How China's High-Tech Industry Breaks through under Sino-US Trade Friction: The Case of Huawei

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Abstract. The various measures of the United States under the Sino-US trade friction are a precise blow to China's high-tech industry, so it is vitally important to study how to break through of the high-tech industry under the Sino-US trade friction. This paper takes Huawei Technologies Co., Ltd (hereinafter referred to as Huawei) as an example. It proposes countermeasures at the enterprise level by studying Huawei's countermeasures. The results of the study conclude that the most important thing is to increase R&D (research and development) expenses and introduce talents to enhance the enterprise's R&D capability to avoid being constrained by others, in addition to which when the R&D capability has apparent advantages in the global scope, there will be no lack of sales channels and partners. Moreover, enterprises also need to have a forward-looking, prepare for the worst, and adequate stock to ensure that the short-term can continue operating the industry. Furthermore, suppose Chinese companies cannot work with U.S. high-tech companies or sell in the U.S. because of sanctions. In that case, they should actively seek other partners and expand sales in their significant markets to mitigate the impact of reduced U.S. consumption.

Keywords: Sino-US trade friction; High-tech industry; R&D capability.

1. Introduction

Bilateral trade tensions have been on the rise recently as a result of the swift development of China-US economic and trade relations. The trigger of this trade friction between China and the U.S. studied in this paper was on August 18, 2017, when the U.S. formally announced the launch of the "301 investigation" against China in the areas of technology transfer, intellectual property rights and innovation. And on March 23, 2018, Trump announced a tax increase on $60 billion of Chinese imports and restrictions on Chinese companies investing in or merging with U.S. companies, and the U.S.-China trade war was officially launched. From then on, the U.S. imposes three rounds of high-priced taxes on about $360 million of Chinese goods. This included high-tech products such as aerospace, information and communication technology, and machinery.

The trade friction between China and the United States has caused much impact on many industries in China, and this paper will focus on how the high-tech industry should break through under the trade conflict between the United States and China. The high-tech industries of China and the United States had a large gap before the current trade friction between China and the United States. It is widely known that the United States is far more advanced in science and technology than China, Yang used the CES production function and standardized supply surface system method to measure the difference in industrial technology between China and the U.S. from 1995 to 2009 and concluded that the technology gap between China and the United States expanded about 2.9 to 3.0 times during the studying period [1]. Although the U.S. is stronger than China in terms of independent innovation and R&D, and high-technology, China also has some advantages in high-technology trade, it has many consumers and thus a wide market space, and is able to accelerate the pace of marketization, industrialization, and scaling of basic research results according to popular demand. The advantage of the U.S. innovation system is its deep technological heritage and rich talent pool, which allows it to focus on long-cycle and high-risk frontier technology exploration. This can indicate that the United States and China each have complementary high-tech trade advantages [2]. Furthermore, Li et al. argue that the U.S. side began to strike China's high-tech industry with precision precisely because the two countries have shifted from complementary trade to competitive trade, and trade frictions

have shifted from general to competitive frictions, and the complexity and long-term nature of the frictions have gradually increased [3].

It is an important and meaningful issue to study how China's high-tech industry should break through under the trade friction. Using Huawei as an example, this paper will examine how China's high-tech industry might overcome the trade tensions between China and the US by looking at Huawei's reaction strategies.

2. Trade Friction History and Relevant Literature

In 2017, before the U.S. formally raised tariffs on China, Ren argued that the primary economic motivation for the “301 investigation” was the U.S. attempt to narrow the trade deficit with China, and reduce China's industrial modernization and the country's economic growth velocity [4]. Some subsequent quantitative studies on the 2018 U.S.-China trade friction through the GTAP model also support Ren's view. Xiao used the GTAP model to simulate the long-term and short-term economic impacts of the trade frictions between China and the U.S. in 2018 and found that China's emerging industry sectors were hit harder in the two rounds of trade frictions, with the output of high-tech industries such as electronic equipment and machinery and equipment declining by 1.14% [5]. Through the GTAP model, Zhang et al. examined the effects of US-China trade tensions on China's key industries, and the results showed that China is in a crucial stage of industrial upgrading, and the rapid growth of high-tech industries gives the country's economy a new boost and serves as a crucial foundation for high-quality development, while trade tensions between the U.S. and China have a significant negative impact on the country's high-tech sector [6]. In addition, the U.S. policy after the first tariff increase in March 2018 also fully illustrates that the various U.S. moves against China on trade are precise strikes against China's high-tech industry. On April 16th, 2018, the U.S. Department of Commerce imposed a seven-year export restriction on ZTE of items from American companies that are used in telecommunications. On the following day, additional steps were taken by American regulators to forbid mobile operators from utilizing federal subsidies to buy any telecom equipment made in China, including Huawei and ZTE Corp. (And in May 2019, the U.S. Department of Commerce launched sanctions against Huawei, adding it to the list of entities for the first time. Making it impossible to obtain products with a U.S. technological component of more than 25%, the sanctions escalated again in August of the same year, with the U.S. further restricting Huawei by including 28 Huawei-affiliated companies on the entity list. This was followed in May 2020 by the re-listing of 33 organizations and individuals involved in cybersecurity and A.I. by the U.S. Department of Commerce's Bureau of Industry and Security). All of these measures have contributed to the segregation of the U.S. and Chinese technology markets from each other and the competition between them, and the "technology ecology" is no longer tight [7].

