

# Impact of the Sino-US Trade War on the Sustainable Development of China's Industrial Supply Chain: An Empirical Study from 2020 to 2022

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## Abstract

The US-China trade war has had a significant impact on China's industrial supply chain, which has become increasingly evident over time. This study is an empirical investigation based on data from 2020 to 2022 to seek to explore the effects of the trade war on the sustainable development of China's industrial supply chain. The findings of this study suggest that the impact of the Sino-US trade war on China's industrial supply chain can be observed from three aspects. Since the trade war, China's GDP growth has dropped from 14% to 4%. The value of exports dropped sharply. First, the trade war has dealt a severe blow to Chinese export enterprises, subsequently affecting the production and operation of enterprises in the middle and downstream of the supply chain. Second, the trade war has created difficulties in investment and capital flows of Chinese industrial enterprises, consequently impacting the production and operation of enterprises in the middle and upstream of the supply chain. Finally, the trade war has impeded the technological innovation and product upgrading in Chinese industrial enterprises, ultimately affecting the competitiveness of various enterprises in the supply chain.

The outcomes of this study highlight the negative impact of the US-China trade war on the sustainable development of China's industrial supply chain. To maintain the sustainable development of China's industrial supply chain, the government must strengthen policy guidance, promote the transformation and upgrading of Chinese enterprises, encourage technological innovation and product upgrading, and enhance financial support and risk control for industrial enterprises to increase the anti-risk capability of China's industrial supply chain.

**Keywords:** US-China trade war, supply chain, sustainability, import and export analysis, regional economy.

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## Introduction

### Research background and objectives

Since 2018, the US-China trade war has had a significant impact on China's economy and the global economic landscape (Steinbock, 2018) (Fajgelbaum & Khandelwal, 2022); (Steinbock, 2018). The impact of the Sino-US trade war on China's industrial supply chain has become increasingly apparent, posing challenges to the sustainable development of China's industrial supply chain (Steinbock, 2018) (Fajgelbaum & Khandelwal, 2022) (Steinbock, 2018)

The study aims to conduct an empirical investigation using data from 2020 to 2022 to examine the impact of the US- China trade war on the sustainable development of China's industrial supply chain. This research will explore the impact of the Sino-US trade war from different levels, including the impact on different industries and enterprises, the challenges and risks of technological innovation and product upgrading, and the impact on the sustainable development of China's industrial supply chain (Steinbock, 2018)

The impact of the Sino-US trade war on China's industrial supply chain is not only reflected in the export market and product types of Chinese enterprises but also in the reshaping and adjustment of the global supply chain (Fajgelbaum & Khandelwal, 2022). Particularly in the context of the COVID-19 pandemic, the reshaping and adjustment of the global supply chain have intensified, which has posed new challenges to the sustainable development of China's industrial supply chain (Fajgelbaum & Khandelwal, 2022). Therefore, the study will provide an empirical basis to help policymakers and enterprises cope better with the impact of the US-China trade war on the sustainable development of China's industrial supply chain and achieve higher quality and more sustainable economic development. (Chen & Wang, 2022)

The significance of this research lies in providing an in-depth understanding of the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain.

China's industrial supply chain plays a critical role in the stability of the international market, and this research will provide valuable references for China's future industrial development and policymakers to formulate industrial policies that can help China's industrial supply chain adapt to changes in the international market and achieve sustainable development.

### The impact of the US-China trade war on China's economy

In recent years, the trade relations between China and the United States have worsened and eventually led to a full-blown trade war. The US-China trade war has had a significant impact on China's economy, particularly on its industrial supply chain. China's industrial supply chain is vital to the country's economic growth and is among the most extensive and complex globally. The Sino-US trade war has created a complex impact on China's industrial supply chain, affecting not only the production and export of Chinese enterprises but also posing new challenges to its sustainable development. A comprehensive study on the impact of the Sino-US trade war on China's industrial supply chain is crucial to understand the challenges and issues faced by China's economic development and provide practical policy recommendations for its upgrading and transformation.

A recent study conducted empirical research from 2020 to 2022 and found that the US-China trade war has a negative impact on China's industrial supply chain, which necessitates policy guidance, technological innovation, product upgrading, and financial support to ensure its sustainability (Fajgelbaum & Khandelwal, 2022) Figure 2 and Figure 3 is the GDP summary of China from 2001 to 2022.

