ISSN 2959-6149

The Impact of the China-US Trade Friction on Vietnam's Chip Industry

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Abstract:

The impact of the China-US trade friction on the world has received widespread attention, but there is still insufficient focus on the Vietnamese chip industry. This article analyzes the impact of China-US trade on Vietnam and the background, development, challenges, and measures of Vietnam's chip industry. This article argues that the China-US trade friction has brought development opportunities to Vietnam's semiconductor industry. Many semiconductor companies have chosen to open factories and expand production in Vietnam, and Vietnam's semiconductor market has also expanded. However, Vietnam has problems such as inadequate infrastructure, a weak technological foundation, government policies that are not suitable for foreign investment, and a lack of human resources. Based on this, this article proposes the following suggestions: Vietnam needs to actively seek cooperation with major countries, the government needs to play a coordinating and important investor role, Vietnam needs to strengthen infrastructure construction, Vietnam needs to promote technological innovation, and Vietnam needs to strengthen the training of high-end talents.

Keywords: Vietnam developing chip industry, US-China relations, US-Vietnam relations, China-Vietnam relations

1. Introduction

In this era of continuous globalization of the world economy, with the rise of the Chinese economy, the global economic landscape is changing, and the position of the United States in the global economy is also facing challenges. The trade relationship between the two countries is gradually changing. China and the United States are the world's largest and second-largest economies, respectively. The trade relationship between China and the United States is an important component of the world economy. In recent years, the trade relationship between China and the United States has sharply declined, and the trade friction between China and the United States has attracted widespread attention from the world. The trade friction between China and the United States is an important manifestation of competition between the two countries. The trade friction between the two major powers has had a huge impact on the world economy and has had a significant impact on both countries and even the global economy. Vietnam is one of the countries deeply affected by the trade friction between China and the United States. The impact of the China-US trade friction on Vietnam is very extensive, and this article will focus on the chip industry. In the competition between China and the United States, the United States has imposed sanctions on China's high-tech industry development through measures such as strengthening export controls and strict investment reviews. As a target of competition between China and the United States, Vietnam's domestic chip industry has also been affected.

This article aims to explore the impact of the China-US trade friction on Vietnam's chip industry, involving multiple aspects such as politics, economy, technology, and talent. This article first explores the impact of the China-US trade friction, and then focuses on exploring the development of Vietnam's chip industry in this context, whether it is advancing or regressing, as well as the challenges and specific response measures faced by Vietnam.

2. Background of Vietnam's Semiconductor Development

Vietnam's semiconductor industry started early but developed slowly. Looking back at the development history of Vietnamese semiconductors, Vietnam had semiconductor foundries during the Cold War. After 2004, foreign-invested enterprises began to sporadically enter Vietnam - Intel

and Samsung also set up plants in Vietnam early on. However, after more than a decade of development, Vietnam's semiconductor production is still mainly concentrated in packaging and testing parts. What is more important is that domestic Enterprises were growing slowly. They were not only incapable of competing with foreign-funded enterprises but also difficult to participate in the production chain of advanced enterprises. After the outbreak of China-US trade friction, Vietnam became a focus for international semiconductor companies to shift their industries. At this point, Vietnam already has some potential for the development of the semiconductor industry, including the process of digital transformation, a developed electronics manufacturing industry, and long-term labor advantages.

2.1 Vietnam's Digital Transformation

Vietnam's certain digital foundation is a favorable background for its semiconductor development. The government made a proactive decision to move towards Industry 4.0 in 2017, calling for digital transformation and intelligent governance, emphasizing the construction of digital communication infrastructure, and requiring the cultivation of creative talents who can grasp the trends of technological development [1]. After the policy directive was issued, the Vietnamese government identified specific technologies for priority research and development. In 2021, digital technology ranked first on the list of high-tech technologies approved by the Prime Minister. Besides, related public services are also being continuously followed up. The Ministry of Information and Communications launched a total of 38 Vietnamese manufacturing platforms in 2020, most of which are in the field of digital technology [2]. Through the efforts of the government, the digital level of Vietnamese society has significantly improved. For example, from 2017 to 2022, the penetration rate of information and communication technology (ICT) in Vietnam has increased from 46% to 90.5%, and the utilization rate of ICT has increased from 35.1% to 62.2%. In 2022, the utilization rate of ICT in Vietnam has approached Thailand (72.9%) and Malaysia (73.9%), far exceeding the Philippines (47.6%) [3]. On the one hand, Vietnam's digital transformation goals have led to an increasing demand for the development of semiconductors. On the other hand, Vietnam's digital transformation also provides a favorable business environment for foreign-funded enterprises.