China's high-tech industry has suffered greatly as a result of the numerous US actions taken in response to the Sino-US trade conflict. This paper summarizes the previous research into the following three aspects.

2.1 China’s Imports from the United States

The Trump administration expanded the authority of the Department of Commerce by amending the Export Control Act in August 2018 to establish a control system for the export, re-export, or transfer of 14 high-tech products and technologies, including artificial intelligence. And in May 2019, it signed executive orders such as "Securing the Supply Chain of Information and Communication Technologies and Services" to implement chip cutoffs for ZTE and Huawei. The above moves have led to the fact that it will be more difficult for China to import high-tech products from the U.S., and the U.S. moves are likely to create overseas resource allocation risks for China's high-tech industry due to its stronger dependence on overseas markets [8]. This also forcibly changes the former interdependent cooperation model of the industrial chain of high-tech enterprises in China and the United States.

2.2 China's ICT Products Exported to the United States

China's high-tech products export profitable products are concentrated in ICT, as of the end of 2018, China's ICT goods exports amounted to $681.129 billion, accounting for 91.67% of all high-tech products exports, there is a certain structural imbalance. Moreover, the U.S. includes companies like Huawei and ZTE, which are mainly in the communication technology business, in the list of entities and interferes with their regular operation with measures such as chip cut-off, which will seriously affect the export of ICT products. Meanwhile, the U.S. imposed three rounds of high tariffs on about $360 billion of Chinese goods in 2018 ware, which is also very unfavorable for Chinese high-tech products out of the country. In addition, Chinese high-tech products export enterprises are still mainly wholly foreign-owned and Sino-foreign joint ventures, foreign-funded enterprises export scale is affected by small but product upgrading power or weakened. If so, domestic enterprises will be able to absorb less new technology from foreign enterprises [2].

2.3 Chinese Investments in U.S. High-tech Industry

The Trump administration has used the Foreign Investment Risk Review Modernization Act to expand the authority and resources of the Committee on Foreign Investment in the United States (CFIUS). CFIUS has restricted Chinese companies from investing in high-tech industries, such as the communications technology industry on the grounds of "better protection of sensitive technologies critical to U.S. national security. This move makes it more difficult and obstructive for Chinese high-tech industries to invest in the U.S. and increases legal risks [9] and additional high investment costs due to enforcement uncertainty [10].

2.4 Measures

Scholars have also provided some adverse on Chinese high technology in the US-China trade friction. Liu suggests that the foreign investment environment should be improved to reduce the systemic risks faced by foreign inflows in China. In this way, foreign investors can be encouraged to establish R&D centers in China and direct the flow of high-tech industries to China to mitigate the impact of China's exposure to U.S. export controls [11]. In addition to the introduction of foreign high-tech technologies, Li et al. argue that China needs to improve its independent R&D capabilities more. First of all, China's research management system needs to be improved to enhance innovation efficiency. China's highly centralized management system has caused widespread problems, such as a mismatch of academic resources and redundancy of management links. What's more, China needs to improve the talent training system, allocate educational resources flexibly, and create a group of world-class higher education institutions with outstanding scientific research capability and strong professional competitiveness to cooperate with enterprises and conduct talent attraction to enterprises [3].

From the above summary, it can be seen that current scholars have studied the adverse impact on China's high-tech industry in the Sino-US trade friction, but most of the measures proposed are at the macro level of the national government, and few countermeasures are proposed at the enterprise level. This paper takes Huawei as an example and discusses how Huawei should break through in the Sino-US trade friction.