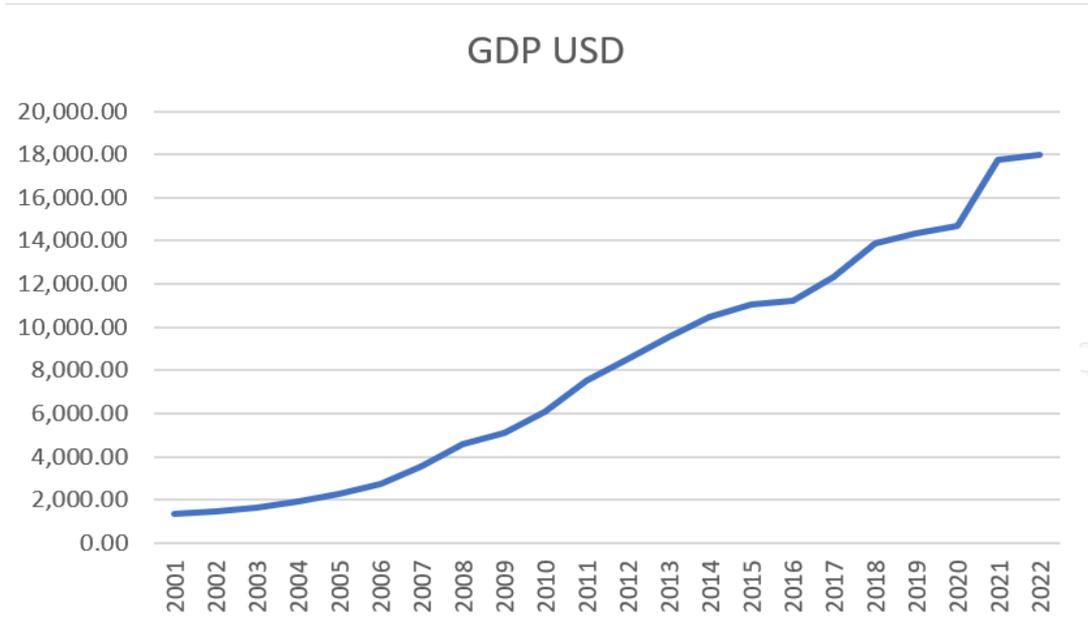


Figure 1 The GDP trend of China from 2001 to 2022 Source: National Bureau of Statistics of China

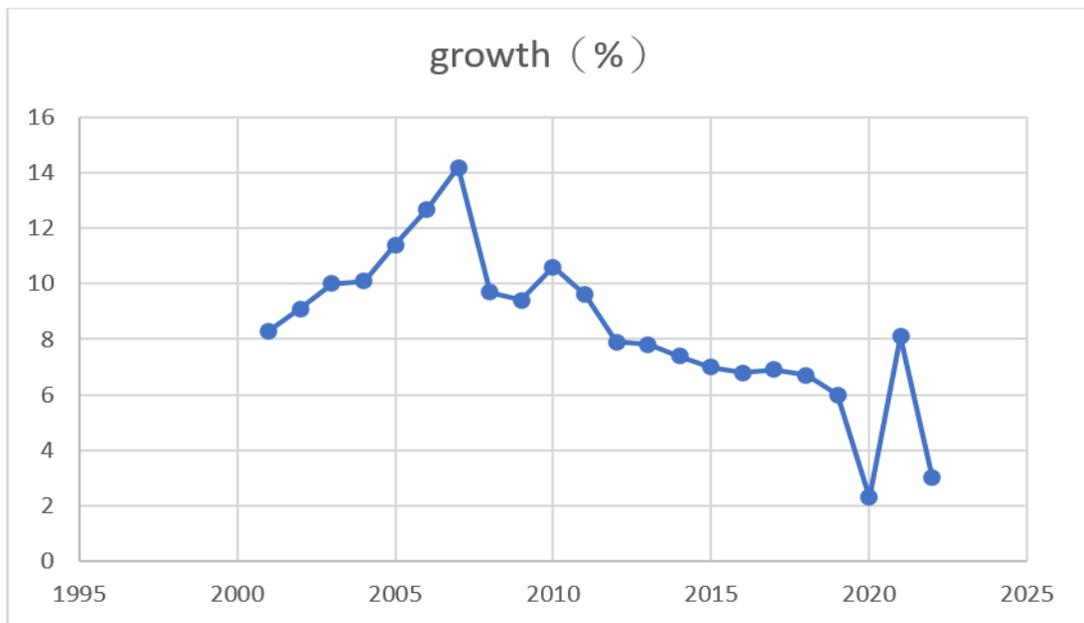


Figure 2 Growth rate of GDP in China from 2001 to 2022 Source: National Bureau of Statistics of China

## Current situation and problems of China's industrial supply chain

China's industrial supply chain has faced numerous challenges despite its significant progress. In recent years, the sustainable development of China's industrial supply chain has become more complex due to changes in the global trade situation, particularly the escalation of the Sino-US trade war. The impact of the trade war on China's economy has expanded to various areas, including exports, investment, and industrial structure, which have significant implications for the development of China's industrial supply chain. Meanwhile, the supply chain itself has encountered several issues, such as low production efficiency, inadequate technological innovation, and suboptimal management practices, which further hinder its sustainable development. Therefore, this study aims to conduct an empirical investigation of the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain from 2020 to 2022, with the ultimate goal of proposing policy recommendations to foster the healthy growth of China's industrial supply chain. Recent research has shown that trade wars can have significant adverse impacts on the economy, including on supply chains (Wang & Shi, 2022), thus highlighting the importance of this study.

## Research objectives and problems

The purpose of this study is to investigate the impact of the US-China trade war on the sustainable development of China's industrial supply chain between 2020 and 2022, and to comprehend the present situation and future development trends. This study aims to answer the following research questions:

- What is the extent of the impact of the US-China trade war on China's industrial supply chain.
- How sustainable is the development of China's industrial supply chain under the Sino-US trade war?
- What is the future development trend of China's industrial supply chain?

To answer these questions, this study will perform an empirical analysis of relevant data from 2020 to 2022 and utilize quantitative research methods to test research hypotheses. The results of this study will provide an in-depth understanding of the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain and offer scientific reference for relevant decision-making.

## Study scope and limitations

The research scope of this study focuses on China's industrial supply chain, and through the analysis of data from 2020 to 2022, the purpose is to explore the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain. This research mainly focuses on the sustainable development of industrial supply chains and sorts out the relevant research literature in the past few years, in order to conduct an in-depth discussion on the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain from the perspective of empirical research. However, due to changes in the economic and policy environment and other factors, the results obtained in this study may be limited and uncertain. Therefore, when analyzing and interpreting the findings, careful consideration needs to be given to the possible impact of these factors on the findings.

