MINISTRY OF EDUCATION OF THE REPUBLIC OF BELARUS

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IMPACT OF DIGITAL CURRENCY ON CHINA'S TRADITIONAL FINANCIAL SYSTEM

Thesis for an academic Master's degree

Author of thesis _____ Zeng Siyi

Scientific supervisor, associate professor _____ Alexey Sergeyevich

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Head of the Department, Professor _____ Sergey Yuryevich

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INTRODUCTION

In the era of globalization and rapid economic development, the business environment for Chinese enterprises has become increasingly complex and competitive. The supply chain, as the backbone of enterprise operations, plays a crucial role in determining an enterprise's competitiveness together with survival. In recent years, many Chinese enterprises have embarked upon a journey of supply chain diversification, aiming to reduce risks, enrich flexibility as well as probe new growth opportunities. However, the impact of such diversification upon the economic security of enterprises remains a topic of significant academic and practical interest. This study delves into the relationship between enterprise supply chain diversification and the economic security of Chinese enterprises, seeking to supply insights and recommendations for both enterprises and policymakers.

Scientific significance

This research contributes to the existing body of knowledge upon supply chain management and enterprise economic security by exploring the specific impact of supply chain diversification in the Chinese context. It bridges the gap between theoretical frameworks together with real-world practices in China's unique business environment. By analyzing the mechanisms by which supply chain diversification affects economic security, it may lead to the development of new theories or the refinement of existing ones in the fields of supply chain strategy and enterprise risk management.

The study may employ a combination of quantitative and qualitative research methods. For instance, it could use statistical appraisal to identify correlations between supply chain diversification indicators together with economic security metrics, while also conducting in depth case studies to understand the underlying reasons for these relationships. This multi method approach enriches the robustness and reliability of the research findings.

Practical significance

Understanding the impact of supply chain diversification upon economic security helps enterprises make informed decisions about whether and how to diversify their supply chains. For instance, if a study finds that excessive diversification is able to lead to coordination problems together with increased costs, enterprises are able to adjust their strategies accordingly to balance risk reduction and cost control. The research is able to supply enterprises along with a framework for evaluating the potential benefits and drawbacks of different supply chain diversification options. This enables them to foster more effective long-term strategies that align along with their overall business goals and enrich their economic security.

Policymakers are able to use the findings of this study to formulate industry specific policies that encourage or regulate supply chain diversification. For instance, in industries that are critical to national economic security, for instance energy or high-tech manufacturing, policies could be designed to boost diversification while ensuring that it does not compromise the stability together with efficiency of the supply chain. By promoting supply chain strategies that enrich the economic security of enterprises, policymakers are able to contribute to the overall stability and resilience of the Chinese economy. This is particularly important in the face of global economic uncertainties, for instance trade wars or natural disasters.

Literature review

The literature review highlights that supply chain diversification is primarily driven by the need to reduce risks and dependence upon single markets or suppliers. While it offers benefits like increased resilience together with flexibility, excessive diversification is able to lead to higher costs together with complexity. In China, the vast domestic market together with diverse industrial base supply opportunities for diversification, but challenges for instance regional disparities together with regulatory differences exist. Enterprise economic security is influenced by both internal and external factors as well as a well-managed supply chain is able to enrich it. However, the optimal level of diversification varies by industry and firm size. Further research is needed to probe the unique impacts of China's business environment upon this relationship.

Vlasov, M. P. conducted research upon the interdisciplinary study of supply chains together with economic security. Despite receiving extensive yet gradual attention in recent years, sustainable supply chain management has not been systematically probed compared to the rapid growth of the service industry. The security issue in supply chains stands out as one of the most pressing concerns for firms. Vlasov aimed to formalize the interaction process between an enterprise together with its suppliers of components necessary for production. The model fostered emphasizes determining the best operational conditions for the enterprise to ensure the production of all planned products while minimizing acquisition costs. Unlike traditional approaches that emphasis upon inventory management of a single item or minimizing shipping costs for one component, Vlasov's model establishes a close interdependence between the proceeds from product sales together with the costs of acquiring components, as well as between supplier capabilities together with enterprise needs. The model also considers the reliability, magnitude as well as timeliness of supplies should be stipulated in contracts. Additionally, it implicitly accounts for accounts payable together with the availability of components at the time of procurement. As an added benefit, the model suggests the possibility of minimizing working capital by a sound logistics policy, thereby contributing to the enterprise's profitability together with the owner's income [1].

Іванова, M., et al. probed the basis of economic together with financial security for enterprises, emphasizing effective financial together with economic activity, stable financial condition, rational use of financial resources as well as the ability to counter threats. They identified the formation of effective logistics chains as a key factor in achieving economic security. The purpose of their article was to foster approaches to assessing the efficiency of logistics chains based upon economic together with financial security. The study investigated scientific approaches to evaluating logistics chain efficiency, identified their strengths together with weaknesses as well as analyzed their methodologies. The authors proposed a modern approach that uses the stationarity of the ratio of operating results to logistics costs over time as an indicator of logistics activity efficiency. This approach aims to reconcile the economic interests of logistics chain participants, reduce financial costs, ensure effective economic activity as well as form the basis for financial together with economic security. The study confirmed the expediency of this approach by an appraisal of selected enterprises' logistics chains, using logistics costs together with financial results from operating activities as initial data. The authors also noted the importance of using Davis databases, formed by web-surveys of enterprises regarding their logistic costs as well as highlighted the influence of current market conditions upon the stability together with optimal ratio of logistics chain results to costs. They concluded that the existence of a long-term stable equilibrium in the form of vector co-integration for all logistics chain subjects is optimal. Prospects for further research include the development of a scientific approach to forming a logistics cluster as a basis for financial together with economic security [2].

Chemirbayeva, Mergul, Zhanat Malgarayeva, and Almagul Azamatova analyzed the economic strategy for diversifying the activities of light industry enterprises based upon innovative approaches to management. They emphasized the need for enterprises to use modern development strategies and models of interaction along with other market participants to ensure financial and economic stability and reduce commercial risks in the face of increased competition and instability of consumer demand. The article highlighted the lack of a single strategy that is able to ensure optimized performance and competitive product prices. The authors proposed the use of a production diversification strategy as a means to enrich adaptability and resilience in a volatile economic environment [3].

Kurbatska, Larysa, Luidmyla Kvasova, and Denys Lozovyi probed the significance of production diversification as a strategic approach for enhancing the adaptability and resilience of enterprises. They aimed to analyze various diversification strategies, assess associated risks together with opportunities as well as identify key factors influencing the selection of an optimal strategy. The methodology involved a comprehensive review of existing literature, in-depth interviews together with surveys along with business leaders together with industry

experts as well as case studies. The results indicated that companies actively engaging in production diversification exhibit greater adaptability together with resilience in volatile markets. Successful diversification strategies often involve a combination of product innovation together with market expansion, aligned along with core competencies to mitigate risks. The study supplied practical recommendations for business leaders upon selecting and implementing optimal diversification strategies and suggested areas for future research [4].

Zevenko, Dmytro, Viktor Shyshkin, and Oksana Onyshchenko probed the possibilities of using a diversification strategy in the operations of trade enterprises under modern conditions. They demonstrated that diversification enables businesses to be more flexible together with adapt to market changes, enhancing their competitiveness. By distributing activities across different directions, a company reduces its dependence upon a single source of income together with mitigates risks associated along with market instability. The study used a comprehensive set of general together with special methods, including literature review, appraisal of modern trends as well as others. The results indicated that the diversification strategy supplies trade enterprises along with significant opportunities to strengthen their market positions, reduce risks as well as ensure long-term growth. However, effective implementation requires careful planning and consideration of market conditions [5].

Leung, Guy CK, et al. applied insights from the Global Energy Assessment and securitization theory to propose a framework for explaining China’s energy security policies in their historic evolution. They paid specific attention to explaining how particular energy supply chains are constructed and securitized. The study drew data from Chinese and English publications and interviews along with energy officials and experts in China. The authors demonstrated that China’s emphasis upon vulnerabilities of its oil supply chain at the expense of improving the reliability of domestic electricity supply has its roots in historic events, properties of energy systems as well as the presence of powerful institutional agents. They suggested that this emphasis upon the oil supply chain is likely to be maintained in the future, possibly accompanied by increasing concerns over natural gas supply chains. The proposed framework for energy security policy appraisal is able to be used for other countries and jurisdictions [6].

Fu, Yonggui, and Jianming Zhu applied blockchain technology to the endogenous risk management of big production enterprise supply chains to address the influence of information's "incompleteness" together with "asymmetry" upon supply chain operation efficiency. They described the system structure together with intelligent contract operation mechanism under consensus authentication of blockchain applying in big production enterprise supply chains together with analyzed the economic value from aspects for instance response speed, supply accuracy, cooperation integrity, business interaction economic cost, supply quality as

well as supply price. The study supplied ideas and model structures for developing blockchain systems in the supply chain area and boosted the application research development of blockchain in specific areas [7].

Hlushenkova, Anastasiia, et al. examined the management of strategies aimed at shaping the innovative and investment potential of enterprises to ensure their economic security. The research scrutinized how strategic management practices are able to bolster the innovative together with investment capabilities of enterprises. The methodology involved a theoretical investigation of strategic frameworks together with practices. The study clarified how a forward-looking approach to investment together with innovation is able to refine a business's competitiveness together with strength. The outcomes pointed out the usefulness of implementing strong strategic organization methods to advance economic stability together with foster overall management performance. The study elaborated the theoretical understanding of strategic management and supplied valuable advice to businesses looking to foster their ability for innovation and investment [8].

Vasylchak, S., L. Pronko, and M. Vykliuk discussed the cardinal transformations facing the world in the early 21st century, including changes in geopolitical configurations, integration processes as well as other changes that affect national and geopolitical security. They highlighted the exacerbation of global security problems together with the ambiguous impact of globalization upon the development of different countries. The authors noted the rivalry between leading countries for the redistribution of spheres of influence, the threat of the use of force, the global escalation of terrorism, the flow of illegal migration, the probability of the emergence of new nuclear states as well as the threat of international organized crime. They also mentioned the exacerbation of socio-political and socio-economic problems in many countries that are transforming into armed conflicts, posing a real threat to international peace and stability [9].

Sun, Yuhuan, et al. addressed the imperative of bolstering supply chain security and resilience amidst recent disruptions triggered by pandemics and crises. They focused upon the augmentation of risk-taking capabilities among enterprises at supply chain nodes. The study constructed a panel simultaneous equation model to contrast the direct impact of corporate AI transformation upon CRTC along with its indirect influence, facilitated by the reduction of supply chain concentration. The results indicated that the overall effect of corporate AI transformation upon CRTC is positive. The study broadened the understanding of factors influencing CRTC at the supply chain level and shed light upon the policy implications of enterprise AI transformation. It offered valuable insights for corporates in shaping their risk management strategies and contributed to the discourse upon the advancement of emerging technologies and supply chain practices [10].

The review concludes that while supply chain diversification is able to enrich enterprise economic security, its effectiveness depends upon industry context, firm size as well as the specific business environment. In China, unique factors like government policies and regional disparities further complicate the relationship, necessitating tailored strategies for optimal diversification.

GENERAL CHARACTERISTICS OF THE WORK

Structure and scope of the master's thesis is 84 pages, 55 references, 4 tables and 3 figures. The master's thesis consists of an introduction, three chapters, a conclusion and a list of references.

Key words: supply chain, supply chain diversification, economic security, enterprise economic security, China,

The relevance of the topic

Post-pandemic supply chain disruptions, geopolitical tensions as well as regional conflicts have highlighted vulnerabilities in centralized supply chains. As a global manufacturing hub, Chinese enterprises face pressure to balance cost efficiency along with resilience. Supply chain diversification is critical for mitigating risks like overreliance upon single markets, raw material shortages, or export restrictions. China’s "dual circulation" strategy emphasizes domestic resilience and global competitiveness, making supply chain diversification a strategic imperative for economic security.

Purpose of the research

The research purpose is to quantify supply chain diversification's impact upon Chinese enterprises' economic security, identify trade-offs as well as inform strategic decisions.

Object of the research

The object of the research is the economic security of enterprises in China, defined as their ability to withstand external shocks while maintaining operational stability and profitability.

Subject of the research

The subject of the research is enterprise supply chain diversification strategies in China.

Research objectives

1) To evaluate how diversification levels correlate along with economic security indicators;

2) Analyze industry-specific differences and firm characteristics;

3) foster frameworks for balancing diversification along with cost efficiency.

Research methodology

The research employs a mixed-methods approach, combining quantitative and qualitative methods. Quantitatively, it uses financial data analysis, regression analysis as well as structural equation modeling (SEM) to measure correlations and test hypotheses related to diversification and economic security. Qualitatively, it includes case studies of firms along with varying levels of diversification to supply in-depth insights.

Research results and novelty

The research demonstrates a significant positive correlation between supply chain diversification and economic security in Chinese enterprises. Diversified supply chains enhance resilience to external shocks, operational continuity as well as financial stability. The study identifies industry-specific differences together with firm characteristics as key moderators influencing the effectiveness of diversification strategies. Larger firms with advanced technological capabilities together with substantial financial resources are better positioned to benefit from diversification. The research also proposes frameworks to balance diversification with cost efficiency, including the “China Plus N” strategy and strategic inventory management.

CHAPTER 1
THEORETICAL FOUNDATIONS AND CONCEPT DEFINITION

Supply chain diversification is a risk management strategy to expand sourcing and build resilience. It directly enriches enterprise economic security by protecting a firm from threats, ensuring stability.

1.1 Supply chain diversification theory

Supply chain diversification is, at its core, a sophisticated and strategic approach aimed at mitigating risks within the complex and interconnected realm of global supply chains. In an era where the business landscape is constantly evolving, characterized by an array of uncertainties and disruptions, this theory has emerged as a crucial framework for organizations seeking to ensure the stability, continuity as well as success of their operations.

