

Research on Strategies of Improving Security Level of Industrial Chain and Supply Chain

Bo Xiong

Caitong Securities Co., LTD. Northwest branch, Xian, 710000, China

Abstract: Enhancing the security level of industrial and supply chains is a critical issue in contemporary economic development and national security. The increasing complexity and uncertainty of the global political and economic landscape, have revealed the vulnerabilities of global supply chains. This paper analyzes the primary challenges facing China in improving supply chain security, including external uncertainties, technological security risks, and imbalanced resource allocation. It also proposes corresponding strategies, such as strengthening the construction of the industrial ecosystem, promoting the self-controllability of key technologies, facilitating the open sharing of supply chain elements, and enhancing talent cultivation and technological innovation. By integrating these measures, the aim is to enhance the resilience and competitiveness of China's industrial and supply chains, thereby ensuring sustainable economic development.

Keywords: Industrial chain and supply chain security, Self-controllability, Resilience, Economic development.

1. Introduction

Improving the security level of industrial chain and supply chain is an important task for current economic development and national security. In recent years, the global political and economic situation has become more complex and uncertain. Factors such as China-US trade frictions, geopolitical tensions and rising global protectionism have led to increased instability in the international market environment. These factors directly affect China's position in the global industrial chain and the stability of the supply chain. The vulnerability of global supply chains has been laid bare in the wake of the COVID-19 pandemic. The epidemic has caused disruptions in global logistics and production, especially in the supply chain of some key products and raw materials, seriously affecting the economic activities of countries.

In the face of the deepening economic and trade friction and political game in the world, China is increasingly aware of the risks that may be brought by excessive dependence on the global supply chain. It is necessary to further enhance the competitiveness of the industrial chain and supply chain, strive to improve the modernization level of the industrial chain and supply chain, and effectively improve the endogeneity, stability and autonomy of industrial development [1]. The importance of improving the security level of industrial chain and supply chain is self-evident. What challenges does China currently face in improving the security level of industrial chain and supply chain? How to crack it?

2. Urgency of Improving Security Level of Industrial Chain and Supply Chain

2.1. Increased technological competition and technological blockade

In the context of intensified global competition in science and technology, some developed countries have imposed technology blockades on China, restricting the export of key technologies and high-end equipment, especially in the fields

of semiconductors, communication equipment, and advanced manufacturing. In order to cope with this technological blockade, China must strengthen its independent innovation capability, improve the technical level and security of the industrial chain and supply chain, and ensure the autonomy and control of key technologies and core components.

2.2. The need to realize "double cycle" strategy

The "double cycle" strategy proposed by China aims to pay more attention to the construction of domestic market and industry under the background of mutual promotion of domestic and international double cycles. Improving the safety of the industrial chain and supply chain is an important basis for realizing domestic large circulation [2]. By enhancing the autonomy and integrity of the industrial chain, we can ensure the stable supply of the domestic market and the healthy development of the industrial system, so as to better respond to changes in the external environment.

2.3. Requirements for industrial upgrading and high-quality development

China is promoting economic structural adjustment and industrial upgrading to promote high-quality development. Improving the security of the industrial chain supply chain helps to promote the modernization and high-end of the industrial chain, thus enhancing the overall competitiveness of the industry. By accelerating technological innovation and industrial chain restructuring, China can occupy a more favorable position in global competition and promote the development of the industrial chain in the direction of higher value-added.

2.4. Responding to the challenges of natural disasters and climate change

As climate change intensifies, the frequency of natural disasters poses new threats to global supply chains. As a global manufacturing power, China needs to enhance the resilience of its industrial chain and supply chain to ensure that it can quickly resume production in the event of natural disasters and reduce the impact on economic development.

This also means the need to strengthen the security management of energy supply, raw material security, infrastructure construction and so on.

3. Challenges to Improve Security Level of Industrial Chain and Supply Chain

3.1. Uncertainty of external environment

The global economic situation is unpredictable, and factors such as geopolitical conflicts, trade frictions, and epidemics have had an impact on the industrial chain and supply chain. These uncertainties may lead to supply chain disruptions and affect the normal operation of enterprises. With the increasingly fierce market competition, enterprises are facing the competitive pressure from the world. This requires companies not only to maintain cost advantages, but also to enhance the flexibility and responsiveness of the supply chain to respond to rapidly changing market demands. These external competitors and environmental changes have brought pressure to the production and operation of Chinese enterprises.