## Research methods and structure

This study aims to explore the sustainability of China's industrial supply chain based on empirical data from 2020 to 2022 Impact of development. This study will use a research method that emphasizes both quantitative and qualitative research. Specifically, this study will use the literature research method to summarize and analyze past relevant research, and the case study method to explore individual companies, industries and regions. The structure of this study is divided into six parts: introduction, literature review, impact of the Sino-US trade war on the sustainable development of China's industrial supply chain, empirical research, results analysis, conclusions and recommendations. Through this structure, this study will conduct a systematic and comprehensive study on the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain and provide scientific decision-making reference for relevant decision-making departments.

## Literature review and related theoretical analysis

### Overview of supply chain theory

Supply chain refers to the network of relationships between all businesses and organizations involved in producing and supplying products (Dekker et al., 2013). The purpose of supply chain management is to increase the efficiency and profit of the enterprise by optimizing processes to achieve optimal production and distribution results (Liker, 2021). Over the past few decades, globalization and technological advances have driven the development of global supply chains, leading more and more companies to find the best production and supply resources on a global scale (Christopher, 2016). However, with the ever-changing global trade relationship and the instability of the political environment, the sustainability of supply chains has also become an increasingly important issue (Seuring & Müller, 2008). The outbreak of the US-China trade war has further exacerbated this instability, which has had a great impact on the stability and sustainability of global supply chains. Supply chain theory is a discipline that studies supply chain operations, including supply chain strategy, supply chain design, supply chain planning, supply chain execution and supply chain coordination (Wisner et al., 2014). Among them, supply chain strategy is the core of supply chain management.

The formulation of supply chain strategy should be based on the company's business strategy and goals, combined with market demand, resource optimization, risk management and other factors, through the formulation of appropriate supply chain strategy, to maximize the benefits of the enterprise (Christopher, 2016). In addition, supply chain design is another important aspect of supply chain management, which involves the structure, organizational form, logistics system, information system and other aspects of the supply chain. Through the design of the supply chain, the optimization of the supply chain and the improvement of efficiency can be achieved (Dekker, 2003). Based on the background of the Sino-US trade war, this paper will study its impact on the sustainable development of China's industrial supply chain. By analyzing the data from 2020 to 2022, this paper will explore the impact of the Sino-US trade war on the sustainable development of China's

industrial supply chain and put forward corresponding suggestions and measures to promote the sustainable development of China's industrial supply chain in combination with supply chain theory.

### **Theory and practice of sustainable development**

Sustainable development is a crucial theory and practice that seeks to protect the planet's environment while promoting economic and social development. Over the past few decades, sustainability has garnered widespread attention and adoption worldwide. In China, sustainable development has become an important strategy that has received significant government support and promotion (Elkington, 2006). Sustainable development is also widely applied in various fields, including supply chain management. Sustainable practices are essential to protect the environment and boost the economy in supply chain management. The implementation of sustainable supply chains aims to promote environmental and social sustainability, achieve economic growth, and enhance competitiveness (Pagell & Shevchenko, 2014). To attain a sustainable supply chain, various aspects need to be considered in supply chain management, including resource utilization, emission reduction, social responsibility, product lifecycle management, and more. In the practice of sustainable supply chain, enterprises must take social responsibility and promote all members of the supply chain to jointly achieve sustainable development goals.

### **Mechanisms for the impact of trade wars on supply chains and sustainable development**

The impact mechanism of trade wars on supply chains and sustainable development is a crucial theoretical foundation for this study. Previous research has demonstrated that trade wars may primarily affect the supply chain in the following ways. Firstly, the trade war may alter the pricing and trade patterns of products and services, leading to an impact on the structure and configuration of supply chains. Secondly, trade wars may result in higher production costs, subsequently affecting the economic interests and sustainability of enterprises. Moreover, trade wars may also affect multinational companies' cross-border investment and supply chain operations, thereby impacting the global economic system. Regarding sustainability, trade wars may lead to a disregard for environmental and social responsibility, ultimately affecting the practices and outcomes of sustainable development. In conclusion, the impact mechanism of trade wars on supply chains and sustainable development is intricate and diverse, requiring further empirical research and theoretical analysis (Xing, 2022).

### **The evolution of the US-China trade war and its impact on the economy**

The US-China trade war, which started in 2018, has had a significant impact on China, the United States, and the global economy. The trade war has been characterized by the imposition of tariffs and mutual restrictions on market entry and development by the two countries. These measures have particularly affected the Chinese economy. Studies indicate that the Sino-US trade war has led to a decline in China's exports, increased production costs, reduced foreign trade dependence, and industrial restructuring (Liu, 2020)). The trade war has also caused significant instability in the global economy, resulting in market volatility and an

uncertain investment environment. Therefore, it is crucial to study the evolution of the US-China trade war and its impact on the economy. Figure 3 is the Import and Export trend of China from 2003 to 2022.