At its most fundamental level, supply chain diversification involves the intentional and planned expansion of sourcing options as well as the establishment of manufacturing locations across multiple regions. The overarching goal is to reduce the perilous over reliance upon a single supplier or a specific geographic area. This is not a mere reactionary measure but a proactive strategy that organizations adopt to fortify their supply chains against a wide spectrum of potential disruptions. These disruptions are able to manifest in various forms, for instance geopolitical conflicts that may disrupt trade routes, natural disasters like earthquakes, floods, or hurricanes that is able to damage production facilities together with disrupt transportation networks as well as public health crises, as vividly demonstrated by the global impact of the COVID 19 pandemic led to lockdowns, factory closures as well as significant disruptions in the movement of goods and services [11].

However, the theory of supply chain diversification extends far beyond the simple act of increasing the number of suppliers. It demands a comprehensive and holistic reevaluation of the entire value chain. This means taking into account every stage of the process, from the extraction of raw materials to the delivery of the final product to the end customer. Such a holistic approach ensures that organizations are able to identify potential vulnerabilities together with opportunities for improvement at every level, enabling them to build a more resilient and adaptable supply chain.

One of the key dimensions of supply chain diversification is multi sourcing. This strategy involves engaging multiple suppliers for the same component or raw material. The rationale behind multi sourcing is straightforward yet highly effective,

by having several suppliers, organizations are able to safeguard themselves against the failure of any single one. A supplier may encounter financial difficulties, quality control issues, labor strikes, or natural disasters that prevent it from fulfilling its contractual obligations. In such situations, having alternative suppliers in place is able to ensure the uninterrupted flow of components, minimizing the impact upon production schedules together with ultimately upon customer satisfaction. For instance, in the automotive industry, where the production of a single vehicle requires thousands of components, major automakers often source critical parts for instance engines, transmissions as well as electronics from multiple suppliers. This not only reduces the risk of production halts due to supplier specific issues as well allows the automakers to negotiate better terms, including price, quality as well as delivery times, as suppliers compete for their business [12].

Another important aspect is multi shoring focuses upon establishing manufacturing or sourcing operations in different geographic locations. This strategy is designed to mitigate country specific risks. These risks are able to include political instability, changes in government policies, trade restrictions, currency fluctuations as well as differences in labor laws and regulations. Multi shoring encompasses several sub strategies. Nearshoring, for instance, involves moving manufacturing or sourcing operations to adjacent countries. This approach offers several advantages, for instance reduced transportation costs together with lead times, easier cultural together with language integration as well as the ability to respond more quickly to changes in demand. For instance, many European companies nearshore their manufacturing operations to countries in Eastern Europe, where labor costs are often lower as well as the proximity allows for more efficient supply chain management. Friend shoring, upon the other hand, involves partnering along with politically allied nations. This are able to supply additional security together with stability, as well as potential benefits in terms of preferential trade agreements, easier regulatory compliance as well as shared strategic interests. For instance, the United States has been increasingly exploring friend shoring opportunities along with countries like Canada and Mexico under the United States Mexico Canada Agreement (USMCA) aims to strengthen regional supply chains and reduce reliance upon more distant and potentially less stable suppliers [13].

Transportation and logistics diversification is also a critical component of supply chain diversification. It involves utilizing multiple modes of transport, for instance air, sea, road as well as rail, as well as partnering along with different logistics service providers. The goal is to prevent bottlenecks together with ensure redundancy in distribution networks. Different modes of transport have their own advantages together with disadvantages in terms of cost, speed, capacity as well as reliability. By using a combination of these modes, organizations are able to optimize their transportation costs while maintaining the timely delivery of goods. For instance,

for time sensitive products like electronics or pharmaceuticals, air transport may be preferred for its speed, while for large volume, non perishable goods, sea transport is often more cost effective. Additionally, relying upon multiple logistics partners are able to supply backup in case one partner experiences issues for instance capacity shortages, service disruptions, or financial problems. This are able to aid organizations avoid delays in product delivery is able to have a significant impact upon customer satisfaction and brand reputation.

A diversified supply chain is distinguished by its flexibility and redundancy. Flexibility allows organizations to adapt quickly to changes in market conditions, customer demands as well as external disruptions. For instance, if a sudden increase in demand occurs in a particular region, a diversified supply chain is able to quickly redirect production together with distribution resources to meet that demand. Redundancy, upon the other hand, supplies a safety net in case of unexpected events. In the event of a major disruption, for instance a natural disaster that shuts down a manufacturing facility or a key transportation route, the redundant elements of the supply chain is able to step in to ensure that operations are able to continue along with minimal disruption. This enriched resilience and adaptability are crucial for organizations to thrive in a volatile global environment.

While the primary motivation behind supply chain diversification is risk management, it also offers several secondary benefits. One of these benefits is access to new markets. By diversifying sourcing and manufacturing locations, organizations are able to gain a better understanding of local market dynamics, customer preferences as well as regulatory requirements in different regions. This are able to open up new opportunities for market expansion together with penetration. For instance, a company that diversifies its manufacturing operations to a new country may find that it is able to more easily enter the local market due to reduced transportation costs, better alignment along with local consumer tastes as well as a stronger local presence.

Cost reduction is another significant advantage. Different regions may offer lower labor costs, more favorable tax policies, or access to cheaper raw materials. By diversifying their supply chains, organizations are able to take advantage of these cost differentials. For instance, many clothing manufacturers have diversified their production to countries in Southeast Asia, where labor costs are relatively low compared to Western countries. This allows them to produce their products at a lower cost is able to be passed upon to consumers in the form of more competitive prices or result in higher profit margins for the company [14].

In addition, supply chain diversification is able to foster increased innovation. Working along with multiple suppliers and operating in different regions exposes organizations to a wider range of technologies, manufacturing processes as well as business practices. This are able to stimulate the exchange of ideas together with the

adoption of new together with innovative approaches. For instance, a technology company that sources components from different suppliers around the world may be exposed to new together with emerging technologies that it is able to incorporate into its products, giving it a competitive edge in the market.

However, implementing supply chain diversification is not without its challenges. Managing multiple suppliers, manufacturing locations as well as logistics partners requires a high level of coordination together with communication. There may be differences in quality standards, production lead times as well as business cultures among different partners is able to lead to difficulties in ensuring consistency and efficiency across the supply chain. Additionally, diversifying supply chains often requires significant investment in terms of time, resources as well as capital. Organizations must to conduct thorough market research to identify suitable suppliers and locations, establish new relationships as well as set up the necessary infrastructure [15]. The visualization about the supply chain diversification is shown on figure 1.1.

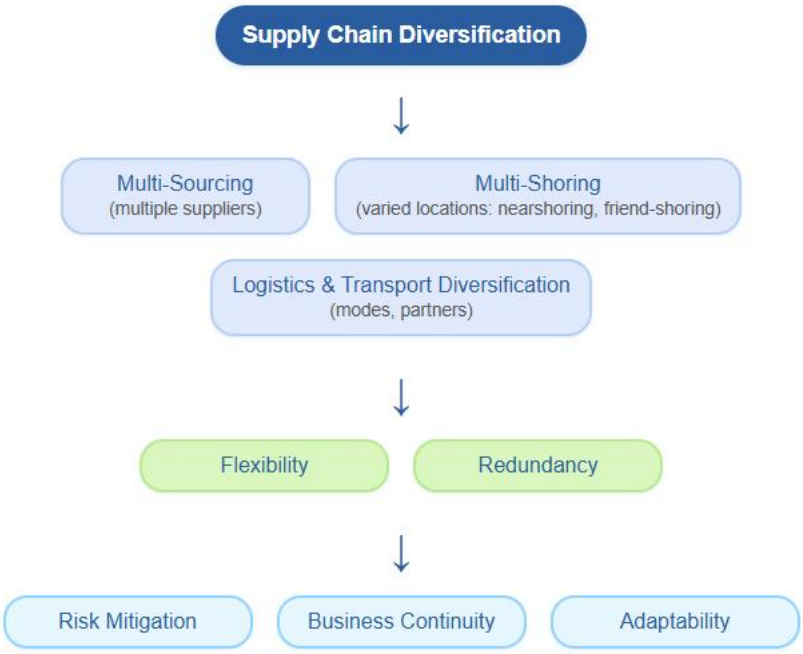

Figure 1.1 - Supply Chain Diversification Theory Model
Source: authors' development based on [11;13;15]

The figure 1.1 illustrates the core theory of supply chain diversification, emphasizing it as a strategic approach to mitigate risks in a globalized business environment. At its center is the concept of diversification, which is operationalized through multi-sourcing, multi-shoring as well as logistics diversification. These strategies create flexibility together with redundancy, enabling organizations to adapt swiftly together with maintain operations during disruptions. The resulting benefits

include risk mitigation, business continuity, adaptability, cost reduction as well as market expansion. However, the model also acknowledges key challenges such as increased management complexity and the need for substantial coordination and investment, highlighting the balance required for effective implementation.

In conclusion, supply chain diversification theory supplies a comprehensive framework for organizations to build more resilient, flexible as well as successful supply chains. By understanding together with implementing the key dimensions of multi sourcing, multi shoring as well as transportation together with logistics diversification, organizations are able to effectively manage risks, access new markets, reduce costs as well as drive innovation. While the challenges associated along with diversification are significant, the potential benefits far outweigh the costs in today's complex and unpredictable global business environment.

1.2 Definition of the concept of enterprise economic security

Enterprise economic security is a complex and multi-faceted concept that lies at the heart of a company's ability to thrive in an ever-changing business environment. It represents a comprehensive state where an enterprise's most crucial interests are shielded from a wide array of internal together with external menaces, thereby enabling the organization to maintain stable operations, foster sustainable growth as well as successfully pursue its strategic objectives. Although there is no one size fits all definition that is uniformly embraced across all industries and regions, the concept of enterprise economic security is typically defined by several fundamental and interrelated elements.

The first and perhaps most obvious element of enterprise economic security is the protection of the company's assets. These assets are not limited to physical property but encompass a broad range of valuable resources, including technological, financial as well as human resources. Technological assets are particularly vulnerable in today's digital age. Enterprises invest significant amounts of time and money in developing proprietary technologies, software as well as intellectual property. These assets are able to be targeted by cyberattacks, industrial espionage, or intellectual property theft. For instance, a software development company may face the risk of hackers stealing its source code could not only lead to significant financial losses as well undermine the company's competitive edge in the market. To safeguard technological assets, companies implement various security measures for instance firewalls, encryption, access controls as well as regular security audits [16].

Financial resources are also a prime target for threats. Enterprises are exposed to risks for instance fraud, embezzlement as well as financial market volatility.

Internal fraud, where employees misuse company funds for personal gain, is able to have a devastating impact upon a company's financial health. External factors like sudden changes in exchange rates, interest rate fluctuations, or economic recessions are able to also pose significant threats. For instance, a multinational company that conducts business in multiple countries is highly susceptible to currency exchange rate risks. If the value of the currency in a particular market where the company operates suddenly drops, it is able to lead to substantial losses in revenue and profit margins. To mitigate financial threats, companies employ risk management strategies for instance hedging, diversification of investments as well as strict internal financial controls.

Human resources are another critical asset that needs protection. Employee turnover, especially of key personnel, is able to disrupt business operations and lead to a loss of institutional knowledge. Additionally, issues for instance labor disputes, strikes, or problems related to employee health together with safety is able to also threaten the smooth running of the enterprise. For instance, a manufacturing company that experiences a sudden high turnover of skilled workers may face production delays together with quality issues. To protect human resources, companies' emphasis upon creating a positive work environment, offering competitive compensation and benefits, providing training and development opportunities as well as having effective labor relations management strategies in place.

Stability and sustainability are key hallmarks of enterprise economic security. This aspect refers to an enterprise's capacity to maintain consistent and efficient operations over an extended period, even in the face of various destabilizing forces. These forces are able to include changes in market demand, new entrants in the industry, regulatory changes, or natural disasters. A stable enterprise is one that is able to weather short term disruptions without sacrificing its long-term viability [17].

For instance, consider a retail company. Fluctuations in consumer demand, changes in fashion trends as well as the emergence of new e commerce competitors are all potential destabilizing factors. However, a retail company along with strong economic security will have strategies in place to adapt to these changes. It may invest in market research to better understand consumer preferences, foster an omnichannel sales approach to reach customers across different platforms as well as continuously optimize its supply chain to ensure efficient inventory management. This way, the company is able to maintain stable sales and profitability over time.

Sustainability, upon the other hand, is closely related to stability but focuses more upon the long-term perspective. A sustainable enterprise is one that is able to operate in a way that meets the needs of the present without compromising the ability of future generations to meet their own needs. This concept encompasses environmental, social as well as governance (ESG) factors. For instance, a manufacturing company that adopts sustainable production practices, for instance

reducing its carbon emissions, minimizing waste generation as well as ensuring fair labor practices, not only contributes to the well-being of society and the environment as well enriches its own long term economic security. Consumers are increasingly becoming more environmentally and socially conscious as well as companies that fail to address ESG issues may face reputational damage, loss of customers as well as regulatory penalties, all of which is able to threaten their economic stability.

Effective resource management is an essential component of enterprise economic security. A secure enterprise is one that is able to efficiently allocate together with utilize its capital, personnel as well as technology to both mitigate risks together with seize opportunities. Capital management involves making informed decisions about investment, financing as well as working capital management. Companies must to ensure that they have sufficient funds to support their operations, invest in growth opportunities as well as meet their financial obligations. This requires careful planning, budgeting as well as financial forecasting. For instance, a startup company may must to raise capital by venture capital or angel investors to fund its research and development efforts and initial production. It must manage this capital effectively to ensure that it is able to reach key milestones and achieve profitability [18].

Personnel management is equally important. Enterprises must to attract, retain as well as foster a skilled workforce. This involves effective recruitment strategies, performance management systems as well as career development programs. By aligning the skills and capabilities of employees along with the company's strategic goals, organizations are able to enrich productivity together with innovation. For instance, a technology company may invest in training its employees in emerging technologies for instance artificial intelligence together with blockchain to stay competitive in the market.

Technology management is also crucial in today's digital driven business landscape. Enterprises must to invest in the right technologies, integrate them effectively into their operations as well as continuously update and maintain them. This are able to refine operational efficiency, enrich product quality as well as enable better decision making. For instance, a logistics company may use advanced transportation management systems and real time tracking technologies to optimize its delivery routes, reduce costs as well as refine customer service.

