuous promotion and application of 5G technology scenarios, head chip manufacturers have gradually withdrawn from the 4G market. UNISOC is expected to gain more shares, ranking third in the 5G public market share. However, UNISOC's chips are all developed around 5G. 5G is important, but UNISOC does not have other types of chips required by mobile devices, such as central processing units.

The only manufacturer in mainland China capable of designing 5nm SoC chips for mobile phones is Huawei HiSilicon. The system-on-chip integrates the key core parts required by smartphones into a small chip, which can greatly save the internal space of the mobile phone. The most difficult part of this is the CPU processor. The Kirin series of processors has always been Huawei's largest chip. At a time when the shipments of Huawei HiSilicon have been rising year by year, the relationship between China and the United States has deteriorated, and Huawei has also become the target of attack.

In May 2019, Huawei was added to the "entity list" by the US government, but Huawei still passed the first sanctions through the cooperation of third-party companies, but in May 2020, the new sanctions made it impossible for Huawei to use the United States. Electronic products developed or produced by technology. This was a devastating blow to Huawei's chip manufacturing, ending a partnership between TSMC, one of the world's largest semiconductor makers, and Huawei [13]. This makes it impossible for Huawei to manufacture its own designed chipsets, and there is no company in mainland China capable of producing the chips that Huawei HiSilicon needs.

Because the relationship between China and the United States is gradually tense, the development of China's high-tech industry has been affected. The United States owns most of the technology patents in the chip field, and Chinese companies in these fields have been seriously affected without exception. Because of the relationship between China and the United States, China is also hostile to more countries in the world. All the allies of the United States have reduced their exchanges with China without exception. This also forces Chinese technology companies to develop independently and reduce their exposure to foreign countries' help. At the same time, the Chinese government has also launched series of policies to encourage and support the development of Chinese technology companies.

4.2 Predictions for the future

The gradual deterioration of the relationship between China and the United States will affect the development of China's smartphone industry to a certain extent. Huawei, the only Chinese mobile phone manufacturer that can design an independent SoC, cannot manufacture it. But even so, because of Huawei's sanctions, Chinese mobile phone manufacturers are beginning to use more of China's local technology supply chain. Moreover, Xiaomi and OPPO are also preparing to make their mobile phone chips to reduce the need for American technology, but because of Huawei's experience, they may question their supply chain [14]. However, because of the Huawei incident, Chinese mobile phone manufacturers have felt pressure and crisis. They cannot rely too much on American technology suppliers, which also makes the future of Chinese mobile phones more clear. Maybe Xiaomi and OPPO are the next mobile phone manufacturers to be sanctioned by the United States, but they also know more about what they need, and they can cultivate their own more complete supply chain technology when they can develop and cooperate. Therefore, the future of Chinese mobile phone manufacturers is bright, but it is also full of crises. The relationship between China and the United States cannot go back to the past, and China's technology industry will continue to be attacked by the United States. For now, China's mobile phone industry will still be suppressed in the short term, and mobile phone manufacturers can only use Qualcomm chips, including Huawei. But the future is not. More and more manufacturers are now beginning to reduce their dependence on American technology. This move is of great help to the future of China's mobile phone industry.

5. CONCLUSION

This paper studies the development of China's smartphone industry through data collation and chart analysis. In the context of tense Sino-US relations, all Chinese mobile phone manufacturers have been affected because of the US sanctions. Among them, Huawei, which can independently design chips, has the greatest impact. Other manufacturers are also trying to develop chips, but the impact of Huawei's sanctions hinders development. This paper speculates that the conflict between China and the United States in the Chinese mobile phone market will be affected to a certain extent. In the short term, manufacturers capable of designing chips will not be able to mass-produce them in time and can only use American chips. However, from a long-term perspective, various Chinese manufacturers are also Cultivate different chip production chains to avoid dependence on the United States to a certain extent and prevent the impact of future sanctions. Also because of the government's encouragement and support, more manufacturers are trying to make chips. Under the promotion of the government, the process of chip production will be further improved. Chinese mobile phone manufacturers will also have more choices and will not be continuously affected by the United States.

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