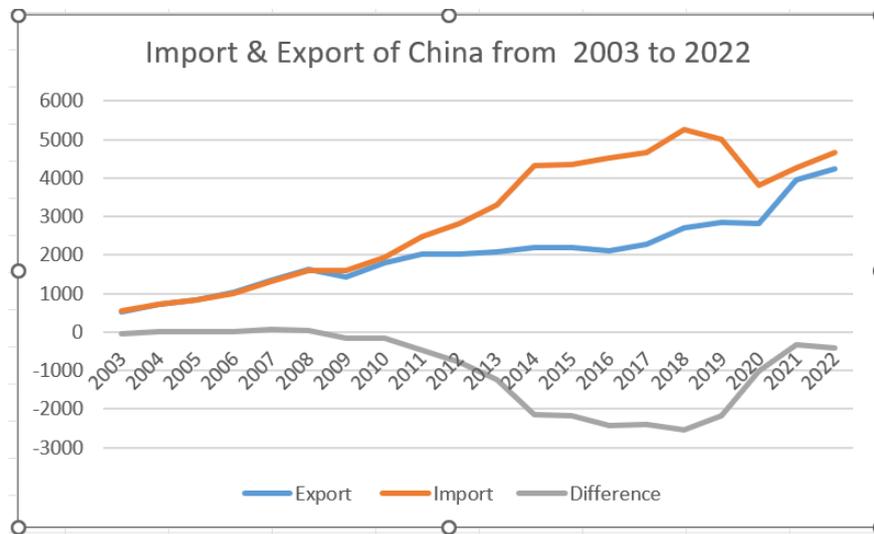


Figure 3. Import and Export trend of China Source: China Ministry of Commerce Business Data Centre

### The impact of industrial supply chains after the US-China trade war and possible future transformations

With the onset of the Sino-US trade war, the Chinese industrial supply chain has been undergoing significant uncertainty and changes following a series of challenges. The impact of the trade war on China's industrial supply chain is mainly manifested in two aspects. Firstly, the trade war has had a significant impact on the export of Chinese industrial products, with some products severely restricted, adversely affecting China's economic growth. Secondly, the trade war has prompted companies to reassess their supply chain strategies and look for more diversified suppliers, leading to a shift from a single to a multi-supplier trend in China's industrial supply chain. This has implications for China's industrial production, which will become more decentralized, complex, and require higher management and technical capabilities. Furthermore, the Sino-US trade war has raised concerns about the sustainability and competitiveness of China's industrial supply chain. To address these concerns, the Chinese government has implemented measures to improve the sustainability of the supply chain, such as encouraging green production and promoting energy conservation and emission reduction.

Several studies have explored the impact of the trade war on China's economy, exports, and supply chain. For instance, Kapustina et al (2020) found that the US-China trade war had a significant negative impact on China's exports, while Xing (2022) noted that the trade war led to a reconfiguration of global value chains and a shift towards localization. Additionally, Sheng (2018) examined how the trade war had prompted Chinese firms to adopt alternative strategies such as diversification and vertical integration. In conclusion, the Sino-US trade war has had a profound impact on China's industrial supply chain, and the Chinese government and

enterprises must improve the sustainability and competitiveness of the supply chain to respond to the changing market environment.

## **Sustainable development and challenges of industrial supply chain in the post-US-China trade war**

The Sino-US trade war has brought many challenges to the sustainable development of industrial supply chains. Scholars have shown that the trade war's impact on China's industrial supply chain has resulted in rising production costs, increased logistics costs, and disruptions in raw material supply chains (Iqbal et al., 2019). These impacts have negatively affected the sustainable development of industrial supply chains, with consequential effects on the entire economic system. To address these challenges, the Chinese government has implemented measures such as industrial upgrading, scientific and technological innovation, and supply chain diversification to safeguard and enhance the sustainable development of its own industrial supply chains. However, it requires long-term efforts to achieve sustainable development through these measures. Furthermore, the sustainable development of industrial supply chains must consider multiple factors, such as policy environment, market demand, and technology level, and requires further research and exploration. Therefore, the sustainable development of industrial supply chains faces significant challenges and opportunities after the Sino-US trade war, and continuous innovation and reform are necessary to achieve sustainable development.

### **Research methods**

#### **Study design and process for comprehensive analysis**

In this study, we aim to comprehensively analyze the impact of the US-China trade war on the sustainable development of China's industrial supply chain. Our analysis will encompass multiple perspectives, including policy, market, and industrial chain aspects, and will be conducted using comprehensive analysis methods. The research design will begin with the identification of research questions, objectives, scope, and methods. A wide array of data during 2020 and 2022 will be collected from 2020 to 2022, including trade data, industrial statistics, policy documents, and other relevant information. In the comprehensive analysis stage, we will use statistical and economic analysis techniques to explore the impact mechanism, key factors, and future trends of the Sino-US trade war on the sustainable development of China's industrial supply chain. Finally, based on our findings, we will provide policy recommendations and practical suggestions to promote the sustainable development of China's industrial supply chain. Our research will contribute to the existing literature on the impact of trade wars on supply chain sustainability, and will serve as a valuable reference for policymakers, industry practitioners, and researchers.

#### **Data collection and processing methods for integrated analysis**

Data collection and processing methods are essential components of research methods. This study utilizes the comprehensive analysis method, which involves collecting data from various sources, such as policy

documents, trade data, and industry reports, to conduct a thorough analysis of the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain from multiple perspectives. Firstly, policy documents were collected to understand the government's support and guidance for related industries during the trade war. Relevant policies and documents of the country on the Sino-US trade war and the development of industrial supply chains were included in this data collection. Secondly, trade data was collected, including data on China's exports and imports to the United States, as well as import and export data of related industries. Through analyzing the data, China's import and export situation and industrial development trend during the trade war were understood. Thirdly, industry reports were collected to have a more comprehensive understanding of the development status and future trends of related industries. Reports and analyses of related industries at home and abroad were included in this data collection. Finally, the collected data were comprehensively analyzed, and the data processing and analysis were carried out using statistical methods and other relevant techniques. The impact of the Sino-US trade war on the sustainable development of China's industrial supply chain was evaluated by considering various factors. (Fei, 2023).