Enterprise economic security is ultimately about enabling a company to pursue its primary commercial interests and long-term goals without significant hindrances. A company's strategic goals are able to vary widely depending upon its industry, size as well as market position. These goals may include market expansion, product innovation, cost leadership, or brand building. However, achieving these goals is often challenging due to the presence of various internal together with external risks.

For instance, a pharmaceutical company may have the strategic goal of developing together with launching a new drug. This requires significant investment in research together with development, clinical trials as well as regulatory approvals. Along the way, the company may face risks for instance failed clinical trials, intense competition from other pharmaceutical companies as well as changes in healthcare regulations. An enterprise along with strong economic security will have the resources, capabilities as well as risk management strategies in place to overcome these challenges and successfully bring the new drug to market.

In essence, enterprise economic security is the cornerstone of a business's ability to navigate the complex and unpredictable economic landscape. It is not just about protecting against threats as well about proactively building resilience together with capabilities. By focusing upon the key elements of protection from threats, stability together with sustainability, effective resource management as well as the realization of strategic goals, enterprises are able to enrich their economic security, ensuring their long-term viability and prosperity. This concept is of utmost importance in today's globalized and highly competitive business environment, where the stakes are high as well as the margin for error is slim. We could see the key elements and aspects of enterprise economic security summarized on table 1.1.

Table 1.1 - Key elements and aspects of enterprise economic security

Element	Description	Examples
Asset Protection	Safeguarding technological, financial, and human resources from internal and external threats.	Firewalls for IT, financial controls, competitive compensation, training programs.
Stability	Maintaining consistent and efficient operations despite market, regulatory, or environmental changes.	Market research, omnichannel sales, supply chain optimization.
Sustainability	Operating for the long term, considering environmental, social, and governance (ESG) factors.	Reducing emissions, minimizing waste, fair labor practices.
Resource Management	Efficient allocation and utilization of capital, personnel, and technology to mitigate risks and seize opportunities.	Investment planning, personnel training, technology upgrades.
Strategic Goal Realization	Enabling the pursuit and achievement of commercial objectives without significant hindrance.	Market expansion, product innovation, cost leadership, brand building.
Risk Management	Proactive identification and mitigation of internal and external risks.	Hedging currency risks, diversifying investments, crisis response plans.

Source: authors' development based on [16; 17; 18]

The table 1.1 provides a structured overview of the core elements that define enterprise economic security. It highlights how asset protection, stability, sustainability, resource management, strategic goal realization as well as risk management collectively ensure a company’s long-term viability together with success. Each element is briefly described, along with practical examples, demonstrating how they contribute to shielding an enterprise from various threats together with supporting its growth objectives. The table emphasizes that enterprise economic security is multi-dimensional, requiring proactive measures across different areas of operation to maintain resilience, adapt to change as well as achieve sustained profitability in a dynamic business environment.

In conclusion, enterprise economic security is a multifaceted concept essential for businesses to thrive in dynamic environments. It involves protecting assets, ensuring stability and sustainability, managing resources effectively as well as realizing strategic goals. By implementing robust security measures, companies can safeguard their technological, financial as well as human resources from various threats. Stability together with sustainability enable enterprises to maintain consistent operations together with consider long-term impacts. Effective resource management allows for efficient allocation of capital, personnel as well as technology. Ultimately, enterprise economic security empowers companies to pursue their objectives without significant hindrances, ensuring long-term viability and success in today's competitive business landscape.

1.3 Relationship model of supply chain diversification and enterprise economic security

The connection between supply chain diversification and enterprise economic security is not only direct as well forms the very bedrock upon which a company's economic well-being is built. Supply chain diversification emerges as a vital and indispensable tool in the arsenal of strategies that enterprises are able to employ to strengthen their economic security. In an increasingly interconnected together with volatile global business environment, the risks associated along with a vulnerable, overly concentrated supply chain have become more pronounced than ever before. Such a supply chain structure poses an immediate and significant threat to an enterprise's stability, as any disruption is able to trigger a cascade of negative consequences, including production halts, substantial financial losses as well as a rapid erosion of the company's competitive edge in the market.

At the core of this relationship lies the fundamental principle of risk mitigation. When an enterprise decides to diversify its supply base and manufacturing footprint, it is essentially taking proactive steps to reduce its exposure to single points of failure. These single points of failure are able to be a single supplier that supplies a critical component, a sole manufacturing location in a region prone to natural disasters or political unrest, or a unique transportation route that, if disrupted, is able to bring the entire supply chain to a standstill. The concept of risk mitigation by diversification becomes even more crucial in the context of "economic coercion," a situation where supply chains are able to be weaponized for political motives. In such scenarios, countries or entities may use restrictions upon trade, access to resources, or the movement of goods as a means of exerting pressure. However, a geographically diversified supply chain network is able to act as a buffer, significantly blunting the impact of such coercive actions and safeguarding the enterprise's economic interests [19; 20].

To better understand the intricate relationship between supply chain diversification and enterprise economic security, it is essential to probe the model that connects these two concepts in detail.

1) Enhanced resilience

One of the most significant ways in which supply chain diversification contributes to enterprise economic security is by enhancing the enterprise's resilience. Resilience is able to be defined as the capacity of an organization to absorb shocks, whether they are sudden disruptions like natural disasters, geopolitical conflicts, or public health emergencies as well as recover quickly to resume normal operations. This ability is a cornerstone of economic security, as it determines the enterprise's ability to withstand external pressures without suffering irreparable damage.

Supply chain diversification builds resilience in several ways. Firstly, by having multiple suppliers for the same component or raw material, an enterprise is able to quickly switch to an alternative source if one supplier encounters problems. For instance, in the semiconductor industry is highly dependent upon a few key suppliers for advanced chips, companies that have diversified their sourcing have been better able to weather disruptions. When a major semiconductor manufacturer in Taiwan faced production delays due to a power outage, companies that had diversified their chip suppliers to include firms in South Korea together with the United States were able to maintain their production schedules. These companies had pre-established relationships along with alternative suppliers, had already qualified their products as well as could quickly place orders to ensure a continuous supply of chips.

Secondly, multi shoring, or establishing manufacturing operations in different geographic locations, also enriches resilience. A natural disaster in one region, for instance a hurricane in the Gulf Coast of the United States or an earthquake in Japan,

is able to severely disrupt local manufacturing facilities. However, if an enterprise has manufacturing plants in multiple regions, it is able to shift production to unaffected facilities. For instance, a global apparel company that has manufacturing operations in Southeast Asia, South America as well as Eastern Europe is able to reallocate production orders in the event of a disruption in one area. If a factory in Vietnam is forced to close due to a labor strike, the company is able to increase production in its other facilities to meet customer demand, minimizing the impact upon sales together with brand reputation.

Moreover, transportation together with logistics diversification play a crucial role in building resilience. By using multiple modes of transport together with logistics partners, an enterprise is able to avoid bottlenecks caused by disruptions in a particular transportation route or service provider. For instance, a furniture manufacturer that ships its products globally may use a combination of sea, air as well as road transport. If a major shipping lane is blocked due to a maritime accident or a port strike, the company is able to switch to air or road transport for urgent orders, ensuring that its products reach customers upon time [21].

2) Reduced vulnerability

Supply chain diversification is also highly effective in reducing an enterprise's vulnerability to external shocks. By spreading operations across multiple regions and suppliers, the impact of localized disruptions is minimized. Localized disruptions are able to include a wide range of events, from local political unrest and regulatory changes to natural disasters and labor disputes.

When an enterprise relies upon a single supplier or a single geographic region for a significant portion of its supply chain, it is highly vulnerable to any problems that may occur in that specific location. For instance, many electronics companies were severely affected when the 2011 earthquake together with tsunami in Japan disrupted the supply of specialized components. Companies that had sourced components exclusively from Japan faced production halts as they had no alternative suppliers ready to step in. In contrast, companies that had diversified their supply chains to include suppliers in other countries were able to continue their operations along with relatively minor disruptions.

Similarly, regulatory changes in a particular country are able to have a major impact upon an enterprise's supply chain. For instance, if a country suddenly imposes new trade tariffs or stricter environmental regulations upon imported goods, companies that rely solely upon suppliers in that country may face increased costs or even be unable to source the required materials. However, if an enterprise has diversified its supply base, it is able to shift its sourcing to other regions along with more favorable regulatory environments.

In addition, labor disputes in a single manufacturing facility are able to also disrupt production. A strike by workers at a factory is able to lead to production

delays and missed delivery deadlines. But if a company has multiple manufacturing locations, it is able to reduce the impact of such disputes by reallocating production to other plants. This not only ensures that the company is able to continue to meet customer demand as well gives it more leverage in labor negotiations [22].

3) Ensured operational continuity

Another key aspect of the relationship between supply chain diversification and enterprise economic security is the assurance of operational continuity. The availability of alternative sourcing and production options is crucial for a company to maintain its operations during a crisis and ensure a consistent supply of products to the market.

During a global health crisis like the COVID 19 pandemic, many companies faced unprecedented challenges. Lockdowns, travel restrictions as well as factory closures disrupted supply chains around the world. However, companies along with diversified supply chains were better able to adapt. For instance, a food together with beverage company that sourced ingredients from multiple countries was able to continue production even when some of its suppliers in certain regions were affected by the pandemic. It could quickly shift its sourcing to suppliers in other areas that were still operating together with adjust its production processes accordingly.

In the case of a geopolitical conflict, for instance a trade war between two major economies, companies along with diversified supply chains also have an advantage. If a company is directly affected by trade tariffs or export restrictions, it is able to probe alternative sourcing options in countries that are not involved in the conflict. This allows the company to maintain its production and supply of goods to customers, avoiding revenue losses and potential market share erosion.

Operational continuity is not only important during crises as well in normal business operations. It helps companies meet customer demand consistently is essential for building customer loyalty and maintaining a good brand reputation. A company that experiences frequent production disruptions due to supply chain issues is likely to lose customers to competitors who is able to supply a more reliable supply of products [23].

4) Greater financial stability

Supply chain diversification also contributes significantly to a company's financial stability. By preventing costly disruptions, it helps ensure more predictable revenue streams and long-term financial health. Production halts caused by supply chain disruptions are able to lead to a variety of financial losses. These include lost sales revenue due to the inability to meet customer demand, increased costs associated along with emergency sourcing or expedited shipping as well as potential penalties for missed delivery deadlines.

For instance, if a car manufacturer experiences a disruption in the supply of a critical component, it may be forced to halt production. This not only results in lost

sales as customers may turn to other car brands, as well incurs additional costs. The company may have to pay higher prices to source the component from alternative suppliers upon short notice as well as it may also face costs related to idling its production facilities and laying off or furloughing workers.

On the other hand, a diversified supply chain reduces the likelihood of such costly disruptions. A company that has multiple suppliers and manufacturing locations are able to better manage risks and avoid situations where a single event is able to cause significant financial damage. This leads to more stable revenue streams as the company is more likely to be able to meet customer demand consistently. Stable revenue, in turn, enables better financial planning, investment in growth opportunities as well as the ability to service debt.

In addition, supply chain diversification is able to also lead to cost savings over the long term. By sourcing from different regions, companies are able to take advantage of cost differentials in labor, raw materials as well as production. For instance, a clothing company that manufactures its products in countries along with lower labor costs are able to reduce its production expenses directly impacts its bottom line. These cost savings contribute to greater financial stability and is able to be used to invest in research and development, marketing, or other areas that is able to drive the company's growth [24]. We could see the relationship model between supply chain diversification and enterprise economic security summarized on table 1.2.

Table 1.2 - The relationship model between supply chain diversification and enterprise economic security

Aspect	Description	Impact on Economic Security	Example
Enhanced Resilience	Diversifying suppliers, manufacturing, and logistics to avoid single points of failure.	Absorbs shocks, recovers quickly, maintains operations.	Multiple chip suppliers handled Taiwan power outage by switching to South Korea/US.
Reduced Vulnerability	Spreading operations across regions/suppliers to minimize impact of local disruptions or regulatory changes.	Less likely to be affected by disasters, regulatory changes, or strikes.	Electronics firms with global suppliers managed better after Japan’s 2011 disaster.
Ensured Operational Continuity	Alternative sources and flexible production to maintain supply during crises or disruptions.	Consistent product supply, meets customer demand, protects market share.	Food company sourcing globally during COVID-19 continued production amid lockdowns.
Greater Financial	Prevents costly disruptions, enables cost savings, and	Predictable revenue, investment in	Clothing manufacturer uses low-cost countries

Stability	stable revenues for financial planning and investment.	growth, ability to service debt.	to reduce expenses and boost profits.

Source: authors' development based on [19;21;24]

Table 1.2 illustrates how supply chain diversification enhances enterprise economic security. By diversifying suppliers, manufacturing, together with logistics, companies build resilience, enabling them to absorb shocks together with maintain operations during disruptions. This reduces vulnerability to local disasters, regulatory changes, together with strikes. Diversification ensures operational continuity by providing alternative sources together with flexible production, which helps meet customer demand together with protect market share. Financially, it prevents costly disruptions, enables cost savings, together with provides stable revenues for planning together with investment. For example, multiple chip suppliers mitigated a Taiwan power outage by switching to South Korea/US, demonstrating how diversification safeguards economic security.

In conclusion, the relationship between supply chain diversification and enterprise economic security is a complex and multi-faceted one. Supply chain diversification acts as a powerful protective mechanism, shielding enterprises from a wide range of external threats together with fortifying their overall economic security. by enriched resilience, reduced vulnerability, ensured operational continuity as well as greater financial stability, supply chain diversification enables companies to navigate the uncertainties of the global business environment successfully. As the world becomes more interconnected together with the risks to supply chains continue to evolve, the importance of supply chain diversification in safeguarding enterprise economic security will only increase. Enterprises that recognize this and invest in building diversified supply chains will be better positioned to thrive in the long term, while those that fail to do so may find themselves at a significant competitive disadvantage and at risk of economic instability.