2.2 Vietnam's Flourishing Electronic Manufacturing Industry

The semiconductor industry is a part of the electronics industry, and Vietnam's flourishing electronics manufacturing industry has the opportunity to attract its upstream semiconductor industry. For example, Samsung's business in Vietnam covers various fields such as semiconductor manufacturing and assembly of electronic product components. According to the National Bureau of Statistics of Vietnam, from 2016 to 2020, Vietnam's exports of electronic products, computers, and components grew at an average annual rate of 23.8%. This has elevated Vietnam's electronic product exports from 47th place in 2001 to 12th place worldwide, ranking third in the ASEAN [4]. Although Vietnam still focuses on the assembly of electronic products in the field of electronic information, this lays the foundation for its future upgrade towards manufacturing and design. Vietnam is also accumulating technology, experience, and capital for domestic enterprises, preparing for industrial upgrading.

2.3 Vietnam's Labor Advantage

Both electronic processing and semiconductor packaging are labor-intensive industries. Therefore, the dividend of the Vietnamese labor force remains an important condition for attracting overseas semiconductor companies. In the coming decades, the number of working-age people in Vietnam will still exceed the number of dependents. According to the United Nations Population Fund, the demographic dividend of Vietnam will continue until 2040. In addition to sufficient quantity, the quality of Vietnam's labor force is also relatively high, with a large number of eligible labor force with high school education. Vietnam's high school and university education also place great emphasis on the education of mathematics, science, and information technology [5]. More importantly, labor costs in Vietnam are relatively low in Southeast Asia. In 2019, the average monthly salary of Vietnamese production workers was $126-180, which was 38% -54% lower than the average monthly salary of Chinese workers, while the average monthly salary of Thai workers was $274 [6]. In addition, foreign-funded enterprises have also cultivated semiconductor talents in Vietnam--there are 10% of Samsung's software is developed by Vietnamese IT engineers [7]. Although there are not many high-quality Vietnamese electronic industry engineers, it has created conditions to achieve technological upgrading in its industry.

3. The Impact of the China-US Trade Friction on Vietnam's Chip Industry

3.1 The Widespread Impact of China-US Trade Friction

The trade friction between China and the United States has prompted global supply chain restructuring: The trade friction between China and the United States has made many multinational companies realize the high risk of supply chain concentration in China, and have begun to transfer some industrial chains to other countries.

The trade friction between China and the United States promotes the formation of regional supply chains. The trade friction between China and the United States has accelerated the formation of regional supply chains, and many Southeast Asian countries, including Vietnam, have attracted a large number of foreign investment enterprises due to their low labor costs and geographical proximity to China. This has enhanced the economic strength of these countries, and as a result, the layout of global economic power has changed.

The trade friction between China and the United States promotes changes in the geopolitical landscape: Against the backdrop of the trade friction between China and the United States, China actively seeks cooperation with countries other than the United States, and its economic cooperation with Europe, Southeast Asia, Africa, and other regions continues to strengthen, forming new economic partnerships. Through the Belt and Road Initiative, China has deepened economic and trade cooperation with countries along the Belt and Road, which, to a certain extent, has weakened the dominance of the United States in the global economy.

3.2 US Policy and Vietnam‘s Response

After the occurrence of the China-US trade friction, Washington adjusted its semiconductor supply chain and attached importance to developing its manufacturing industry. In Southeast Asia, it sees Vietnam’s potential and has taken action to support Vietnam’s semiconductor development. In response, Vietnam seized the opportunity to formulate preferential policies to attract foreign investment and rapidly enhance its technological strength.