3. Analytical Framework

3.1 Case Description

Huawei, a top global supplier of ICT infrastructure and smart terminals, was founded in 1987. At the moment, Huawei employs around 195,000 people and serves more than 3 billion people globally through operations in more than 170 countries and regions. Huawei aims to create an intelligent, interconnected world by bringing the digital world to every individual, family, and enterprise. As a result of the trade disputes between the United States and China, Huawei was placed on a U.S. list of

entities and was subject to chip cutoff regulations. In addition, Huawei's Chief Financial Officer Wanzhou Meng was arrested in Canada and extradition was requested by the U.S.

Nie et al. found that the impact of Sino-US trade friction on the export of Chinese high-tech products is concentrated on the foreign development of private enterprises' ICT industry [2]. Huawei, as the largest private ICT enterprise in China, has been adversely affected by China-US trade frictions in many aspects, so it is significant to study and analyze Huawei.

3.2 Huawei's Problems under Trade Friction

In this section, the study will analyze the problems brought by the trade friction between China and the United States to Huawei from three aspects: product development and production, sales, and foreign investment and cooperation.

3.2.1 Product development and production

Huawei, as a company included in the list of entities by the United States, not only chips such as the core components of the phone was cut off, even the former Android system, which was free for the whole society to use, was also banned. The importance of the operating system and the chip is self-evident, and the sudden cut-off and disabling of the chip and the operating system makes many people think that this is the end of the road for Huawei. The U.S. export controls on China have also made it more difficult for Huawei to obtain overseas resources for research and development.

3.2.2 Sales

The U.S. government and the Department of Commerce have repeatedly blocked and interfered with a number of Huawei's major business partnerships in the U.S. In March 2018, Best Buy, the largest electronics retailer in the U.S., began halting purchases of Huawei phones and stopped selling Huawei products. The U.S. National Defense Authorization Act for Fiscal Year 2019, which Trump signed in August 2018, forbids all U.S. federal agencies from acquiring goods and services from Huawei. In addition to this, the U.S. imposed three rounds of high-priced tariffs on approximately $360 million of Chinese goods that also affected exports of Huawei-related products in the U.S. As shown in Table1, Huawei's sales in the Americas in 2020 are 24.5% lower than in 2019, while Huawei's sales in the Americas in 2021 are 26.3 %lower than in 2020, which is closely related to the measures implemented by the U.S. in the U.S.-China trade friction.

Table 1. Huawei's sales in each region (RMB million)

Region	2016	2017	2018	2019	2020	2021
China	236512	312,532	372,162	506,733	584,910	413,299
Europe, Middle East, Africa	156,509	164,603	204,536	206,007	180,849	131,467
Asia Pacific	67,500	71,199	81,918	70,533	64,369	53,675
America	44,082	39,470	47,885	52,478	39,638	29,225
Other	16,971	15,817	14,701	23,082	21,602	9,141
Total	521,574	603,621	721,202	858,833	891,368	636,807

(Source:2016-2021 Annual Report of Huawei)

3.2.3 Foreign investment and cooperation

The U.S. government has used the Foreign Investment Risk Review Modernization Act to expand the right of the Committee on Foreign Investment in the United States (CFIUS) to limit Chinese companies' investments in U.S. ICT and other high-tech industries, making it more difficult for Huawei to invest in U.S. high-tech industries. In terms of cooperation, in January 2018, Huawei was ready to announce a cooperation agreement with U.S. telecom operator AT&T at the big CES show in Las Vegas. But at the last minute, AT&T announced that it was dropping its cooperation with Huawei. After preventing its own companies from accepting Huawei's investment and cooperation, the U.S. also interfered with other countries' cooperation with China. In March 2019, U.S. Secretary of State Mike Pompeo told the Philippines not to enter into a partnership with Huawei, citing its lack of transparency as a risk to the Philippines. And in May 2019, Pompeo urged the U.K. to ban Huawei's

participation in 5G construction. All the restrictions and interference from the U.S. have made it extremely difficult for Huawei to invest and cooperate with the U.S. and U.S. Friend Countries.

3.3 Huawei's Response Strategies

3.3.1 Product development and production

In the face of such tremendous pressure as chip outages and OS bans, Huawei is operating normally for several reasons. In the short term, Huawei had learned from the lessons of ZTE and stockpiled 1~2 year of spare parts before the chip supply was cut off. In the long run, Huawei anticipated this crisis early, launched a very early self-developed Harmony terminal operating system, and Huawei Kirin SOC chip and Apple, Qualcomm, etc. are also at the world's leading level, while Huawei also released the final End Baron 5G baseband chip. It can be inferred from Huawei's response that Huawei has been focusing on R&D for a long time, and this can also be proven by Huawei's R&D spending in recent years, as shown in figure 1, it can be seen that Huawei's R&D expenses have been increasing year by year in recent years, and the percentage of annual revenue also shows an overall upward trend. In addition, Huawei's research staff always accounts for about fifty percent of the total employees, both of which are good indicators of the importance Huawei places on R&D.