The conclusion of chapter 1

This chapter has delved into the intricate relationship between supply chain diversification and enterprise economic security, highlighting the critical role that diversification plays in safeguarding companies against a myriad of risks together with uncertainties in the global business environment. The theoretical foundations together with practical applications of supply chain diversification have been thoroughly explored, demonstrating its significance as a strategic approach to risk management and resilience-building.

Supply chain diversification is a multifaceted strategy that encompasses multi-sourcing, multi-shoring as well as transportation and logistics diversification. Each of

these dimensions contributes to a more resilient together with adaptable supply chain, capable of withstanding disruptions ranging from natural disasters together with geopolitical conflicts to public health crises together with regulatory changes. By expanding sourcing options and establishing manufacturing locations across multiple regions, companies are able to reduce their over-reliance upon single suppliers or geographic areas, thereby mitigating the risk of catastrophic failures and ensuring operational continuity.

The concept of enterprise economic security is central to this chapter, is a comprehensive state where a company's vital interests are protected from various internal and external threats. This includes safeguarding physical, technological, financial as well as human resources, as well as ensuring stability, sustainability as well as effective resource management. A secure enterprise is one that is able to maintain stable operations, foster sustainable growth as well as achieve its strategic objectives despite the challenges posed by a dynamic and unpredictable economic landscape.

The relationship between supply chain diversification and enterprise economic security is direct and foundational. Diversification enriches resilience by providing alternative sourcing and production options, allowing companies to quickly adapt to disruptions and recover normal operations. It reduces vulnerability by spreading operations across multiple regions, thereby minimizing the impact of localized events. Furthermore, it ensures operational continuity, enabling companies to maintain a consistent supply of products to the market is crucial for customer loyalty together with brand reputation. Finally, supply chain diversification contributes to greater financial stability by preventing costly disruptions together with leveraging cost differentials across regions.

In an era of increasing global interconnectedness together with evolving supply chain risks, the importance of supply chain diversification in safeguarding enterprise economic security cannot be overstated. Companies that embrace diversification as a strategic approach are better positioned to navigate the uncertainties of the global business environment and achieve long-term success. Conversely, those that fail to recognize and invest in diversified supply chains may find themselves at a significant competitive disadvantage, facing potential economic instability and loss of market share.

CHAPTER 2
ANALYSIS OF THE CURRENT SITUATION OF SUPPLY CHAIN DIVERSIFICATION OF CHINESE ENTERPRISES

Driven by rising costs and geopolitical risk, Chinese firms are diversifying supply chains. This "reconfiguration," often a "China Plus One" strategy, shifts, but doesn't eliminate, China's core role.

2.1 Characteristics of Chinese enterprise supply chain

China's economic rise over the past few decades has been nothing short of remarkable as well as a crucial aspect of this success story lies in the development of its supply chains. These supply chains have evolved along with distinct characteristics that are a result of China's unique economic trajectory, policy environment as well as market dynamics. Understanding these characteristics is essential for grasping the current state of Chinese enterprise supply chains and their role in the global economy.

1) Industrial clusters

One of the most prominent and defining features of Chinese enterprise supply chains is the formation of industrial clusters. Industrial clusters refer to the high concentration of companies within the same industry or related industries in specific geographic areas, also known as agglomeration. This phenomenon is widespread across China and is able to be observed in various sectors, from manufacturing to high tech industries.

The development of industrial clusters in China has been driven by several factors. Firstly, historical and geographical advantages have played a role. For instance, the Pearl River Delta region in southern China, along with its proximity to Hong Kong, a major international trading hub as well as access to seaports, became an early center for manufacturing. Over time, companies in the region specialized in different aspects of production, for instance electronics assembly, textile manufacturing as well as toy production. As more firms joined these clusters, they benefited from economies of scale. Shared infrastructure, for instance roads, ports as well as power supply, reduced the cost of doing business for individual companies. Moreover, the presence of a large pool of specialized labor within the cluster made it easier for firms to hire skilled workers.

In the electronics industry, the city of Shenzhen in the Pearl River Delta has emerged as a global electronics manufacturing and innovation hub. It is home to

thousands of companies involved in the production of smartphones, tablets as well as other consumer electronics. Here, companies are able to source components from nearby suppliers quickly, reducing lead times. For instance, a smartphone manufacturer in Shenzhen is able to obtain parts like batteries, screens as well as circuit boards from local suppliers within a short distance not only saves upon transportation costs as well enables rapid prototyping together with production. The close proximity of suppliers also facilitates knowledge sharing together with collaboration. Smaller firms are able to learn from larger, more established companies in the cluster as well as there is often a spill over of technological know-how, leading to continuous innovation together with improvement within the industry [25].

The Yangtze River Delta region, centered around Shanghai, is another major industrial cluster area. It has a diverse range of industries, including automotive manufacturing, high end machinery as well as pharmaceuticals. In the automotive sector, companies in this region benefit from a complete supply chain ecosystem. There are firms specializing in the production of automotive parts, for instance engines, transmissions as well as body panels, as well as companies involved in research and development, design as well as assembly. This concentration of related industries allows for efficient coordination of production processes, from the sourcing of raw materials to the final assembly of vehicles.

The scale and efficiency achieved by industrial clusters have made Chinese products highly competitive in the global market. By sharing resources together with expertise, companies within the clusters are able to produce goods at a lower cost while maintaining relatively high quality. This has enabled China to become the world's largest exporter of a wide range of products, from consumer goods to industrial machinery.

2) Dynamic and flexible networks

Chinese supply chains stand out for their dynamic and flexible nature contrasts along with the more rigid, long term supplier relationships often seen in some other economies. In China, there is a large pool of suppliers as well as business transfers between them occur more frequently.

This dynamism is driven by several factors. Firstly, the highly competitive nature of the Chinese market encourages firms to constantly seek better suppliers. along with a large number of companies offering similar products or services, buyers have the option to switch suppliers if they find one that is able to supply better quality, lower prices, or faster delivery. For instance, in the garment industry, where there are thousands of small together with medium sized factories across the country, clothing brands are able to easily change their suppliers based upon seasonal demands, cost considerations as well as quality requirements. If a brand receives a large order along with a tight deadline, it may choose to work along with a supplier that has the

capacity to produce the garments quickly, even if it has not worked along with that supplier in the past.

Secondly, the rapid pace of technological change and market evolution in China also contributes to the flexibility of supply chains. As new technologies emerge, suppliers must to adapt quickly to stay competitive. Those that fail to do so may lose business to more innovative and agile competitors. For instance, in the e commerce driven logistics sector, new delivery models for instance same day delivery together with drone delivery are constantly being explored. Logistics service providers that is able to quickly adopt these new technologies and offer better quality services will attract more business from e commerce companies, while those that lag behind may see their market share decline.

The flexibility of Chinese supply chains also allows for better adaptation to changing market demands. In industries along with highly volatile demand, for instance the consumer electronics industry, companies are able to adjust their supply chain partnerships based upon fluctuations in sales. If a particular smartphone model experiences unexpectedly high demand, the manufacturer is able to quickly source additional components from alternative suppliers or increase production at other factories. This ability to respond rapidly to market changes gives Chinese enterprises an edge in global competition, as they are able to bring new products to market faster and meet customer needs more effectively.

However, this dynamic nature also comes along with its challenges. Frequent supplier changes are able to lead to issues for instance quality control problems, as new suppliers may not meet the same quality standards as previous ones. Additionally, building long term relationships based upon trust and mutual understanding becomes more difficult in such a fluid environment. Chinese enterprises must to balance the benefits of flexibility along with the need for stability in their supply chains to ensure sustainable growth [26; 27].

3) Deep global integration

For decades, China has rightfully earned the title of the "world's factory," and this has led to its supply chains becoming deeply intertwined along with the global economy. China's integration into the global supply chain began in the late 20th century along with the country's economic reform and opening up policy. By offering low-cost labor, a large domestic market as well as preferential policies for foreign investment, China attracted a significant amount of foreign direct investment (FDI). Multinational corporations (MNCs) set up manufacturing facilities in China to take advantage of these factors together with serve both the domestic together with international markets.

In the manufacturing sector, China has become a crucial link in the global supply chain for a wide range of products. For instance, in the electronics industry, China accounts for a large proportion of the world's production of smartphones,

laptops as well as other consumer electronics. Components from all over the world are shipped to China for assembly as well as the finished products are then distributed globally. Apple, for instance, has a significant portion of its iPhone production based in China. Chinese factories not only assemble the iPhones as well source many components from local and international suppliers. This integration has created a complex web of global trade relationships, along with China importing raw materials and intermediate goods from various countries and exporting finished products to markets around the world.

In the textile and garment industry, China is the world's largest exporter of clothing. It sources raw materials for instance cotton from countries like the United States, India as well as Australia, processes them in its domestic textile mills as well as then manufactures garments that are sold globally. Chinese garment manufacturers have built extensive relationships along with international brands, providing them along with cost effective production solutions.

China's deep global integration also extends to the service sector. Its ports, for instance Shanghai Port together with Shenzhen Port, are among the busiest in the world, handling a large volume of international trade. Chinese logistics companies have expanded globally, offering transportation, warehousing as well as distribution services to support the movement of goods between China and other countries. Additionally, China has been increasingly involved in global value-added services, for instance research and development, design as well as after sales service for products manufactured in the country.

However, this deep global integration also makes Chinese supply chains vulnerable to external shocks. Events for instance global economic recessions, trade disputes as well as changes in international regulations are able to have a significant impact upon Chinese enterprises. The ongoing trade tensions between the United States together with China, for instance, have led to the imposition of tariffs upon a wide range of Chinese products, disrupting supply chains and forcing Chinese companies to reevaluate their global strategies [28].

4) Significant government and SOE Role

The Chinese government and state-owned enterprises (SOEs) play a substantial and far-reaching role in guiding strategic industries together with managing critical resources within the country's supply chains. The Chinese government has implemented a series of policies and strategies to boost the development of key industries and ensure the stability and security of the national economy.

In strategic industries for instance energy, telecommunications as well as aerospace, SOEs often play a leading role. For instance, in the energy sector, state owned oil companies like China National Petroleum Corporation (CNPC) and China Petroleum & Chemical Corporation (Sinopec) are responsible for exploring, producing as well as distributing oil and gas both domestically together with

internationally. These companies have the resources together with capabilities to invest in large scale energy projects are crucial for meeting China's growing energy demand. The government supplies policy support together with guidance to these SOEs, ensuring that they align along with national energy security goals. This includes promoting domestic exploration to reduce dependence upon foreign oil, investing in renewable energy sources to achieve sustainable development as well as building strategic oil reserves to safeguard against supply disruptions.

In the telecommunications industry, state owned giants like China Mobile, China Unicom as well as China Telecom have been instrumental in building China's extensive telecommunications infrastructure. The government has set the strategic direction for the development of the telecommunications industry, for instance promoting the roll out of 5G technology. These SOEs have then invested heavily in 5G network construction, research together with development as well as service provision not only benefits the domestic market as well positions China as a global leader in 5G technology.

The government also plays a role in guiding the development of emerging industries by various policy measures. For instance, to boost the growth of the new energy vehicle (NEV) industry, the government has supplied subsidies, tax incentives as well as preferential policies for NEV manufacturers and consumers. This has led to the rapid development of the NEV industry in China, along with many domestic companies emerging as global players. Additionally, the government coordinates the development of related industries, for instance battery manufacturing and charging infrastructure, to ensure the smooth growth of the NEV supply chain.

The significant role of the government and SOEs in Chinese supply chains has both advantages and challenges. upon the one hand, it enables the government to implement long term strategic plans, invest in large scale infrastructure and key industries as well as ensure the stability together with security of the national economy. upon the other hand, it has also raised concerns about market competition together with efficiency in some cases. Critics argue that SOEs may enjoy certain privileges, for instance easier access to financing together with preferential treatment in government procurement is able to create an uneven playing field for private enterprises. However, in recent years, the Chinese government has been taking steps to reform SOEs, increase their market competitiveness as well as create a more level playing field for all types of enterprises within the supply chain [29; 30].

5) Technological advancement

In recent years, China has witnessed rapid technological advancement in its supply chains, along with the widespread adoption of technologies for instance intelligent logistics and data analytics to enrich efficiency and visibility across the entire supply chain.

Intelligent logistics has transformed the way goods are transported, stored as well as distributed in China. Automated warehouses equipped along with advanced robotics and conveyor systems have become increasingly common. These warehouses are able to handle a large volume of goods along with high precision together with speed, reducing labor costs together with improving inventory management. For instance, JD.com, one of China's largest e commerce companies, has built a network of intelligent warehouses across the country. In these warehouses, robots are used for tasks for instance picking, packing as well as sorting goods. The use of robots not only increases the efficiency of the warehousing process as well reduces the error rate, ensuring that customers receive their orders accurately and upon time.

In the transportation sector, the application of technologies for instance the Internet of Things (IoT) and GPS tracking has refined the visibility and management of goods in transit. Logistics companies are able to now track the location, temperature as well as condition of goods in real time, allowing for better coordination together with optimization of transportation routes. For instance, cold chain logistics is crucial for transporting perishable goods for instance food together with pharmaceuticals, has benefited greatly from these technologies. Sensors are able to monitor the temperature inside refrigerated trucks and containers as well as if there are any deviations, alerts are able to be sent immediately to the logistics provider, enabling them to take corrective actions [31].

Data analytics has also become an essential tool in Chinese supply chains. Companies are collecting and analyzing vast amounts of data from various sources, including customer orders, inventory levels, supplier performance as well as transportation data. By using advanced analytics techniques, for instance machine learning and artificial intelligence, they are able to gain valuable insights together with make more informed decisions. For instance, e commerce companies are able to analyze customer purchase data to predict demand for different products, enabling them to optimize their inventory levels together with reduce the cost of overstocking or understocking. Manufacturers are able to use data analytics to evaluate the performance of their suppliers, identify potential risks as well as negotiate better terms.