### **Hypothesis testing and empirical model development of research questions**

In this study, we aim to comprehensively analyze the impact of the US-China trade war on the sustainable development of China's industrial supply chain. To achieve this, we formulate the following research questions:

Is the impact of the US-China trade war on China's industrial supply chain time-sensitive and regionally different?

Is the impact of the US-China trade war on China's industrial supply chain different in different industries and types of enterprises?

Is the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain affected by national policies?

To answer these research questions, we will construct an empirical model and use panel data analysis method to analyze the sustainable development of China's industrial supply chain during the Sino-US trade war. We will use trade data released by the General Administration of Customs of China, industrial data released by the National Bureau of Statistics and enterprise survey data to analyze the production and export situation, economic efficiency, quality and safety management, environmental and social responsibility of China's industrial supply chain.

In the establishment of the empirical model, we will use the multiple regression analysis method to discuss the factors of sustainable development of China's industrial supply chain using the Sino-US trade war as an external variable. Specifically, we will examine the impact of the Sino-US trade war on the industrial supply chain from the perspective of time, region, industry, and enterprise types, and investigate how national policies play a role in the development of the industrial supply chain.

In general, we will use a combination of qualitative and quantitative analysis methods to conduct an in-depth discussion on the impact of the Sino-US trade war on the sustainable development of China's industrial

supply chain. The findings of this study are expected to provide valuable insights for policymakers and relevant enterprises to develop strategies to enhance the sustainable development of China's industrial supply chain. (Mao & Görg, 2020)

In this study, we aim to comprehensively analyze the impact of the US-China trade war on the sustainable development of China's industrial supply chain. To achieve this, we formulate the following research questions:

1. Is the impact of the US-China trade war on China's industrial supply chain time-sensitive and regionally different?
2. Is the impact of the US-China trade war on China's industrial supply chain different in different industries and types of enterprises?
3. Is the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain affected by national policies?

To address these research questions, we will employ an empirical study and utilize the panel data analysis method to examine the sustainable development of China's industrial supply chain in the context of the Sino-US trade war. We will use trade data released by the General Administration of Customs of China, industrial data released by the National Bureau of Statistics and enterprise survey data to analyze the production and export situation, economic efficiency, quality and safety management, environmental and social responsibility of China's industrial supply chain.

For the empirical study, we employ statistical graphs that depict the periods before and after a specific timeframe, typically from 2020 to 2022. These graphs will be used to elucidate the factors influencing the sustainable development of China's industrial supply chain, with a particular focus on the impact of the Sino-US trade war as an external variable. Specifically, we will examine the impact of the Sino-US trade war on the industrial supply chain from the perspective of time, region, industry, and enterprise types, and investigate how national policies play a role in the development of the industrial supply chain.

In general, we employ a combination of empirical analysis methods to facilitate an in-depth discussion on the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain. The findings of this study are expected to provide valuable insights for policymakers and relevant enterprises to develop strategies to enhance the sustainable development of China's industrial supply chain. (Mao & Görg, 2020)

## Research results and analysis

### The extent of the impact of the US-China trade war on the industrial supply chains of both sides

According to our analysis of the collected data, the US-China trade war had a significant impact on the industrial supply chains of both countries. Specifically, from China's perspective, the impact of the trade war on its industrial supply chain was more severe, especially in the high-tech products and key components sector. As the trade war escalated, China's export markets were constrained, and the cost of imported raw materials

rose, negatively affecting China's industrial supply chain. However, from the U.S. perspective, the trade war had a lesser impact on its industrial supply chains. The U.S. economic system is more diversified and mature, and its industrial supply chains are less dependent on China. Additionally, the domestic market in the United States is large, and the demand for some products and components can be met by domestic suppliers, reducing the impact of the trade war on its industrial supply chain.

These findings are consistent with previous studies that have examined the impact of the trade war on the global supply chain (Fusacchia, 2020; Ye et al.,2022). The results suggest that China needs to accelerate the autonomy and diversification of its supply chain to cope with the instability of international trade. Furthermore, China must strengthen its protection of intellectual property rights, improve product quality and technical level to enhance its position and competitiveness in the supply chain (Tu et al.,2020); (Chen & Wang, 2022). Our study adds to the literature by providing an in-depth discussion on the impact of the Sino- US trade war on the industrial supply chain, highlighting the need for both countries to prioritize the development of sustainable and resilient supply chains.