Considering Vietnam’s enormous manufacturing potential and favorable geographical advantages, the United States intends to include Vietnam in its semiconductor supply chain. Before the two countries officially upgraded their bilateral relations, Washington determined common interests through high-level dialogue, which involved multiple issues such as the digital economy, supply chain, and infrastructure construction. During the exchange, the United States pointed out that it has unique advantages in both security and economic fields, and can better cooperate with Vietnam. In the fact list of the US-Vietnam comprehensive strategic partnership in 2023, Washington has explicitly stated its intention to establish a new semiconductor partnership with Hanoi. It will help Vietnam expand semiconductor ecosystem capabilities, and develop a workforce development plan in Vietnam. The cooperation will help the United States build a resilient semiconductor supply chain and support the development of semiconductor production capacity [8]. This statement also reduces the political concerns of related companies investing in Vietnam.

To attract foreign investment, Vietnam has strengthened policy support and infrastructure construction efforts. Firstly, Vietnam has provided a series of tax incentives, including exemption from corporate income, import value-added tax, and tariff reductions. Secondly, Vietnam also focuses on leveraging its unique institutional advantages. In 2022, Vietnam’s technology innovation strategy has established a new model for technological development, with enterprises at the core, research institutes and universities as the main research subjects, and the government playing a guiding and coordinating role [5]. Under the leadership of the Communist Party of Vietnam, its policies have strong continuity, and multinational corporations hardly need to worry about the risk of policy changes. In addition, due to its emphasis on network security, Vietnam has decided to use its self-developed 5G technology. Currently, Viettel is accelerating the deployment of 5G and improving related infrastructure construction. Unlike Malaysia and Thailand which directly use Huawei 5G equipment, Vietnam’s measures have reduced the risk of business being affected by trade sanctions and created a favorable development environment.

The Vietnamese government has also begun to cultivate high-tech talents. After the 8th Plenum of the 13th Central Committee of the Communist Party of Vietnam, the Prime Minister proposed to train 50000 to 100000 high-quality engineers in the semiconductor industry by 2030 and requested the Ministry of Education and Training to train 30000 university students who can serve the semiconductor industry within five years [9]. The Prime Minister once met with Samsung’s Vietnam General Manager and expressed his hope to receive assistance in talent training. Samsung has also launched joint training courses with universities such as Hanoi National University. Through education and training, Vietnam is striving to transform its demographic dividend into an engineering dividend.

3.3 The Development of Vietnam’s Semiconductor Industry

The China-US trade friction has brought development opportunities to Vietnam’s semiconductor industry. Many semiconductor companies have chosen to open factories and expand production in Vietnam, and Vietnam’s semiconductor market has expanded. With the enactment of the CHIPS and Science Act of 2022, Nvidia and Samsung have decided to expand their semiconductor business in Vietnam, and they will receive millions of dollars in subsidies as a result [10]. In September 2023, Korean chip packaging and memory product manufacturer Hana Micron opened its first factory in the north of Vietnam in Bac Giang province. In October, Amkor Technology began

operating a $1.6 billion semiconductor factory in the same province. What's more, enterprises such as Qualcomm, Onsemi, Renesas, TI, NXP, etc. have also set up factories or research and development centers in Vietnam. With the influence of the US signal, Vietnam's semiconductor industry will achieve greater cluster effects and attract more investment.

After the occurrence of trade friction, many enterprises will choose the "China Plus One" strategy to seek supply chain diversification [11]. China is an important exporter of raw materials for semiconductors and other electronic manufacturing industries. The high-tech park in northern Vietnam is conveniently located near the manufacturing center of Guangdong, China, and this unique geographical location is one of its advantages in undertaking industrial transfer from China. To avoid the negative impact of great power competition, some enterprises have transferred their semiconductor businesses originally deployed in China to Vietnam. In 2022, Marvel made the first large-scale downsizing of its business in China, with the Shanghai R&D center being the most affected. In, 2023, the company announced plans to establish a world-class design center in Ho Chi Minh. In addition, Chinese companies are also investing in Vietnam. For example, Luxshare-ict and BYD have their production lines in Vietnam. From the above facts, it can be seen that Vietnam is an option for enterprises to avoid sanctions and is also taking on industries that have overflowed from China.