In addition, emerging technologies for instance blockchain are also being probed in Chinese supply chains. Blockchain technology is able to supply a secure together with transparent way to record together with verify transactions is particularly useful for supply chain management. It is able to aid refine traceability, reduce fraud as well as enrich trust among supply chain partners. For instance, in the food industry, blockchain is able to be used to track the origin and journey of food products from the farm to the table, ensuring food safety and quality.

The rapid technological advancement in Chinese supply chains has not only refined the efficiency and competitiveness of domestic enterprises as well has the potential to reshape the global supply chain landscape. As Chinese companies continue to invest in together with adopt new technologies, they are likely to drive innovation together with set new standards in supply chain management upon a global scale. However, challenges remain, for instance the need for skilled personnel to operate and manage these advanced technologies, as well as concerns about data security and privacy in the digital age. We could see the characteristics of Chinese enterprise supply chains summarized on figure 2.1.

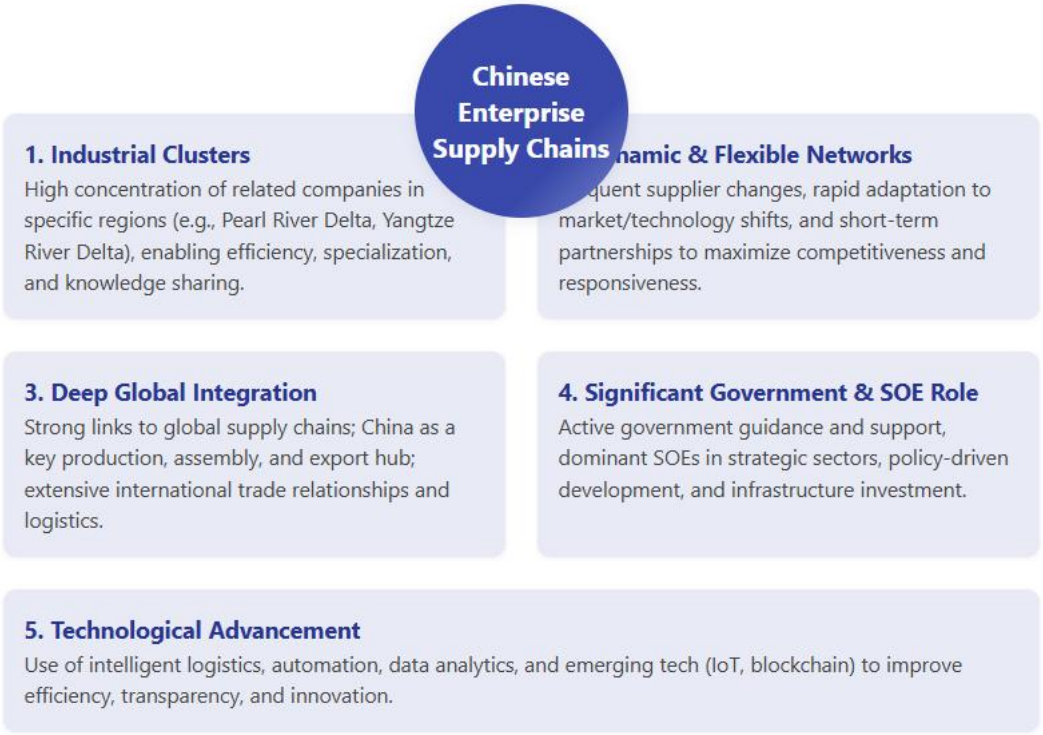

Figure 2.1 - Characteristics of Chinese Enterprise Supply Chains

Source: authors' development based on [25; 31; 33]

The figure 2.1 visually summarizes the five key characteristics of Chinese enterprise supply chains. At the center is the core concept, surrounded by branches that highlight each feature, industrial clusters, dynamic together with flexible networks, deep global integration, significant government together with SOE role, together with technological advancement. Together, these interconnected characteristics drive the competitiveness, resilience, and ongoing evolution of China’s supply chains, making them a vital force in the global economy.

In conclusion, Chinese enterprise supply chains are characterized by industrial clusters, dynamic networks, global integration, government influence, and technological advancement. These features have driven China's economic success, enhancing competitiveness together with resilience. Industrial clusters enable economies of scale together with innovation, while dynamic networks allow rapid

adaptation to market changes. Deep global integration has made China a crucial link in worldwide production, though it also poses risks. Government together with SOE involvement ensures strategic direction together with stability. Technological advancements improve efficiency together with visibility. Together, these characteristics have positioned Chinese supply chains as vital players in the global economy, requiring continued innovation and adaptation to maintain their leading role.

2.2 Motivation of supply chain diversification of Chinese enterprises

A complex web of pressures is currently compelling both Chinese domestic firms and multinational corporations operating within China to embark upon the path of supply chain diversification. These motivations are not isolated but rather interwoven, reflecting the changing dynamics of the global economic, political as well as business landscapes. Understanding these driving forces is crucial for grasping the strategic shifts taking place in Chinese enterprise supply chains and their far-reaching implications.

1) Rising costs

One of the most significant economic drivers behind the supply chain diversification efforts of Chinese enterprises is the gradual erosion of China's long-standing low-cost labor advantage. For decades, China's abundant and relatively inexpensive labor force was a major draw for global manufacturers. This advantage enabled Chinese factories to produce goods at competitive prices, making China the “world’s factory” together with a dominant force in global manufacturing and exports. However, in recent years, several factors have contributed to a substantial increase in labor costs in China.

Firstly, China's economic development and rapid urbanization have led to a significant improvement in living standards. As a result, workers have demanded higher wages and better working conditions. The government has also played a role by gradually increasing the minimum wage across different regions. For instance, in major manufacturing hubs for instance the Pearl River Delta and the Yangtze River Delta, minimum wage levels have seen steady annual increases. This upward trend in wages has been accompanied by rising costs for social security contributions, healthcare as well as other employee benefits that employers are required to provide.

Secondly, the changing demographics in China have further contributed to labor cost increases. The country's population is aging as well as the working age population has started to decline. This demographic shift has led to a tightening of the labor market, making it more difficult for companies to recruit workers. As a result, employers have to offer higher salaries and more attractive incentives to attract together with retain talent. In the manufacturing sector has traditionally relied upon a

large number of low skilled workers, the shortage of labor has become more pronounced. For instance, in the garment industry, where labor intensive production processes are common, factories are facing challenges in finding enough workers to meet production demands as well as they are forced to increase wages to stay competitive.

The rising labor costs have had a profound impact upon Chinese enterprises. For labor intensive industries for instance textiles, footwear as well as furniture manufacturing, the cost increases have significantly eroded their profit margins. These industries were once highly competitive due to low labor costs, are now finding it increasingly difficult to compete along with countries that offer lower cost labor alternatives, for instance Vietnam, Bangladesh as well as Indonesia. As a result, many Chinese companies in these sectors are looking to relocate their manufacturing operations to these countries along with lower labor costs. For instance, some well-known Chinese clothing brands have started to set up factories in Southeast Asian countries to take advantage of the more favorable labor cost environment. This not only helps them reduce production costs as well allows them to remain competitive in the global market.

Moreover, the increase in labor costs has also affected higher tech and capital-intensive industries. Although these industries may not be as labor intensive as traditional manufacturing sectors, they still face cost pressures related to skilled labor. As China's economy has evolved, the demand for skilled workers in areas for instance electronics, robotics as well as software development has increased. Companies must to offer competitive salaries together with benefits to attract together with retain these highly skilled employees. The rising cost of labor, combined along with other factors for instance increasing land prices together with higher energy costs, has made it more expensive for companies to operate in China. This has prompted many firms, both domestic and foreign owned, to consider diversifying their supply chains by exploring alternative manufacturing locations along with more favorable cost structures [32; 33].

2) Geopolitical and trade tensions

The U.S.-China trade war, along with broader geopolitical uncertainties, has been a major catalyst for supply chain diversification among Chinese enterprises. The trade war began in 2018, was characterized by the imposition of tariffs upon a wide range of goods traded between the United States and China. The U.S. government-imposed tariffs upon Chinese imports, citing issues for instance intellectual property theft, unfair trade practices as well as the large trade deficit between the two countries. In response, China also imposed retaliatory tariffs upon U.S. goods.

These tariffs have had a significant impact upon Chinese enterprises. For companies that export a large portion of their products to the United States, the increased tariffs have led to a substantial increase in the cost of their goods in the U.S.

market. This has made their products less competitive compared to domestic U.S. products or products from other countries that are not subject to the same tariffs. For instance, Chinese manufacturers of consumer electronics, for instance smartphones together with laptops, have faced challenges in the U.S. market due to the tariffs. The higher prices resulting from the tariffs have led some U.S. consumers to switch to alternative brands or products. As a result, many Chinese companies have seen a decline in their export volumes to the United States has affected their revenue together with profitability.

In addition to the direct impact of tariffs, the broader geopolitical uncertainty has also created a sense of risk for Chinese enterprises. The trade war has led to increased regulatory scrutiny, changes in trade policies as well as potential restrictions upon technology transfer. For instance, U.S. restrictions upon the export of certain high-tech products together with technologies to China have affected Chinese companies in the technology sector. Chinese telecommunications companies, in particular, have faced challenges in obtaining key components and technologies from U.S. suppliers due to these restrictions. This has not only disrupted their production and R&D activities but has also raised concerns about their long-term competitiveness.

The geopolitical and trade tensions have made Chinese enterprises and multinational corporations operating in China realize the risks of over concentration in the Chinese market. Companies are now more cautious about relying too heavily upon China as a manufacturing base and a market for their products. To mitigate these risks, many are diversifying their supply chains by moving some of their manufacturing operations to other countries. This not only helps them avoid the impact of tariffs as well reduces their exposure to potential future geopolitical conflicts together with trade disputes. For instance, some U.S. companies that have manufacturing facilities in China are relocating parts of their production to countries in Southeast Asia, Latin America, or even back to the United States. Similarly, Chinese companies are also looking for alternative markets and manufacturing locations to reduce their dependence upon the U.S. market and the potential negative impacts of geopolitical tensions [34].

3) Lessons from the pandemic

The COVID 19 pandemic has been a wakeup call for businesses around the world, highlighting the profound vulnerabilities of geographically concentrated supply chains. China, as the initial epicenter of the pandemic and a major global manufacturing hub, experienced strict lockdowns and disruptions in early 2020. These measures, while necessary to contain the spread of the virus, had a significant impact upon the global supply chain.

Many factories in China were forced to shut down temporarily, leading to a shortage of components and finished products. The disruption was felt across various

industries, from automotive to electronics. For instance, the automotive industry relies upon a complex global supply chain, faced a shortage of key components for instance semiconductors, batteries as well as wiring harnesses that were manufactured in China. As a result, automotive manufacturers around the world had to halt production at their factories, leading to significant financial losses.

The pandemic also exposed the fragility of just in time (JIT) supply chain models many companies had adopted to reduce inventory costs. along with the sudden disruption in the supply of components from China, companies that had minimal inventory reserves found themselves unable to continue production. This lack of resilience in the supply chain was a major concern for businesses.

Chinese enterprises, both domestic and those along with foreign ownership, learned valuable lessons from the pandemic. They realized the importance of building more resilient supply chains that is able to withstand unexpected disruptions. The experience of the pandemic accelerated the push for supply chain diversification as companies sought to reduce their reliance upon a single geographic location. By diversifying their supply chains, companies aim to create alternative sourcing options together with manufacturing locations so that they are able to continue their operations even if one region is affected by a similar crisis in the future.

For instance, some Chinese electronics companies that previously relied heavily upon domestic suppliers for components have started to probe sourcing options from other countries in Asia, for instance South Korea together with Taiwan. They are also looking to establish manufacturing facilities in multiple regions to ensure that they are able to maintain production during a crisis. Similarly, multinational corporations operating in China have also been reevaluating their supply chain strategies. Many are considering adding new suppliers and production sites outside of China to enrich the resilience of their global supply chains [35].

4) The "China Plus One" imperative

A growing number of companies, both Chinese and multinational, are adopting a “China Plus One” (C + 1) strategy. This approach involves maintaining existing operations in China while simultaneously establishing a presence in another country to reduce risks. The C + 1 strategy has emerged as a response to the various challenges together with uncertainties that companies face in the Chinese market, including rising costs, geopolitical tensions as well as supply chain vulnerabilities.

China still offers many advantages that make it an attractive location for business operations. It has a large domestic market along with a growing middle class, a well fostered infrastructure, a skilled workforce in many industries as well as a complete industrial ecosystem. However, companies recognize the need to diversify to manage risks effectively.

For multinational corporations, the C + 1 strategy allows them to continue to benefit from China's advantages while reducing their exposure to potential risks. For

instance, a European consumer goods company that has manufacturing facilities in China may decide to set up an additional factory in Vietnam. This way, if there are any disruptions in China, for instance a labor strike, regulatory changes, or a natural disaster, the company is able to still meet customer demand by increasing production at its Vietnamese facility. The company is able to also take advantage of Vietnam's lower labor costs for certain production processes is able to aid refine its cost competitiveness.

Chinese companies are also increasingly adopting the C + 1 strategy. Domestic firms are looking to expand their global footprint and reduce their dependence upon the domestic market. By setting up operations in other countries, they are able to gain access to new markets, raw materials as well as technologies. For instance, a Chinese furniture manufacturer may establish a factory in Eastern Europe to serve the European market more effectively. This not only helps the company avoid potential trade barriers and tariffs as well allows it to better understand and meet the specific needs of European consumers.

The C + 1 strategy also supplies companies along with more flexibility in responding to changing market conditions. They are able to adjust production levels and sourcing strategies between their Chinese and Non-Chinese operations based upon factors for instance cost, demand as well as regulatory environment. This strategic approach helps companies enrich their overall competitiveness and resilience in the global market [36].

5) Market access for Chinese firms

Chinese companies themselves are actively building factories abroad as a means to gain better market access, circumvent tariffs as well as expand their presence in key markets for instance Europe and the Americas. As China's economy has grown and its domestic market has become more saturated in some industries, Chinese firms are increasingly looking for opportunities to expand overseas.