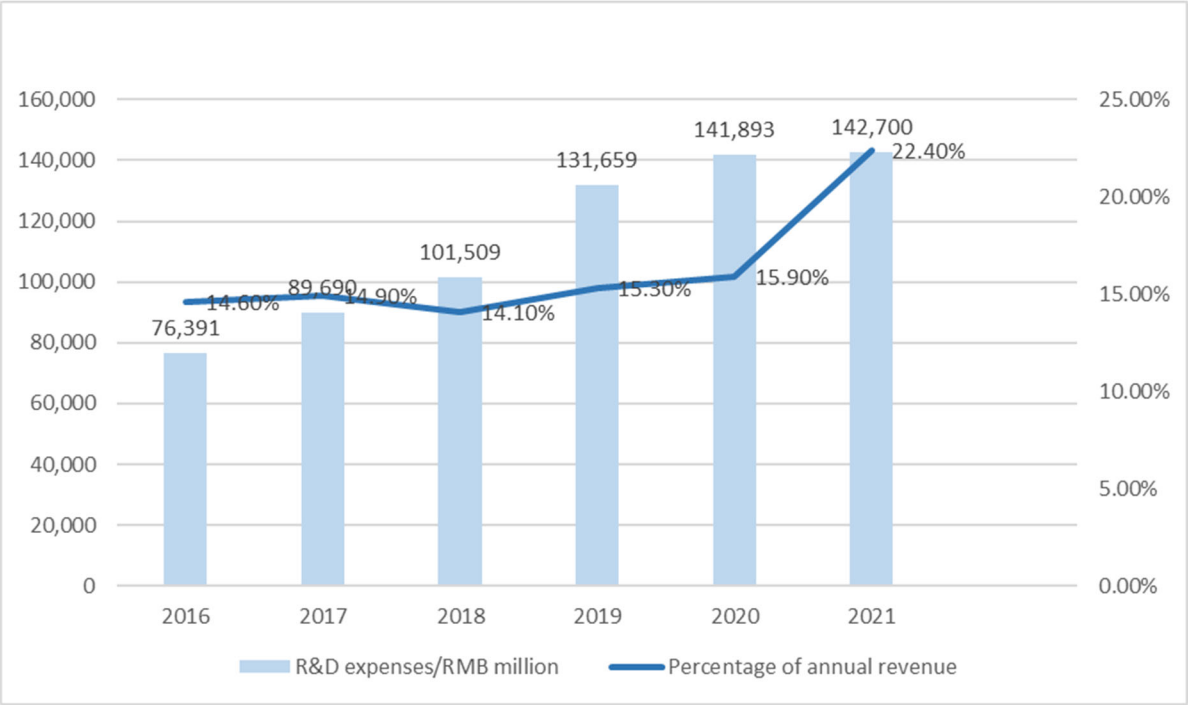

Fig. 1 Huawei's R&D Expense in Recent Years
(Source: 2016-2021 Annual Report of Huawei)

From Huawei's response strategy, it is not hard to speculate that high-tech enterprises need to have foresight in the face of trade friction between the United States and China and prepare for the worst possible actions taken by the United States and prepare for measures in advance. To avoid being constrained by others, it is crucial to fully comprehend the value of independent innovation and R&D, increase the budget allocated to it, bring in high-tech people, and strengthen the enterprise's independent innovation and R&D skills.

3.3.2 Sales

From Figure 2, it can be seen that the trade friction between the U.S. and China has had a significant impact on Huawei's exports to the U.S., but it can also be seen that the Americas is not Huawei's main market, as Huawei's sales are more concentrated in China and Europe, the Middle East and Africa. Huawei can design products for its main markets to meet the needs of consumers in its main markets in order to mitigate the damage of reduced sales in the Americas. In addition, the

core technology is also the most critical to selling products. As Huawei's dominant 5G technology is about to be rolled out globally on a large scale, companies such as Intel, which previously cooperated with U.S. sanctions against Huawei, have been very active in expressing their willingness to cooperate with Huawei. This shows that products with obvious advantages in core technology are also subject to less trade friction between China and the United States.