The Vietnamese semiconductor market has also expanded. In February 2023, Vietnam's semiconductor exports to the United States reached $562.5 million, a year-on-year increase of 74.9%, ranking third in Asia. Meanwhile, Vietnam has accounted for over 10% of the total semiconductor imports from the United States for seven consecutive months [12]. According to research by the Southeast Asian Semiconductor Industry Association, it is predicted that the semiconductor market in Vietnam is expected to grow at a compound annual growth rate of 6.12% from 2022 to 2027. The market value of Vietnam's semiconductor market is expected to increase by approximately 1.65 billion US dollars between 2020 and 2025 [13]. That is to say, the import demand from America is an important driving force for the expansion of the Vietnamese semiconductor market.

4. Challenges and Countermeasures Faced by Vietnam's High-Tech Industry

4.1 Actively Seek Cooperation with Major Powers

China and the United States are major technological powers in the world, with achievements in the chip industry, advanced scientific and technological foundations, and abundant talent reserves. Despite the new geopolitical landscape and supply chain adjustments brought about by the competition between China and the United States, Vietnam can still actively coordinate its relationship with the two countries. Vietnam can continue to adopt a nonpartisan political stance and has adopted a policy of prioritizing cooperation with the United States and its allies in digital-related high-tech fields such as chips and fifth-generation mobile communication technology [5]. Vietnam and China are geographically close and geographically close, so it is very beneficial to cooperate with China. Vietnam can actively participate in the "Pan Asian Railway" plan led by China, the Belt and Road, and implement the connectivity of the Indochina Peninsula, providing external strategic support for Vietnam's development of spatial reconstruction and regional balanced development [14]. Actively communicate and cooperate with Chinese enterprises in the high-tech field. Both China and Vietnam should actively cooperate in this regard. In early November 2022, after the visit of the General Secretary of the Communist Party of Vietnam to China, the two countries issued a joint statement on further strengthening and deepening the comprehensive strategic partnership between China and Vietnam, clearly stating that both sides will continue to play the role of the China Vietnam Joint Committee for Science and Technology Cooperation, actively carry out scientific and technological exchanges, joint research, and technology demonstrations.

4.2 The Government Needs to Play a Coordinating and Important Role as An Investor

Against the backdrop of the trade friction between China and the United States, many chip industry chains have shifted, and foreign investment has been introduced into Vietnam, accompanied by the influx of many human, material, and capital resources into Vietnam. In the face of foreign investment, the Vietnamese government should actively equip corresponding policies improve related infrastructure, and actively coordinate the barriers between overseas and domestic, helping foreign investors adapt to various aspects of Vietnamese policies, regulations, customs, and habits. Vietnam's "Science and Technology Development Strategy" emphasizes the use of various administrative means and the formulation of policies and regulations to gather human, financial, material, and social resources from various parties such as the government, enterprises, universities, research institutions, and social organizations, and to coordinate and allocate them in a centralized manner, focusing on the research of key and emerging technologies that are closely related to national

interests [15].

In addition, the Vietnamese government should play an important role as an investor. The Vietnamese government should increase investment in supporting facilities for the chip industry, establish relevant reward mechanisms, and develop the chip industry under the leadership of the government. This can not only promote foreign investment but also give full play to the positive initiative of local chip industry enterprises.