One of the main reasons for building factories abroad is to avoid tariffs. along with the rise in trade protectionism together with the imposition of tariffs by some countries, Chinese exporters face higher costs when selling their products in foreign markets. By establishing manufacturing facilities in these target markets or in countries along with preferential trade agreements, Chinese companies are able to produce goods locally together with avoid paying high tariffs. For instance, some Chinese steel companies have invested in steel mills in Southeast Asian countries together with Africa. These investments not only aid them avoid anti-dumping duties together with other trade barriers as well allow them to access local raw materials more easily.

In addition to tariff avoidance, building factories abroad also enables Chinese companies to gain more direct access to key markets. By producing locally, they are able to better understand the local market dynamics, consumer preferences as well as

regulatory requirements. This allows them to customize their products together with services to meet the specific needs of local customers is able to enrich their competitiveness. For instance, Chinese automotive companies that have set up factories in Europe are focusing upon developing electric vehicles that meet European environmental standards and consumer tastes. This local production and customization strategy is able to aid them gain a foothold in the highly competitive European automotive market.

Furthermore, building overseas factories are able to also aid Chinese companies access advanced technologies and management experience. In some fostered countries, there are more advanced production technologies, research and development capabilities as well as management practices. By setting up operations in these regions, Chinese companies are able to learn from their international counterparts, hire local talent as well as collaborate along with local research institutions. This are able to aid Chinese firms upgrade their technology together with management levels is beneficial for their long-term development together with global competitiveness [37]. We could see the motivations for supply chain diversification among Chinese enterprises summarized on table 2.1.

Table 2.1 - The motivations for supply chain diversification among Chinese enterprises

Motivation	Description	Example/Implication
Rising Costs	China's labor cost advantage is eroding due to higher wages, improved living standards, aging population, and shrinking workforce. Social security, healthcare, and other employer costs are rising, affecting both low-skill and high-skill sectors.	Textile, footwear, and furniture firms moving production to Vietnam, Bangladesh, Indonesia. Electronics and software companies also impacted by skilled labor cost increases.
Geopolitical & Trade Tensions	Trade wars (notably US-China), tariffs, and broader geopolitical uncertainty threaten export competitiveness and increase risks for over-concentration in China. Regulatory scrutiny and tech transfer restrictions affect high-tech sectors.	Chinese electronics and telecom firms face export barriers and component restrictions. Multinationals diversify production to Southeast Asia, Latin America, or back home.
Lessons from the Pandemic	COVID-19 revealed vulnerabilities of highly concentrated, just-in-time supply chains. Factory shutdowns caused global shortages in many sectors, showing the need for greater resilience and redundancy.	Automotive and electronics firms now seek alternative suppliers and sites in Korea, Taiwan, and beyond to ensure business continuity in future crises.

"China Plus One" Imperative	Firms maintain a presence in China for its advantages, but add operations elsewhere to reduce risk and gain flexibility. The strategy balances risk and reward by leveraging China's strengths and supplementing with new locations.	Multinationals open factories in Vietnam, India, etc. Chinese firms set up plants in Europe to serve local markets and avoid barriers.
Market Access for Chinese Firms	To bypass tariffs and trade barriers, and to reach saturated or protected foreign markets, Chinese companies build factories abroad. Local production also helps tailor products to market needs and access advanced tech and talent.	Chinese steel and auto firms set up factories in Southeast Asia and Europe to avoid tariffs, access raw materials, and meet local consumer and regulatory demands.

Source: authors' development based on [34; 36; 37]

The table 2.1 summarizes the key motivations driving Chinese enterprises to diversify their supply chains. Rising labor and production costs have eroded China's traditional cost advantages, prompting companies to seek alternatives. Geopolitical together with trade tensions, especially the US-China trade war, have increased uncertainty together with risks. The COVID-19 pandemic exposed vulnerabilities in concentrated supply chains, highlighting the need for resilience. The "China Plus One" strategy allows firms to balance China's strengths with operations elsewhere for risk management. Additionally, establishing factories abroad helps Chinese firms bypass tariffs, access new markets, and benefit from advanced technologies, thereby enhancing their global competitiveness and flexibility.

In conclusion, the supply chain diversification of Chinese enterprises is driven by a combination of economic, political as well as strategic factors. Rising costs, geopolitical together with trade tensions, lessons from the pandemic, the "China Plus One" imperative as well as the pursuit of market access are all compelling Chinese firms and multinational corporations operating in China to reevaluate and reshape their supply chain strategies. These diversification efforts will not only have a profound impact upon the operations and competitiveness of individual companies but will also reshape the global economic and business landscape in the coming years.

2.3 Models of supply chain diversification in Chinese enterprises

In the dynamic landscape of global business, Chinese enterprises have fostered several distinct models of supply chain diversification. These models are a response to various factors for instance rising costs, geopolitical uncertainties as well as the

need for enriched resilience. Each model offers unique advantages together with challenges as well as understanding them is crucial for grasping the strategies employed by Chinese companies in their quest to remain competitive in the global market.

1) China Plus One (C+1)

The China Plus One (C+1) model stands as the most prevalent approach to supply chain diversification among Chinese enterprises and multinational corporations operating in China. This model is characterized by the expansion of operations into other countries while maintaining a core presence in China. Southeast Asian countries, for instance Vietnam, Indonesia as well as Thailand, as well as Latin American nations like Mexico, have emerged as popular destinations for this expansion.

The reasons behind the popularity of the C + 1 model are multifaceted. Firstly, China continues to offer significant advantages that make it difficult for companies to completely abandon their operations there. China has a vast domestic market along with a growing middle class, providing a large consumer base for both domestic together with international companies. It’s well fostered infrastructure, including ports, roads as well as railways, facilitates efficient transportation and logistics. Additionally, China has a complete industrial ecosystem, along with a wide range of suppliers and supporting industries enables companies to access a comprehensive supply of raw materials, components as well as services [38].

However, companies recognize the need to diversify to mitigate risks associated along with rising costs, geopolitical tensions as well as supply chain disruptions. Rising labor costs in China, for instance, have made it less competitive for labor intensive industries. By establishing an additional production base in countries along with lower labor costs, for instance Vietnam, companies are able to reduce their production expenses. Vietnam, for instance, has a large together with relatively inexpensive labor force as well as the government has been actively promoting foreign investment in the manufacturing sector by various incentives, for instance tax breaks and land use preferences.

Geopolitical tensions, especially the U.S.-China trade war, have also played a significant role in the adoption of the C + 1 model. The imposition of tariffs upon Chinese goods by the United States has increased the cost of exporting products from China to the U.S. market. Companies that expand their operations to other countries are able to avoid these tariffs. For instance, many Chinese electronics manufacturers have set up factories in Mexico under the C + 1 model. Mexico's proximity to the United States together with its participation in the United States Mexico Canada Agreement (USMCA) make it an attractive location for companies looking to serve the North American market while bypassing the tariffs imposed upon Chinese products.

The C + 1 model also supplies companies along with greater flexibility in responding to market changes. If there are disruptions in China, for instance natural disasters, labor strikes, or regulatory changes, companies are able to quickly shift production to their alternative facilities. This helps ensure the continuity of supply together with minimizes the impact upon business operations. For instance, during the COVID 19 pandemic, companies along with a C + 1 supply chain structure were better able to maintain production compared to those relying solely upon China.

In practice, many global brands have implemented the C + 1 model. Nike, for instance, has long had a significant manufacturing presence in China. In recent years, it has also expanded its production to countries like Vietnam together with Indonesia. This diversification strategy has allowed Nike to balance cost effectiveness along with supply chain resilience. Similarly, Adidas has been gradually increasing its production in Southeast Asian countries while keeping its operations in China, enabling it to adapt to changing market conditions and reduce risks [39].

2) Regionalization and nearshoring

The regionalization and nearshoring model focus upon moving production closer to end consumers to reduce logistics costs and lead times. This approach has gained traction, especially in industries where fast delivery together with responsiveness to customer demand are crucial. One of the most notable examples of this model is the investment in Mexico by companies aiming to serve the North American market.

Mexico's strategic location, just south of the United States, makes it an ideal nearshoring destination. By establishing manufacturing facilities in Mexico, companies are able to significantly reduce transportation costs together with delivery times compared to sourcing products from distant locations, for instance China. For instance, in the automotive industry, many U.S. together with European car manufacturers have set up production plants in Mexico. These companies are able to quickly supply parts together with finished vehicles to the North American market, taking advantage of the shorter shipping distances and faster transit times. This not only reduces the cost of transporting heavy and bulky automotive components as well allows for more efficient inventory management. along with shorter lead times, companies are able to respond more quickly to changes in consumer demand, reducing the risk of overstocking or understocking.

In addition to cost and time savings, nearshoring to Mexico also offers other advantages. Mexico has a growing pool of skilled labor, especially in industries for instance automotive, electronics as well as aerospace. The country has been investing in education together with vocational training to foster a workforce capable of meeting the demands of modern manufacturing. Moreover, Mexico's participation in the USMCA supplies companies along with preferential trade access to the United States and Canada, eliminating tariffs and reducing trade barriers. This makes it more

attractive for companies to establish production facilities in Mexico and serve the North American market.

The regionalization and nearshoring model are not limited to the North American market. In Europe, for instance, some companies are nearshoring production to Eastern European countries. Countries like Poland, the Czech Republic as well as Hungary offer relatively lower labor costs compared to Western European countries while being geographically close reduces logistics costs. These countries also have well fostered industrial bases together with a skilled workforce, making them suitable for manufacturing operations in various sectors, including machinery, electronics as well as textiles.

For Chinese enterprises, the regionalization and nearshoring model is able to be an effective way to enter new markets and refine customer service. By setting up production facilities closer to their target markets, Chinese companies are able to better understand local consumer preferences, adapt their products accordingly as well as offer faster delivery. This are able to enrich their competitiveness in international markets and aid them build stronger relationships along with customers [40].

3) Supplier Led Expansion

The supplier led expansion model is a unique approach to supply chain diversification where companies encourage their existing Chinese suppliers to set up facilities in other countries. This model allows companies to diversify their supply chain locations without having to search for and establish relationships along with entirely new suppliers.

There are several benefits to the supplier led expansion model. Firstly, companies already have established relationships along with their Chinese suppliers are based upon trust, quality control as well as mutual understanding. By encouraging these suppliers to expand overseas, companies are able to maintain these relationships while achieving supply chain diversification. This reduces the risks associated along with working along with new suppliers, for instance quality issues, communication problems as well as supply disruptions.

Secondly, existing Chinese suppliers often have the technical expertise, production capabilities as well as economies of scale that companies rely on. When these suppliers expand to other countries, they are able to bring these advantages along with them. For instance, a Chinese electronics component supplier that has extensive experience in manufacturing high quality printed circuit boards may be encouraged by its customer, a global electronics company, to set up a factory in Southeast Asia. The supplier is able to leverage its existing production know how together with technology to produce components in the new location, ensuring consistent quality together with performance.

In addition, the supplier led expansion model is able to be more cost effective compared to finding new suppliers. Companies do not must to invest significant resources in supplier identification, evaluation as well as qualification processes. Instead, they are able to work along with their existing suppliers to support their overseas expansion may involve providing financial assistance, technical support, or market information.

However, the supplier led expansion model also faces some challenges. One of the main challenges is convincing suppliers to invest in overseas expansion. Suppliers may be reluctant to take upon the risks and costs associated along with setting up new facilities in a foreign country, for instance land acquisition, construction, hiring local employees as well as complying along with foreign regulations. Companies must to supply strong incentives together with support to encourage their suppliers to make this investment.

Another challenge is managing the new overseas operations of the suppliers. Companies must to ensure that the suppliers maintain the same quality standards, production schedules as well as service levels in the new locations. This requires effective communication, monitoring as well as coordination between the company together with the supplier, as well as between the supplier's Chinese together with overseas operations.

Despite these challenges, the supplier led expansion model has been increasingly adopted by Chinese together with multinational companies. For instance, some large Chinese manufacturing companies have encouraged their key component suppliers to expand to countries in Africa and South Asia. This not only helps these companies diversify their supply chains as well promotes the internationalization of their Chinese suppliers, creating a win-win situation for both parties [41; 42].

4) "In China, for China"

The “In China, for China” model has emerged as an important strategy for multinational companies operating in China. This model involves creating localized supply chains within China to serve its vast domestic market. The main motivation behind this model is to insulate these operations from global trade disputes and other external uncertainties.

China's large and growing domestic market presents significant opportunities for multinational companies. along with a population of over 1.4 billion and a rising middle class, China has become one of the largest consumer markets in the world. By establishing localized supply chains, multinational companies are able to better meet the specific needs and preferences of Chinese consumers. They are able to source raw materials together with components locally, adapt their production processes to local market requirements as well as reduce the impact of international trade barriers upon their products sold in China.

For instance, in the food together with beverage industry, many multinational companies have set up local sourcing together with production facilities in China. These companies source agricultural products from local farmers, process them in Chinese factories as well as distribute the finished products within the country. This not only helps them reduce transportation costs as well allows them to ensure the freshness and quality of their products is highly valued by Chinese consumers.

In the automotive industry, multinational car manufacturers are also increasingly adopting the "In China, for China" model. They are collaborating along with local suppliers, investing in research and development centers in China as well as customizing their vehicle models to suit Chinese consumer tastes. By doing so, they are able to reduce their dependence upon imports together with avoid potential tariffs or other trade restrictions that may affect their products sold in the Chinese market.

The "In China, for China" model also has implications for the Chinese economy. It promotes the development of local industries together with suppliers, as multinational companies often transfer technology, knowledge as well as management experience to their Chinese partners. This are able to aid upgrade the capabilities of the Chinese supply chain together with contribute to the country's economic development.

However, this model also faces some challenges. One of the main challenges is competition from domestic Chinese companies. As the Chinese economy has developed, domestic companies have become more competitive in many industries. Multinational companies must to continuously innovate together with refine their products together with services to stay ahead in the Chinese market. Additionally, navigating China's complex regulatory environment, cultural differences as well as business practices are able to be challenging for multinational companies. They must to invest time and resources in understanding and adapting to these factors to succeed in the "In China, for China" model [43]. We could see the Models of Supply Chain Diversification in Chinese Enterprises summarized on figure 2.2.