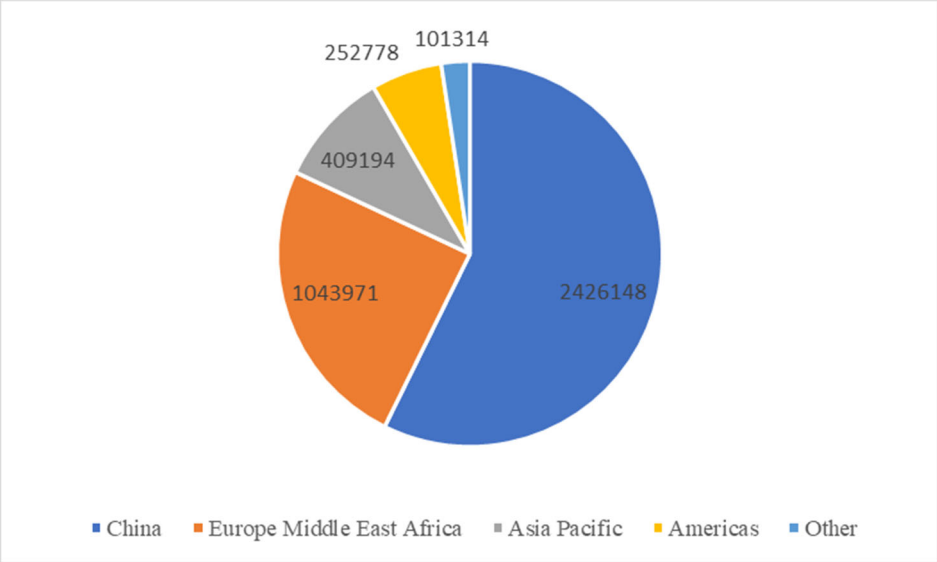

Fig. 2 Total sales of Huawei in Various Regions from 2016 to 2021(RMB million)
(Source: 2016-2021 Annual Report of Huawei)

In this way, it can be seen that high-tech companies can expand their consumption in their main markets by studying the demand of consumers in their main markets to offset the decrease in consumption in the Americas. The most important thing is to develop products with absolute advantages because there is no lack of market for products with absolute advantages.

3.3.3 Foreign investment and cooperation

Regarding investment and cooperation, Huawei's principles are that in the future, if the United States allows Huawei will continue to invest and cooperate with U.S. high-tech enterprises. However, if the situation really does not allow, Huawei will also seek other suitable cooperation and investment objects. In addition, the most important thing is to strengthen their core R & D capabilities, using their strong capability to make partners come forward to seek cooperation.

In this way, it can be concluded that high-tech enterprises can seek other alternative investment enterprises and partners when they face obstacles to investment and cooperation with the United States. But the most important thing is to strengthen their own R&D capabilities.

4. Conclusion and Discussion

By studying Huawei's various countermeasures in the U.S.-China trade friction, this paper summarizes the coping strategies of Chinese high-tech enterprises in the face of various problems brought about by the U.S.-China trade friction from the perspective of enterprises. In terms of product development and production, it is important to be forward-looking in the short term, to plan for the worst, and to ensure adequate stocking to allow normal operations in the short term. But in the long run, to recognize the importance of having independent R&D capabilities, to improve research and development funds to introduce talent, the core technology into the hands of the enterprise itself, to avoid being constrained by others. As for sales, companies should study the needs of consumers in their major markets, launch products that meet their needs, and increase sales in major markets to mitigate the impact of declining sales in the Americas. Regarding foreign investment and cooperation, high-tech companies facing obstacles to investment and cooperation in the U.S. can go for other

alternative investment companies and partners. But all in all, R&D capability is the most important, and when a company's R&D capability advantage is extremely obvious, there will be no lack of sales channels and partners.

However, the study also has some limitations, as the U.S. is still sanctioning Huawei now, and Huawei's total sales for the Fiscal year 2021 are also affected, down 28.6% from 2020. Huawei's various countermeasures did not make Huawei face bankruptcy, but the profits were also affected to some extent. Huawei's countermeasures to sum up the effectiveness of the countermeasures of Chinese high-tech enterprises facing various problems brought about by trade friction between China and the United States still need time to test. But in general, Huawei has done an excellent job in the face of many people who feel that it is a disaster and can resist the pressure of regular operation, and Huawei's countermeasures still have some reference.

In general, the Sino-US trade frictions did have a significant impact on China's high-tech industry, but at the same time, Sino-US trade frictions have also caused many adverse effects on the United States. It can be seen that the overly intense US-China trade frictions have caused a great impact on both countries, and only cooperation and making full use of the complementarity of industries in China and the U.S. can achieve the greatest win-win situation.

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