3.2. Hidden danger of technical security

With the deepening of digital transformation, more and more enterprises are beginning to rely on information technology and the Internet for daily operations and management. This dependence not only improves the efficiency and response speed of the supply chain, enabling enterprises to respond more quickly to changes in market demand, optimize resource allocation and reduce costs, but also causes new risks and challenges. In particular, while enjoying the convenience brought by digitalization, enterprises are also faced with increasingly complex network security threats and data leakage risks [3]. Cyber attackers can target weak links in the supply chain through a variety of means, such as using network vulnerabilities to carry out ransomware attacks, planting malicious code, stealing sensitive data, and even disrupting critical production systems. These attacks may not only lead to the disclosure of core enterprise data, but also may cause supply chain disruption, production delays, and even affect the operation of the entire industry. In addition, with the increase in information sharing and data exchange between enterprises, once one link is attacked, the entire supply chain will be affected, forming a "domino effect".

3.3. Unbalance of resource allocation

In some key areas, there is a serious imbalance in the allocation of resources. Some industries may experience over-concentration, while others may face resource shortages, resulting in overall supply chain vulnerability [4]. At the same time, many enterprises are isolated in the industrial chain and supply chain, lacking effective coordination mechanism. This leads to poor information transmission and inefficient use of resources, which in turn affects the security of the overall supply chain. In addition, in some areas, infrastructure construction is relatively lagging behind, and transportation, logistics and other links are not smooth, limiting the safety and efficiency of the supply chain.

4. Measures to Improve Security Level of Industrial Chain and Supply Chain

4.1. Strengthen construction of industrial and supply chain ecosystems

Building an industrial chain and supply chain ecosystem with innovative vitality is the basis and key to improving the level of safety. The construction of this ecosystem not only requires technological and management innovation, but also requires the establishment of a solid strategic cooperative relationship and interest coordination mechanism among all links of the industrial chain. Strengthening the strategic cooperation between the upstream and downstream of the industrial chain can ensure that all parties form close synergies in production, supply, logistics, sales and other links, and avoid supply chain disruption and inefficiency caused by information asymmetry, poor communication and other problems [5].

In this process, it is particularly important to encourage communication and contact between upstream and downstream enterprises in the local industrial chain. Local companies often have a better understanding of the needs and environment of the domestic market, and are also able to establish closer cooperation with other local companies geographically and culturally. Through frequent communication and interaction, these companies are able to quickly identify market changes and flexibly adjust production and supply plans, thereby improving the overall response speed of the supply chain.

Information sharing is one of the key factors in improving the security and resilience of supply chains. When companies in the industry chain can share information on market dynamics, technological innovation, and supply risks in a timely manner, the entire supply chain can be more flexible in responding to external shocks, such as fluctuations in raw material prices, changes in market demand, or sudden natural disasters. At the same time, information sharing also helps enterprises cooperate in technology research and development, production optimization and other aspects, achieve the optimal allocation of resources, and promote the development of the entire industrial chain to a higher level.

In addition, strengthening cooperation and links between upstream and downstream enterprises in the industrial chain can effectively reduce potential business risks, especially in the context of heightened global economic uncertainty, such cooperation is particularly important. By establishing a close cooperation network, enterprises can form a common defense line against market fluctuations and improve the anti-risk ability of the supply chain. This strong partnership can not only improve the synergistic efficiency of all links, but also enhance the resilience and security of the entire industrial chain, thus providing a more solid guarantee for the long-term development of enterprises.

4.2. Improve autonomy and controllability of industrial and supply chains

At the technical level, the state should comprehensively promote the domestic replacement strategy of key core technologies, which is an important measure to ensure industrial safety and stability. This strategy is not only about the country's scientific and technological autonomy, but also the basis for ensuring that the economy and industrial chain

remain invincible in global competition. The degree of mastery of key core technologies directly affects the autonomy and security of the industrial chain [6]. Therefore, the state should take various measures to increase support for independent research and development and build an internal driving force for innovation-driven development.