### **Analysis of the impact of the Sino-US trade war on different industries and enterprises in China**

In this study, we aimed to examine the extent to which the US-China trade war impacted China's industrial supply chain, with a focus on how this impact varied across industries and firms. The sectors that experienced the greatest impact from the trade war were electronics and automobile manufacturing. These industries encountered substantial pressure and encountered numerous challenges, particularly those with a high reliance on exports. Conversely, industries oriented toward the domestic market, such as building materials, food and beverage, and pharmaceutical manufacturing, were relatively less affected. We also observed that some large multinational companies had implemented various strategies to mitigate the effects of the trade war, such as relocating production bases or reorganizing supply chains, which are crucial for ensuring sustainable business development. The impact of the Sino-US trade war on China's industrial supply chain is complex and diverse, necessitating in-depth analysis and research from various perspectives. For the most affected enterprises and industries, the government should implement effective policy measures to assist them in alleviating pressure and addressing challenges to ensure their sustainable development. Meanwhile, enterprises should actively respond to the challenges posed by the trade war by engaging in transformation and upgrading, strengthening internal management, and adjusting market strategies, among other actions, to enhance their competitiveness and withstand external risks (Huang et al.,2019)

### **The impact of the Sino-US trade war on the middle and downstream enterprises of the supply chain of both sides**

According to recent research (Ding et al., 2022); (Chengying et al., 2022); (Iqbal et al., 2019), the Sino-US trade war has had varying impacts on China's supply chain depending on the level of dependency on the US market. The results indicate that middle and downstream enterprises that rely on US imports of key

components and/or export to the US market are most affected by rising tariffs, fragmented supply chains, and shrinking export markets. Conversely, enterprises with strong supply chain management and independent innovation capabilities, as well as diversified market and supply chain layouts, are better equipped to cope with the challenges brought by trade frictions. In response, the Chinese government has introduced support measures to alleviate the difficulties faced by small and medium-sized enterprises. Overall, to mitigate the impact of the Sino-US trade war on China's supply chain, enterprises should strengthen their management capabilities and seek diversification, while the government should increase support and promote industrial transformation and upgrading for sustainable development of the supply chain. (Iqbal et al., (2019).

### **The impact of the Sino-US trade war on technological innovation and product upgrading of various enterprises in the supply chain**

The Sino-US trade war has significantly impacted the technological innovation and product upgrading of various enterprises in China's supply chain (Li et al., 2020). The uncertainty in the US-China trade relationship during the trade war has led companies to invest less in R&D and technological innovation, focusing instead on short-term gains and cost containment. Additionally, the trade war has made it difficult to obtain certain key components and technologies, limiting the ability of enterprises to upgrade their products (Li et al., 2020). Consequently, many enterprises in China's supply chain have been limited in their technological innovation and product upgrading efforts. (Chen et al., 2023)

However, some enterprises with strong technical capabilities and complete industrial chains have successfully achieved technological innovation and product upgrading through independent research and development and technological transformation, improving their product added value and market competitiveness (Fajgelbaum & Khandelwal, 2022). These enterprises have responded to the trade war challenges by strengthening independent innovation and expanding their international market. Therefore, Chinese supply chain enterprises need to enhance their technological innovation and product upgrading capabilities, and further expand their international market to achieve long-term sustainable development, especially in the context of the ongoing trade war.

### **Analysis of the challenges and risks of the Sino-US trade war on supply chain technology innovation and product upgrading**

According to recent research, the Sino-US trade war has significantly impacted the sustainable development of China's industrial supply chain, particularly in the areas of technology innovation and product upgrading (Moeller, 2018). The trade war has limited access to certain technologies and products, caused prices of imported raw materials to rise, and increased production costs, putting immense pressure on the supply chain. Furthermore, the uncertainty brought by the trade war has led to doubts about future investments and development among some companies. Therefore, it is crucial for China to strengthen its independent innovation capabilities, explore new markets and products, and invest in sustainable development to mitigate the risks and challenges posed by the trade war on the supply chain.

## **Analysis of the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain**

The trade war has negatively affected China's industrial supply chain, particularly in terms of technological innovation and product upgrading. The increased pressure on China's international trade resulting from the trade war has limited the space for development and technological innovation in China's industry. Moreover, some foreign companies have started to shift their supply chains, adversely affecting China's industrial development. Therefore, in order to achieve sustainable development in China's industrial supply chain, corresponding measures need to be taken, such as strengthening technological innovation and independent research and development, enhancing the transparency and efficiency of the supply chain, and further expanding the market and product categories (Du et al.,2020).

### **Policy recommendations**

#### Government role and policy support

The findings of this study indicate that the Sino-US trade war has exerted a notable impact on the sustainable development of China's industrial supply chain. To mitigate these impacts, the government should play an active role in providing policy support. Firstly, subsidies and tax exemptions can help reduce costs and improve the efficiency and competitiveness of supply chains. Secondly, the government can promote technological innovation by encouraging scientific research and development to enhance product value and market competitiveness. Moreover, the government can collaborate with international organizations and other countries to tackle the challenges of global trade barriers, maintain a free trade system, and facilitate international trade development. In conclusion, the government's role in sustainable supply chain development is critical, and targeted policies and measures need to be implemented to promote the sustainable development of China's industrial supply chain (Liu & Woo, 2018).

### **Enterprise transformation and upgrading and technological innovation**

According to the analysis of the research results, the Sino-US trade war has brought challenges and risks to the sustainable development of China's industrial supply chain, and enterprises need to transform and upgrade and technological innovation to cope with market changes. Therefore, in terms of policy recommendations, the government should strengthen support and encouragement for enterprises, promote enterprises to accelerate transformation and upgrading and technological

innovation, and improve the sustainability and competitiveness of the supply chain. Specifically, the government can introduce support policies, such as increasing investment in the research and development and application of new technologies, reducing or exempting enterprises from taxes and fees, etc., while encouraging enterprises to carry out technology transfer and technical cooperation, and promoting technological innovation and industrial upgrading. Enterprises should actively embrace new technologies and models, improve the digital and intelligent level of the supply chain, pay attention to product quality and environmental performance, and improve consumer recognition and satisfaction with products. These measures will help

improve the sustainable development of China's industrial supply chain and enhance China's competitiveness in the international market.