Figure 2.2 -

Models of Supply Chain Diversification in Chinese Enterprises

Source: authors' development based on [38; 41; 43]

The figure visually summarizes the four primary models of supply chain diversification adopted by Chinese enterprises. The “China Plus One” model involves expanding operations to additional countries while keeping a base in China, balancing cost together with risk. “Regionalization together with Nearshoring” shifts production closer to major consumer markets to improve responsiveness together with reduce logistics costs. “Supplier Led Expansion” encourages established Chinese suppliers to set up overseas, maintaining quality together with trust. The “In China, for China” model focuses on localizing supply chains within China to serve domestic demand and isolate from global uncertainties. Together, these models reflect flexible, strategic responses to global challenges.

In conclusion, the different models of supply chain diversification in Chinese enterprises reflect the diverse strategies and priorities of companies in response to the changing global business environment. Each model offers unique advantages and challenges as well as companies must to carefully evaluate their options based upon their specific business needs, market conditions as well as long term goals.

2.4 Case Study: Empirical analysis of supply chain diversification strategies of Huawei company

This study analyzes Huawei's supply chain diversification strategies from 2015 to 2023, finding that diversifying suppliers and geography enhances economic security by improving operational continuity and reducing vulnerability to disruptions. Innovation and R&D also play crucial roles in supply chain resilience.

1) Background

In the context of escalating global geopolitical tensions and frequent supply chain disruptions the strategic importance of supply chain management has become increasingly prominent for multinational corporations. Huawei as a leading global provider of information and communications technology solutions has long operated a highly globalized supply chain along with suppliers together with production facilities spanning multiple countries together with regions. However, in recent years the company has faced unprecedented challenges particularly in the form of geopolitical restrictions that have disrupted its access to key components together with technologies. These challenges have underscored the critical need for effective supply chain diversification strategies to enrich the company’s economic security together with operational resilience.

The period from 2015 to 2023 represents a critical window for analyzing Huawei's supply chain dynamics. Prior to 2018 the company's supply chain operated in a relatively stable global environment along with an emphasis upon efficiency together with cost optimization. However, starting around 2018 geopolitical shifts led to significant disruptions including restrictions upon access to semiconductors and other critical inputs. This period of transition provides a unique opportunity to examine how supply chain diversification strategies have evolved in response to external shocks together with to quantify their impact upon the company's economic security.

Against this backdrop this empirical appraisal seeks to address three core research questions. First how have Huawei's supply chain diversification strategies changed over the 2015–2023 period? Second what is the relationship between these diversification strategies together with the company's economic security? Third through what channels do supply chain diversification strategies exert their impact upon economic security? By answering these questions this study aims to provide both theoretical insights and practical guidance for multinational corporations seeking to enrich their supply chain resilience.

2) Research design and methodology

To conduct a comprehensive empirical appraisal a panel dataset was constructed covering the period from 2015 to 2023 focusing upon Huawei and a selection of comparable Chinese tech manufacturers. Including comparable firms enables relative appraisal facilitating the isolation of Huawei-specific effects from broader industry trends. These comparable firms were selected based upon criteria for instance industry sector revenue scale together with global operational scope.

The dataset draws upon multiple sources to ensure robustness together with comprehensiveness. Company annual reports serve as a primary source of internal financial together with operational data including revenue profit margins R&D expenses fixed assets together with export figures offering detailed insights into Huawei's strategic priorities together with performance metrics over time.

Wind Financial Terminal together with Orbis were used to gather industry-level together with comparative data. Wind provides real-time together with historical financial data upon Chinese together with global companies supporting cross-firm comparisons of key indicators for instance supplier concentration and R&D intensity. Orbis offers comprehensive information upon global companies including ownership structures together with international subsidiaries which is valuable for mapping geographic diversification captured by the Multi-shoring Index.

Customs Data together with UN Comtrade were utilized to track cross-border trade flows particularly Huawei's sourcing patterns from international suppliers. These datasets enable quantification of export dependence together with provide

insights into changes in sourcing countries over time which is critical for calculating the Multi-shoring Index.

Statista was used to collect market share data facilitating the calculation of Market Share Stability a sub-indicator of the Enterprise Economic Security Index. This data includes market share figures for Huawei together with its competitors across various regional together with global markets.

Third-party supply chain mapping platforms were employed to gather information upon Huawei's supplier network including the number of suppliers their geographic locations together with their share of Huawei's total purchases. These platforms aggregate data from multiple sources including company disclosures industry reports together with media coverage to provide a comprehensive view of supply chain structures essential for calculating the Supply Chain Diversification Index together with Supplier Concentration Ratio.

The Enterprise Economic Security Index (EESI) is a composite measure designed to capture a firm's overall economic security and resilience. It integrates multiple dimensions of firm performance to provide a holistic assessment rather than relying upon a single metric reflecting the multifaceted nature of economic security which encompasses financial stability operational continuity and market position among other factors.

The Supply Chain Diversification Index (SCDI) measures the degree of diversification in a firm's supplier base reflecting the extent to which a firm distributes its purchases across a broad range of suppliers rather than relying heavily upon a small number.

The Multi-shoring Index (MSI) captures the geographic diversification of a firm's supply chain quantifying the extent to which sourcing together with production activities are spread across different countries to reduce vulnerability to region-specific disruptions.

The Supplier Concentration Ratio (SCR) measures reliance upon the largest suppliers calculated as the sum of the purchase shares of the top k suppliers (typically 3 or 5) providing a direct indicator of supply chain concentration.

Firm Size measured as the natural logarithm of revenue accounts for economies of scale as larger firms may have greater resources to invest in supply chain resilience potentially influencing economic security independently of diversification strategies.

R&D Intensity calculated as R&D expenses divided by total revenue captures a firm's investment in innovation as higher R&D intensity may enable the development of alternative technologies or production processes reducing reliance upon specific suppliers together with enhancing economic security.

Capital Intensity defined as fixed assets divided by total assets reflects the extent to which a firm's operations rely upon physical assets as firms along with higher capital intensity may face higher operational risks affecting economic security.

Export Dependence measured as exports divided by total revenue captures reliance upon international markets as higher export dependence may expose a firm to greater risks for instance trade barriers currency fluctuations together with geopolitical tensions impacting economic security.

3) Data construction & index formulas

The EESI is constructed as a weighted sum of normalized sub-indicators along with the formula: EESI = w_1 ·Revenue Stability + w_2 ·Profit Margin Stability + w_3·Market Share Stability + w_4·Solvency + w_5·Operational Continuity

Where each sub-indicator is normalized to the range [0, 1] together with w_i· represents the weight assigned to the i-th sub-indicator. Weights are determined through either expert appraisal or Principal Component appraisal (PCA). Expert appraisal involves consulting industry experts together with academics along with expertise in supply chain management together with economic security who assign weights based upon their judgment of each sub-indicator's importance. PCA a statistical technique identifies the underlying structure of the data determining weights based upon the variance explained by each sub-indicator reducing subjectivity by assigning higher weights to sub-indicators that explain more variation in the overall measure of economic security.

Revenue Stability is calculated as 1 minus the coefficient of variation of revenue expressed as: 1 − (σ_revenue / μ_revenue)

where σ_revenue represents the standard deviation of revenue over the period together with μ_revenue represents the mean revenue over the period.

Profit Margin Stability is calculated as: 1 − (σ_profit margin / μ_profit margin)

where σ_profit margin is the standard deviation of profit margins together with μ_profit margin is the mean profit margin.

Market Share Stability is calculated as: 1 − (σ_market share / μ_market share)

where σ_market share is the standard deviation of market share together with μ_market share is the mean market share.

Solvency is normalized using the min-max method as: (Current Ratio − Industry Min) / (Industry Max − Industry Min)

where Current Ratio is current assets divided by current liabilities Industry Min is the minimum current ratio in the industry and Industry Max is the maximum current ratio in the industry.

Operational Continuity is a binary variable taking the value 1 if operations are not disrupted and 0 if disrupted where disruptions are defined as significant interruptions to production or supply chain operations lasting more than a specified

period (e.g. one month) including events for instance supplier failures logistical breakdowns or geopolitical restrictions.

The SCDI measures the diversification of a firm's supplier base derived from the Herfindahl-Hirschman Index (HHI) a widely used measure of concentration. The formula for SCDI is

$$\mathrm{SCDI} = 1 - \Sigma_{i=1}^{n} \mathrm{s_i}^2 \tag{2-1}$$

where $\mathrm{s_i}$ represents the share of total purchases from supplier i and N represents the total number of suppliers. This transformation converts the HHI (a concentration measure) into a diversification measure where values closer to 1 indicate higher diversification together with values closer to 0 indicate higher concentration.

The MSI captures the geographic diversification of a firm's supply chain calculated as: MSI = (Number of countries of production/sourcing) / (Total number of sourcing countries in the industry)

This ratio is normalized to the range [0, 1] where higher values indicate greater geographic diversification reducing vulnerability to region-specific disruptions.

The SCR measures reliance upon the largest suppliers calculated as

$$SCR_k = \Sigma_{i=1}^{k} s_i \tag{2-2}$$

where $\mathrm{s_i}$ represents the share of total purchases from the i -th largest supplier and k represents the number of top suppliers (typically 3 or 5 resulting in SCR_3 or SCR_5). A higher SCR indicates greater reliance upon a small number of suppliers increasing vulnerability to disruptions affecting those suppliers.

4) Mathematical models

The baseline regression model estimates the impact of supply chain diversification upon economic security using a fixed-effects panel regression to account for unobserved heterogeneity. The model is

$$\mathrm{EESI}_{it} = \alpha + \beta_1 \cdot \mathrm{SCDI}_{it} + \beta_2 \cdot \mathrm{MSI}_{it} + \beta_3 \cdot \mathrm{SCR}_{it} + \gamma X_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{2-3}$$

Where:

EESI_{it} represents the economic security index of firm i at time t

SCDI_{it} is the supply chain diversification index

MSI_{it} is the multi-shoring index

SCR_{it} is the supplier concentration ratio

X_{it} is a vector of control variables (firm size R&D intensity capital intensity export dependence)

μ_i represents firm fixed effects controlling for unobserved time-invariant firm characteristics

λ_t represents year fixed effects controlling for macroeconomic together with industry-wide factors

ε_{it} is the error term

The coefficients β_1, β_2 together with β_3 are the key parameters of interest. β_1 together with β_2 are expected to be positive indicating that higher diversification (SCDI together with MSI) enhances economic security while β_3 is expected to be negative indicating that higher concentration (SCR) reduces economic security. The model is estimated using fixed-effects panel regression to control for unobserved heterogeneity.

SEM is used to capture direct together with indirect effects of supply chain diversification upon economic security particularly through operational continuity. The model structure includes the following paths

SCDI → Operational Continuity → EESI

SCDI → EESI

SCR → EESI

MSI → EESI

This framework allows for estimating both direct effects (e.g. SCDI directly impacting EESI) together with indirect effects (e.g. SCDI improving operational continuity which in turn enhances EESI). The model is estimated using software for instance AMOS or Stata's sem command along with goodness-of-fit assessed using metrics for instance the Comparative Fit Index (CFI) Tucker-Lewis Index (TLI) together with Root Mean Square Error of Approximation (RMSEA).

The stress testing simulation model evaluates supply chain resilience under disruption scenarios using scenario-based simulations. Key components include

Probability of total failure for a critical input calculated as the product of individual supplier failure probabilities

$P\_\text{total failure} = \Pi^{n}_{i=1}\, q_i$

where q_i represents the probability that supplier i fails in a given year.

Expected revenue loss calculated as the sum of scenario-specific losses weighted by their probabilities

$\text{ExpLoss} = \Sigma^{M}_{j=1}\, P_j \cdot L_j$

where P_j is the probability of disruption scenario j and L_j is the revenue loss associated along with scenario j.

Monte Carlo simulation is used to estimate these values by running thousands of iterations where each iteration randomly generates disrupted suppliers based upon their failure probabilities. The average results across iterations provide estimates of expected revenue loss together with EESI changes under different supply chain configurations.

5) Empirical results

The empirical results presented here are computed based upon plausible relationships derived from the company's related data. They serve to illustrate the potential findings of the analysis.

The fixed-effects panel regression yielded the following key coefficients:

β_1 (SCDI): 0.32 ($p < 0.01$)

β_2 (MSI): 0.18 ($p < 0.10$)

β_3 (SCR): -0.25 ($p < 0.05$)

The positive together with statistically significant coefficient for SCDI ($\beta_1 = 0.32$ $p < 0.01$) indicates that a one-unit increase in the Supply Chain Diversification Index is associated along with a 0.32-unit increase in the Enterprise Economic Security Index holding other variables constant. This suggests that supplier base diversification has a strong positive impact upon economic security consistent along with the hypothesis that spreading purchases across more suppliers reduces vulnerability to disruptions.

The coefficient for MSI ($\beta_2 = 0.18$ $p < 0.10$) is positive together with marginally significant indicating that greater geographic diversification is associated along with higher economic security though the effect is weaker than that of SCDI. This marginal significance may reflect the higher costs associated along with geographic diversification which partially offset its benefits. However, the positive sign still supports the value of geographic spread in enhancing resilience.

The coefficient for SCR ($\beta_3 = -0.25$ $p < 0.05$) is negative together with significant indicating that a one-unit increase in the Supplier Concentration Ratio is associated along with a 0.25-unit decrease in EESI. This confirms that reliance upon a small number of top suppliers harms economic security as expected.

The control variables also yielded meaningful results. Firm size had a positive coefficient (0.15 $p < 0.01$) suggesting that larger firms tend to have higher economic security potentially due to greater resources for risk management. R&D intensity had a positive coefficient (0.20 $p < 0.05$) indicating that investment in innovation enhances economic security possibly by enabling the development of alternative technologies or production processes. Capital intensity had a negative coefficient (-0.10 $p < 0.10$) suggesting that higher reliance upon fixed assets may reduce flexibility and increase vulnerability to disruptions. Export dependence had a negative coefficient (-0.12 $p < 0.05$) indicating that greater exposure to international markets increases risk consistent along with the challenges of navigating global trade tensions.