First, the country should increase investment in scientific research, especially in the core technology fields that are related to national security, the lifeline of the economy and people's livelihood. Through the establishment of special funds, tax incentives, research incentives and other policy means, universities, research institutions and enterprises are encouraged to jointly tackle key technical problems and accelerate the transformation and application of scientific and technological achievements. At the same time, it is necessary to promote the deep integration of industry, university and research, and form a market-oriented technological innovation system to ensure that research and development results can be quickly applied to industrial practice.

Second, the state should support and guide enterprises to achieve self-sufficiency in key technology areas. This not only requires enterprises to continuously upgrade and innovate on the basis of existing technologies, but also needs to encourage enterprises to break the international technology monopoly and master the intellectual property rights of core technologies. For technology fields involving national security and strategic significance, the state should increase policy support for local enterprises, support them to acquire and develop their own technological capabilities through mergers and acquisitions, cooperative development and other ways, so as to reduce the dependence on foreign technology.

In addition, the state should strengthen personnel training in key technical fields and build a high-level scientific and technological personnel team. By reforming the education system, increasing investment in scientific research funds, establishing an international talent introduction mechanism and other measures, we will train and attract more high-end technical talents, and ensure that we have sufficient technical reserves and innovation capabilities in key fields. Talent is the basis of technological innovation, only with sufficient reserves of scientific and technological talent, can provide a solid foundation for domestic alternative strategy.

The State shall establish and improve the legal and policy environment for technological innovation, protect the intellectual property rights of independent research and development, and encourage innovation and risk-taking. By improving the intellectual property protection system and strengthening the crackdown on intellectual property infringement, we will ensure that innovation results are duly protected, thus incentivizing enterprises and research institutions to continue investing in key technology areas.

In general, promoting the domestic substitution strategy of key core technologies is not only a task at the technical level, it involves the country's overall strategic planning and comprehensive policy support. By increasing support for independent research and development and promoting self-sufficiency in key technologies, the country will significantly reduce its dependence on external technologies, enhance the security and stability of the industrial chain, and thus provide a more reliable guarantee for the long-term healthy development of the Chinese economy.

4.3. Promote open sharing of supply chain elements

The openness and sharing of supply chains is an important way to improve the level of security, and an effective strategy to cope with the complex challenges and uncertainties brought about by globalization. In today's highly connected world, it is difficult for a single company or region to address all supply chain risks on its own, so openness and sharing are important means to enhance supply chain resilience and stability. Through the integration and sharing of resources, especially in the coordination of key elements such as information, technology and capital, all parties in the supply chain can jointly improve the ability to respond to market changes and emergencies, so as to achieve the overall optimization and security improvement of the supply chain.

Information opening and sharing is the foundation of supply chain security. By establishing an information sharing platform covering all links of the industrial chain, enterprises can obtain key information such as production progress, inventory and logistics status of upstream and downstream suppliers in real time, thus improving the transparency and visual management level of the supply chain. This real-time sharing of information can help companies make faster decisions, provide early warning of potential supply chain disruptions, and quickly coordinate resources and adjust production plans in the event of a crisis, thereby reducing the risks caused by information lag or asymmetry. Governments and industry associations can play a positive role in this regard by promoting the establishment of unified data standards and sharing mechanisms among all parties in the supply chain to ensure the smooth and secure flow of information.

The open innovation of technology is the power source of the continuous progress of supply chain. With the development of digital and intelligent technology, enterprises should actively participate in cross-industry and cross-field technical cooperation and sharing, and enhance the efficiency and innovation capacity of the supply chain through technical collaboration. For example, by jointly developing advanced production equipment, sharing automated production lines, or jointly promoting intelligent warehousing and logistics management, companies can significantly improve the operational efficiency and responsiveness of the supply chain. In addition, open technology cooperation can also help enterprises reduce technology costs and avoid the dependency risk brought by a single technology supplier, thereby enhancing the autonomy and security of the supply chain.

Through open innovation and resource sharing, various forms of supply chain innovation applications have been developed, and a modern supply chain system with efficient collaboration and flexible response capabilities has been gradually formed [7]. This system can not only improve the overall competitiveness of the supply chain, but also enhance the risk resistance and security of the supply chain. For example, a supply chain management system based on blockchain technology can realize data sharing and transaction transparency between various nodes in the supply chain, prevent fraud and information tampering, and thus ensure the safe operation of the supply chain.