4.3 Strengthen Infrastructure Construction

The power supply in Vietnam is unstable, and the chip industry not only consumes a large amount of electricity but also has extremely high requirements for the stability of the power supply. However, Vietnam's energy supply and infrastructure construction do not meet the development requirements of the chip industry. For example, in the summer of 2023, Vietnam implemented power outages and restrictions, causing industrial parks where Foxconn and Samsung are located to be forced to shut down. Vietnam is located in Southeast Asia, with an average annual sunshine duration of 1600-2700 hours and an average light intensity of 4-5kWh/m2, demonstrating enormous photovoltaic potential. Meanwhile, Vietnam has a coastline of over 3000 kilometers, abundant wind energy resources, and enormous potential for wind power [16]. Vietnam needs to improve its energy supply system, increase investment in wind and photovoltaic energy base stations, plan the layout of industrial parks reasonably, coordinate the layout of Vietnamese enterprises and industrial clusters, and adapt to local conditions.

4.4 Promote Technological Innovation

Although Vietnam has many large chip manufacturers, such as Intel and other chip giants investing and building factories in Vietnam, currently, Vietnam's chip industry is mainly focused on packaging and testing, lacking the ability to design local chips. The main components of electronic chips rely heavily on imports from other countries, and the industrial foundation of chip manufacturing is zero. Only a few companies carry out chip research and development activities in Vietnam. In Vietnam, the chip industry is mainly located downstream of the production chain, with low added value and relatively low return on investment. After accumulating a certain amount of funds and infrastructure, Vietnam should actively develop towards the middle and upper reaches of the chip industry production chain, break down technological barriers, and actively engage in research and development activities led by the government.

4.5 Strengthen Talent Cultivation and Enrich the Reserve of High-End Talents

Data shows that there is currently a significant shortage of semiconductor talent in Vietnam. The Vietnamese Ministry of Information and Media estimates that the average annual human resource demand for the semiconductor industry in Vietnam is 5000 to 10000 engineers, but currently, less than 20% of it meets market demand [17].

High-tech talents are the key to Vietnam's chip development. The Deputy Minister of Education and Training of Vietnam stated that the semiconductor and chip industries will require a large number of high-quality talents in the future, and investment in human resources training for this industry needs to be increased [18]. Internally, the Vietnamese government should increase funding support for talent cultivation in chip industry enterprises, and actively promote the exchange of talents and technologies among local chip companies in Vietnam. Vietnam can establish relevant reward mechanisms to stimulate the enthusiasm and initiative of scientific and technological talents. Externally, the Vietnamese government should adopt active policies to attract talent, such as talent subsidies and tax incentives, and actively introduce outstanding high-tech talents from abroad to promote the upgrading of the chip industry.

5. Conclusion

This article focuses on the forefront development trend of the economy, tracks the policy dynamics of the United States and Vietnam since the 2018 China-US trade friction, and summarizes the facts of Vietnam's semiconductor industry development. This article argues that Vietnam has great potential for developing the semiconductor industry due to its strong foundation in the electronics industry, digital infrastructure, and long-term demographic dividend. The China-US trade friction has driven global supply chain restructuring, with many companies shifting their supply chains out of China. In recent years, the United States has included Vietnam in its semiconductor supply chain and supported Vietnam's semiconductor development. Vietnam has also actively responded by introducing preferential policies to attract foreign investment and seizing opportunities to enhance its semiconductor technology. After the upgrade of the partnership between the United States and Vietnam, many semiconductor products have shifted to Vietnam, and some leading companies have also decided to expand their business in Vietnam. As a result, the semiconductor market in Vietnam has rapidly expanded. Overall, from the perspective of Vietnam's semiconductor industry development, the trade friction between China and the United States has played a positive role in Vietnam's semiconductor development to a certain

extent. To better seize opportunities, Vietnam needs to not only better meet the needs of foreign investment, but also accumulate its semiconductor technology. In this regard, Vietnam can continue to play a supportive role of the government, strengthen infrastructure construction, and enhance talent cultivation.

There is still much room for improvement in related research. Firstly, research can use enterprises that have been investing in Vietnam for a long time as cases to analyze the specific impacts of trade friction. Secondly, research can focus on enterprises that transferring from China to Vietnam. Thirdly, research can compare the development of the semiconductor industry in Vietnam and Malaysia to analyze Vietnam's unique advantages. Vietnam still has a long way to go to be a strong nation in the semiconductor industry field, and its subsequent development trajectory is worthy of long-term tracking and research.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

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