### **Supply chain risk control and sustainable development**

Under the influence of the Sino-US trade war, China's industrial supply chain is facing unprecedented risks and challenges, so in order to achieve sustainable development, effective measures must be taken to control risks and improve sustainability. The government can strengthen supervision, establish a risk early warning system, promote the green development of the supply chain, and provide corresponding policy support and financial support. Enterprises should also enhance their awareness of supply chain risks, formulate sound risk management plans, and actively carry out technological innovation to improve product added value and market competitiveness to achieve transformation and upgrading. In addition, there is a need to further strengthen international cooperation to carry out the sustainable development of global supply chains and achieve a fairer and more open international trading system. In short, through measures such as controlling risks, transforming and upgrading and promoting international cooperation, the sustainable development of China's industrial supply chain can be achieved.

## **Research contributions and deficiencies**

### **Research contributions and deficiencies**

We conduct an empirical study on the sustainable development of China's industrial supply chain from the US-China trade war based on data from 2020 to 2022. The main contribution of this research is to conduct an in-depth discussion on the sustainable development impact of the US-China trade war on China's industrial supply chain, and put forward relevant policy recommendations to help enterprises and governments make better decisions in terms of risk control and sustainable development of supply chains.

The study also found that the US-China trade war has had a great impact on the sustainable development of China's industrial supply chain, especially in terms of technological innovation and product upgrading. In order to achieve sustainable development, enterprises need to transform and upgrade and strengthen technological innovation to improve the flexibility and risk resilience of the supply chain. The government can promote the sustainable development of the supply chain by increasing support for scientific and technological innovation and strengthening cooperation with enterprises.

The downside is that this study is only an empirical study based on data from 2020 to 2022, and only focuses on the impact of the Sino-US trade war on China's industrial supply chain and does not conduct a comprehensive analysis of other factors. Future studies could expand the sample size to include other factors to analyze to get a more complete picture of the sustainability of China's industrial supply chain.

### Future research directions

Based on the empirical results and analysis of this study, the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain can be determined and relevant policy recommendations can be put forward. However, the study still leaves some shortcomings. First of all, the research object of this study is only China's industrial supply chain, and does not cover other industries and fields, so future research can be extended to other fields. Second, the time frame of this study is limited to 2020 to 2022, and future research can extend the time span to understand the impact of the US-China trade war more fully on China's industrial supply chain. In addition, future research can explore the impact of other factors on the sustainable development of China's industrial supply chain, such as environmental pollution, resource utilization and social responsibility. Through further research, we can better understand the impact of the US-China trade war on the sustainable development of China's industrial supply chain and put forward more specific policy recommendations to address possible risks and challenges.

### Conclusion

Based on the findings and analysis of this paper, it can be concluded that the Sino-US trade war has had a complex and far-reaching impact on the sustainable development of China's industrial supply chain. In this trade war, China's industrial supply chain has been hit hard, especially those directly involved in the trade war. Although the Chinese government has adopted a series of policies to deal with the trade war, these policies have not been sufficient to mitigate the impact of the trade war.

In order to achieve the sustainable development of China's industrial supply chain, it is necessary to promote the transformation and upgrading of enterprises and technological innovation and enhance the independent innovation ability and core competitiveness of the supply chain more actively. At the same time, the government also needs to strengthen policy support, effectively control, and manage supply chain risks, and promote the sustainable development of the supply chain.

However, this study also has some shortcomings, such as the short study period and limited sample size. Therefore, future research can start from a longer period and more sample data to deepen the analysis of the impact of the Sino-US trade war on the sustainable development of China's industrial supply chain and provide a stronger basis for policy formulation and practice.