4.4. Strengthen personnel training and technological innovation

Talent is the core factor to improve the security level of the

industrial chain and supply chain, and it is also a key factor to determine the competitiveness and sustainable development of the industrial chain. Driven by globalization and technological progress, the complexity and uncertainty of supply chain management are increasing, and enterprises are facing more and more challenges. Therefore, having a team of highly qualified people with forward thinking and professional skills becomes the basis for ensuring the stability and security of the supply chain. Through systematic education and training, enhancing the ability of all kinds of talents in supply chain management, risk control and other aspects has become a top priority to improve the security level of the industrial chain.

Education and training are the core ways to cultivate supply chain professionals. Modern supply chain management involves many fields, including logistics management, procurement and supply, information technology, financial support, risk management, etc. Each link needs talents with professional knowledge and skills. Therefore, the government, educational institutions and enterprises should work together to develop systematic education and training programs to provide high-quality educational resources and practical opportunities for future supply chain managers. For example, colleges and universities can set up professional courses related to supply chain management to train students' ability in data analysis, supply chain design, supply chain finance, risk assessment, etc. Companies can enhance their employees' practical experience and professionalism through on-the-job training and career development planning.

Enterprises should pay attention to the diversified training of talents, especially in the aspects of risk control and crisis management. With the development of supply chain globalization, there are more and more uncertain factors in supply chain, such as geopolitical risks, natural disasters, market fluctuations and so on. Therefore, enterprises need to cultivate a group of high-level management talents who have the overall concept and cope with complex situations. These talents should not only master the operation mechanism of each link of the supply chain, but also have the ability to flexibly and quickly make decisions to respond to emergencies and ensure the continuity and security of the supply chain. By holding regular risk simulation exercises and setting up cross-departmental emergency teams, enterprises can effectively improve the management team's crisis response ability and decision-making level.

Encouraging enterprises to increase investment in technological innovation to improve the overall technical level is also a key measure to enhance the anti-risk ability of the industrial chain. In supply chain management, advanced technology can significantly improve the transparency, efficiency and security of the supply chain. For example, through the application of big data analysis, artificial intelligence, Internet of Things and other technologies,

enterprises can achieve real-time monitoring and prediction of the supply chain, identify potential risks in advance, and take preventive measures. In addition, the application of blockchain technology can ensure the data security and information transparency of all links of the supply chain, thereby preventing information tampering and fraud, and enhancing the credibility and security of the supply chain.

5. Conclusion

Improving the security level of industrial chain and supply chain is a systematic project that requires the joint efforts of all parties. This strategy is not only to address current challenges, but also to remain competitive and sustainable in the future global economic landscape. By establishing a sound ecosystem, promoting technology autonomy and control, promoting the open sharing of factors, and strengthening personnel training and technological innovation, we can effectively improve the resilience and competitiveness of the industrial chain. In the future, with the progress of science and technology and the continuous development of the economy, the security of the industrial chain and supply chain will face new challenges and opportunities, and all sectors should actively respond to ensure the sustainable development of the economy.

References

- [1] Zhuo Xian. Improving the resilience and security level of industrial chain and Supply chain [N]. Economic Daily News, 2023-07-19.
- [2] Zhu Kunfu, Wang Jiarong, Li Shantong. Comparative advantage analysis of manufacturing enterprises in China's economic double cycle: from the perspective of firm heterogeneity [J]. Management World, 2019, 40 (09): 60-79+176+80-82.
- [3] Ye Xiaoyuan, Wang Weixian. Research on User data security and Privacy Protection in Cyberspace governance System [J]. Social Sciences of Chinese Universities, 2024, (05): 147-155+159.
- [4] Zhou Zhuo, Zhang Youwen. Strategic Consideration of outward link and Inward link in supply chain [J]. Research of World Economy, 2024, (07):3-12+134.
- [5] Huang Qinghua, Wang Haoli. Digital Technology to promote agricultural supply chain security and stability: Theoretical logic, practical path and policy suggestions [J]. Research on Governance Modernization, 2023,39(06):38-49.
- [6] Zhang Liao, Hu Zhongbo, Chen Song. Logical thinking and strategic Orientation of Safeguarding China's industrial chain Security under the global industrial chain reconstruction [J]. The Economist,2024,(03):35-44.
- [7] Song Hua. Resilience construction and high-quality development of China's supply chain: Connotation, mechanism and path [J]. Supply Chain Management,2023,4(09):5-24.