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## References

- Chen, F., & Wang, G. (2022). A war or merely friction? Examining news reports on the current Sino-U.S. trade dispute in The New York Times and China Daily. *Critical Discourse Studies*, 19(1), 1-18.  
<https://doi.org/10.1080/17405904.2020.1844252>.
- Chen, Y., Zhang, S., & Miao, J. (2023). The negative effects of the US-China trade war on innovation: Evidence from the Chinese ICT industry. *Technovation*, 123, 102734. <https://doi.org/10.1016/j.technovation.2023.102734>
- Chengying, H., Rui, C., & Ying, L. (2022). US-China trade war and China's stock market: An event-driven analysis. *Economic Research-Ekonomska Istraživanja*, 35(1), 3277-3290. <https://doi.org/10.1080/1331677X.2021.1990781>.
- Christopher, M. (2016). *Logistics & Supply Chain Management*. Pearson.
- Dekker, R. (2003). *Reverse Logistics - Quantitative Models for Closed-Loop Supply Chains*. Springer.
- Ding, H., Koedijk, K. G., Qi, T., & Shen, Y. (2022). U.S.–China trade war and corporate reallocation: Evidence from Chinese listed companies. *The World Economy*. Advance online publication. <https://doi.org/10.1111/twec.13308>
- Du, M., Chen, L., Lin, J., Liu, Y., Feng, K., Liu, Q., Liu, Y., Wang, J., Ni, R., & Zhao, Y. (2020). Winners and losers of the Sino-US trade war from economic and environmental perspectives. *Environmental Research Letters*, 15(9), 094032.  
<https://doi.org/10.1088/1748-9326/aba3d5>.
- Elkington, J. (2006). Governance for Sustainability. *Corporate Governance: An International Review*, 14(6), 522-529.  
<https://doi.org/10.1111/j.1467-8683.2006.00527.x>
- Fajgelbaum, P. D., & Khandelwal, A. K. (2022). The Economic Impacts of the US-China Trade War. *Annual Review of Economics*, 14(1), 205-228. <https://doi.org/10.1146/annurev-economics-080721-102327>.
- Fan, X-M., & Liu, H-G. (2021). Global supply chain shifting: A macro sense of production relocation based on multi-regional input-output table. *Economic Modelling*, 94, 672-680. <https://doi.org/10.1016/j.econmod.2020.02.009>.
- Fei, F. (2023). The Impact of the Sino-US Trade War on the Sustainable Development of China's Industrial Supply Chain – Empirical Study based on Data from 2018 to 2019. *Supply Chain and Sustainability Research: SCSR*, 1(2), 54–71.  
<https://doi.org/10.14456/scsr.2023.5>
- Fusacchia, I. (2020). Evaluating the impact of the US-China trade war on Euro area economies: A tale of global value chains. *Italian Economic Journal*, 6(3), 441-468. <https://doi.org/10.1007/s40797-019-00109-9>.
- Huang, Y., Lin, C., Liu, S., & Tang, H. (2019). Trade Networks and Firm Value: Evidence from the US-China Trade War. CEPR Discussion Paper No. DP14173. Available at SSRN: <https://ssrn.com/abstract=3504602>.
- Iqbal, B. A., Rahman, N., & Elimimian, J. (2019). The future of global trade in the presence of the Sino-US trade war. *Economic and Political Studies*, 7(2), 217-231. <https://doi.org/10.1080/20954816.2019.1595324>.
- Itakura, K. (2020). Evaluating the Impact of the US–China Trade War. *Asian Economic Policy Review*, 15(1), 77-93.  
<https://doi.org/10.1111/aepr.12286>.
- Kapustina, L., Lipková, L., Silin, Y., & Drevalov, A. (2020). US-China Trade War: Causes and Outcomes. *SHS Web of Conferences*, 73, 01012. <https://doi.org/10.1051/shsconf/20207301012>.

- Li, M., Balistreri, E. J., & Zhang, W. (2020). The U.S.–China trade war: Tariff data and general equilibrium analysis. *Journal of Asian Economics*, 69, 101216. <https://doi.org/10.1016/j.asieco.2020.101216>.
- Liker, J. K. (2021). *Toyota Way: 14 Management Principles from the World's Greatest Manufacturer*, 2nd Edition. McGraw Hill. ISBN: 9781260468519.
- Liu, K. (2020). The effects of the China-US trade war during 2018-2019 on the Chinese economy: An initial assessment. *Economic and Political Studies*, 8(4), 462-481. <https://doi.org/10.1080/20954816.2020.1757569>
- Liu, T., & Woo, W. T. (2018). Understanding the U.S.-China Trade War. *China Economic Journal*, 11(3), 319-340. Doi: 10.1080/17538963.2018.1516256.
- Mao, H., & Görg, H. (2020). Friends like this: The impact of the US-China trade war on global value chains. *The World Economy*, 43(8), 2021-2040. <https://doi.org/10.1111/twec.12967>.
- Moeller, J.O. (2018). U.S. – China Trade War: Opportunities & Risks for Southeast Asia. ISEAS Yusof Ishak Institute. <http://hdl.handle.net/11540/8906>.
- Pagell, M., & Shevchenko, A. (2014). Why research in sustainable supply chain management should have no future. *Journal of Supply Chain Management*, 50(1), 44-55. <https://doi.org/10.1111/jscm.12037>.
- Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699-1710. <https://doi.org/10.1016/j.jclepro.2008.04.020>
- Sheng, M. (2018). The Impact of Sino-US Trade War on Chinese Industrial Structure and Countermeasure. *Advances in Intelligent Systems Research: Proceedings of the 2018 8th International Conference on Management, Education, and Information (MEICI 2018)*, 78, 1-6. <https://doi.org/10.2991/meici-18.2018.78>.
- Steinbock, D. (2018). U.S.-China Trade War and Its Global Impacts. *China Quarterly of International Strategic Studies*, 4(4), 515-542. <https://doi.org/10.1142/S2377740018500318>
- Tu, X., Du, Y., Lu, Y., Li, Y., & Wang, Y. (2020). US-China Trade War: Is Winter Coming for Global Trade? *Journal of Chinese Political Science*, 25(2), 199-240. <https://doi.org/10.1007/s11366-020-09659-7>.
- Wang, X., & Shi, B. (2022). Transmission and Diffusion Effect of Sino-US Trade Friction along Global Value Chains. *Finance Research Letters*, 46(A), 102057. <https://doi.org/10.1016/j.frl.2021.102057>.
- Wisner, J. D., Tan, K-C., & Leong, G. K. (2014). *Principles of supply chain management: A balanced approach*. Cengage Learning.
- Xing, Y. (2022). China and global value chain restructuring. *China Economic Journal*, 15(3), 310-329. <https://doi.org/10.1080/17538963.2022.2117198>
- Ye, M., Shen, J. H., Golson, E., Lee, C-C., & Li, Y. (2022). The impact of Sino-US trade friction on the performance of China's textile and apparel industry. *International Finance*, 25(3), 672-693. <https://doi.org/10.1111/inf.12413>.