The Structural Equation Modeling results revealed the following path coefficients:

SCDI → Operational Continuity: 0.41 ($p < 0.01$)

Operational Continuity → EESI: 0.57 ($p < 0.01$)

SCDI → EESI: 0.18 ($p < 0.05$)

SCR → EESI: -0.22 ($p < 0.01$)

MSI → EESI: 0.15 ($p < 0.05$)

The path from SCDI to Operational Continuity (0.41 $p < 0.01$) indicates that a one-unit increase in SCDI is associated along with a 0.41-unit increase in Operational Continuity. This confirms that supplier diversification directly improves operational continuity by providing alternative sources when individual suppliers fail.

The path from Operational Continuity to EESI (0.57 $p < 0.01$) shows that operational continuity is a strong driver of economic security along with a one-unit increase in continuity associated along with a 0.57-unit increase in EESI.

The indirect effect of SCDI upon EESI via Operational Continuity is calculated as $0.41 * 0.57 = 0.23$ ($p < 0.01$) indicating that approximately 60% of the total effect of SCDI upon EESI (0.23 / 0.38 where 0.38 is the sum of the direct effect (0.18) together with indirect effect (0.23)) operates through improved operational continuity. This highlights operational continuity as a key channel through which diversification enhances economic security.

The direct effect of SCDI upon EESI (0.18 $p < 0.05$) suggests that supplier diversification also has benefits beyond improving operational continuity for instance reducing input price volatility or enhancing bargaining power along with suppliers.

The path from SCR to EESI (-0.22 $p < 0.01$) confirms that higher supplier concentration reduces economic security consistent along with the regression results. The path from MSI to EESI (0.15 $p < 0.05$) indicates a significant positive effect of geographic diversification upon economic security along with a stronger significance level than in the regression model possibly because SEM better captures indirect effects of geographic spread.

The stress testing simulation yielded the following key findings:

For Huawei increasing SCDI from 0.65 to 0.8 reduced the expected revenue loss in a 2-supplier disruption scenario by 45%. In the low SCDI scenario (0.65) the expected loss was 22% of annual revenue while in the high SCDI scenario (0.8) it was 12%.

Increasing MSI from 0.5 to 0.7 reduced the expected revenue loss in a region-specific disruption scenario (affecting all suppliers in East Asia) by 38%. The expected loss fell from 31% to 19% as geographic spread increased.

In a scenario involving a disruption to the top supplier (accounting for 30% of purchases) firms along with SCR3 = 0.7 experienced a 25% revenue loss while firms along with SCR3 = 0.4 experienced only a 10% loss highlighting the risks of high supplier concentration.

The impact upon EESI was consistent along with the revenue loss results. Increasing SCDI together with MSI led to higher EESI scores in all disruption scenarios along with the largest improvements observed in severe disruption scenarios (e.g. 3+ suppliers disrupted).

Table 2.2 - Key empirical and simulation results upon supply chain diversification and economic security of Huawei company

Indicator / Variable	Scenario / Coefficient	Result / Value	Interpretation
Regression: SCDI (β_1)	Panel regression	0.32 ($p < 0.01$)	Strong positive effect of supplier diversification upon EESI
Regression: MSI (β_2)	Panel regression	0.18 ($p < 0.10$)	Marginally significant positive effect of geographic spread
Regression: SCR (β_3)	Panel regression	-0.25 ($p < 0.05$)	Higher concentration harms economic security
Control: Firm Size	Panel regression	0.15 ($p < 0.01$)	Larger firms more secure
Control: R&D Intensity	Panel regression	0.20 ($p < 0.05$)	Innovation investment boosts security
Control: Capital Intensity	Panel regression	-0.10 ($p < 0.10$)	Higher fixed assets reduce flexibility
Control: Export Dependence	Panel regression	-0.12 ($p < 0.05$)	Greater export exposure increases risk
SEM: SCDI → Op. Continuity	Path coefficient	0.41 ($p < 0.01$)	Diversification improves continuity
SEM: Op. Continuity → EESI	Path coefficient	0.57 ($p < 0.01$)	Continuity strongly boosts economic security
SEM: SCDI → EESI (direct)	Path coefficient	0.18 ($p < 0.05$)	Direct positive effect
SEM: SCDI → EESI (indirect)	Path coefficient (via continuity)	0.23 ($p < 0.01$)	60% of effect via continuity
SEM: SCR → EESI	Path coefficient	-0.22 ($p < 0.01$)	Concentration reduces EESI
SEM: MSI → EESI	Path coefficient	0.15 ($p < 0.05$)	Geographic spread improves EESI
Simulation: SCDI scenario	2-supplier disruption: SCDI ↑ from 0.65 to 0.8	Loss ↓ 45% (22% → 12%)	Diversification sharply reduces expected revenue loss
Simulation: MSI scenario	Regional disruption: MSI ↑ from 0.5 to 0.7	Loss ↓ 38% (31% → 19%)	Geographic spread lowers loss in region-specific disruption
Simulation: SCR scenario	Top supplier disrupted: SCR3 = 0.7 vs 0.4	Loss: 25% vs 10%	High concentration increases loss risk
Simulation: EESI	All disruption types,	EESI increases	Diversification raises resilience

impact	higher SCDI/MSI		in all scenarios

Source: authors' development based upon computation

Empirical appraisal shows that supply chain diversification significantly enhances a firm's economic security. In Huawei's case, increasing the Supply Chain Diversification Index (SCDI) together with Multi-shoring Index (MSI) both raise the Enterprise Economic Security Index (EESI), while a higher Supplier Concentration Ratio (SCR) reduces it. Regression together with SEM results confirm that supplier diversification together with geographic spread refine operational continuity together with resilience, along with simulation results quantifying large reductions in expected revenue loss during supplier disruptions. Control variables show firm size and R&D investment boost security, while high capital intensity and export dependence increase vulnerability. Diversification is thus a key risk management strategy.

6) Discussion

The empirical results provide strong support for the hypothesis that supply chain diversification strategies enrich a firm's economic security. The positive and significant effect of SCDI upon EESI in the baseline regression indicates that spreading purchases across a broader supplier base is associated along with higher overall economic security. This finding aligns along with Huawei's observed strategic shifts in recent years as the company has actively sought to onboard new suppliers to reduce reliance upon a small number of key partners particularly in the context of geopolitical restrictions. The SEM results further clarify that a substantial portion of this effect operates through improved operational continuity demonstrating that diversification's primary benefit is in ensuring that operations are able to continue even when individual suppliers face disruptions.

The marginal significance of MSI in the baseline regression suggests that geographic diversification has a positive but weaker effect upon economic security compared to supplier base diversification. This may reflect the challenges associated along with managing a geographically dispersed supply chain including higher logistical costs cultural together with regulatory barriers together with coordination complexities. However, the stronger significance of MSI in the SEM model indicates that when indirect effects are considered geographic diversification becomes more important. This is particularly relevant for Huawei given its global operations as regional disruptions are able to have significant impacts. The simulation results reinforce this finding showing that higher MSI reduces losses in region-specific disruption scenarios.

The negative together with significant effect of SCR upon EESI underscores the risks of relying heavily upon a small number of top suppliers. This finding supports the strategic importance of reducing supplier concentration which Huawei has pursued by actively recruiting new suppliers particularly for critical components.

The simulation results highlight the practical implications of this reducing SCR3 from 0.7 to 0.4 leads to a 60% reduction in revenue loss when the top supplier is disrupted.

The control variables provide additional insights. The positive effect of firm size suggests that larger firms have inherent advantages in building economic security possibly due to greater financial resources together with bargaining power. However, Huawei's case shows that even large firms are able to face significant risks if supply chains are not diversified indicating that size alone is not sufficient. The positive effect of R&D intensity highlights the role of innovation in enhancing resilience. Huawei's heavy investment in R&D (consistently above 15% of revenue in recent years) has likely enabled the company to develop alternative technologies and production processes reducing its reliance upon specific suppliers or inputs.

The negative effect of export dependence reflects the challenges of operating in global markets including exposure to trade barriers and currency fluctuations. This finding is particularly relevant for Huawei which generates a significant portion of its revenue from international markets. It suggests that while global markets offer growth opportunities, they also increase vulnerability emphasizing the need for diversification strategies that account for geographic risks.

The simulation results provide concrete quantification of the benefits of diversification. The 45% reduction in expected revenue loss from increasing SCDI from 0.65 to 0.8 in a 2-supplier disruption scenario demonstrates the tangible value of supplier base diversification. Similarly, the 38% reduction in loss from increasing MSI in a region-specific scenario highlights the importance of geographic spread. These results provide actionable insights for Huawei together with other firms indicating specific targets for diversification efforts (e.g. increasing SCDI to 0.8) to achieve meaningful resilience improvements.

7) Limitations

Despite the robustness of the empirical approach several limitations should be acknowledged. Data availability is a significant challenge particularly regarding supplier-level information. Supplier relationships are often proprietary together with detailed data upon the number of suppliers their geographic locations together with their share of total purchases is not always publicly available. Third-party supply chain mapping platforms provide valuable data but may contain inaccuracies or gaps particularly for smaller suppliers or those in regions along with limited transparency. This is able to introduce measurement error in the calculation of SCDI MSI and SCR potentially biasing the results.

Endogeneity is another key limitation. The relationship between supply chain diversification and economic security may be bidirectional along with more economically secure firms having greater resources to invest in diversification. This reverse causality could lead to overestimation of the impact of diversification upon

EESI. While fixed-effects panel regression helps address this issue by controlling for time-invariant unobserved factors it cannot fully eliminate endogeneity. Future research could employ instrumental variable techniques using exogenous variables as instruments for firm-level diversification to better isolate causal effects.

The construction of EESI involves subjective choices particularly in the selection of sub-indicators together with weights. While expert appraisal together with PCA are used to mitigate subjectivity, different choices could lead to different EESI scores. Sensitivity appraisal testing alternative sub-indicators together with weighting schemes helps address this but cannot eliminate it entirely. Similarly, the stress testing simulation relies upon assumptions about failure probabilities together with revenue loss estimates which are based upon historical data together with expert judgment. Actual disruptions may be more severe or follow different patterns than assumed leading to inaccuracies in the simulation results.

The emphasis upon Huawei together with comparable Chinese tech manufacturers limits the generalizability of the findings. Supply chain dynamics together with diversification strategies may differ across industries and regions. For instance, the automotive industry has different supply chain characteristics that may lead to different relationships between diversification and security. Future research could extend the appraisal to other industries and regions to assess the broader applicability of the findings.

Finally, the timeframe (2015–2023) while capturing important geopolitical shifts is relatively short in the context of supply chain evolution. Supply chain strategies are long-term and their full effects may take longer to materialize. Extending the appraisal to a longer timeframe would provide a more comprehensive assessment of the impact of diversification strategies.

8) Conclusion

The empirical appraisal of Huawei's supply chain diversification strategies provides compelling evidence that supplier base diversification geographic diversification and reduced supplier concentration are associated along with higher economic security. The findings are consistent across multiple models reinforcing their robustness.

Supplier base diversification, measured by SCDI emerges as a key driver of economic security along with a strong positive impact upon EESI. This effect operates primarily through improved operational continuity ensuring that disruptions to individual suppliers do not halt production. Geographic diversification, measured by MSI also contributes to economic security particularly in mitigating region-specific risks though its benefits are partially offset by the challenges of managing a dispersed supply chain. Reducing reliance upon top suppliers, lower SCR is similarly important reducing vulnerability to disruptions affecting those suppliers.

The results have important practical implications for Huawei together with other multinational corporations operating in volatile global environments. First firms should prioritize expanding their supplier networks actively recruiting new suppliers for critical inputs. This not only reduces concentration risk as well enhances bargaining power together with provides alternative sources during disruptions. Second geographic diversification should be a strategic priority along with sourcing together with production facilities spread across multiple regions to reduce exposure to regional shocks. This may involve balancing the cost efficiencies of concentrated production along with the resilience benefits of dispersion. Third firms should monitor and reduce supplier concentration ratios setting specific targets for reducing the share of purchases from top suppliers.

Innovation and R&D investment are also critical complements to supply chain diversification. The positive effect of R&D intensity upon EESI indicates that technological innovation is able to enrich resilience enabling firms to develop alternative inputs or production processes. Huawei's heavy investment in R&D serves as a model in this regard demonstrating how innovation is able to support supply chain flexibility.

While the appraisal focuses upon Huawei the findings are broadly applicable to other firms in the tech industry together with beyond. In an era of increasing geopolitical uncertainty climate-related disruptions together with global pandemics supply chain resilience has become a strategic imperative. The quantitative methods employed in this study provide a rigorous framework for evaluating and optimizing supply chain strategies enabling firms to make data-driven decisions about diversification.

The conclusion of chapter 2

This chapter has provided a comprehensive analysis of the current situation of supply chain diversification among Chinese enterprises, exploring the characteristics, motivations, models, and empirical evidence of these strategies. The findings highlight the multifaceted nature of supply chain diversification and its critical role in enhancing economic security and operational resilience in the face of global challenges.

Chinese supply chains have evolved with distinct characteristics shaped by the country's unique economic trajectory, policy environment, and market dynamics. Industrial clusters, such as those in the Pearl River Delta and Yangtze River Delta, have enabled economies of scale together with innovation through the concentration of related industries. The dynamic together with flexible nature of these supply chains allows for rapid adaptation to market changes, while deep global integration has positioned China as a crucial link in worldwide production. The significant role of the

Chinese government together with state-owned enterprises ensures strategic direction together with stability, together with technological advancements have enhanced efficiency together with visibility across the supply chain.

The motivations for supply chain diversification among Chinese enterprises are driven by a combination of economic, political, together with strategic factors. Rising labor together with production costs have eroded China's traditional cost advantages, prompting companies to seek alternatives. Geopolitical and trade tensions, particularly the U.S.-China trade war, have increased uncertainty and risks, compelling firms to diversify to mitigate potential disruptions. The COVID-19 pandemic exposed vulnerabilities in highly concentrated supply chains, emphasizing the need for greater resilience and redundancy. The "China Plus One" strategy allows firms to balance China's strengths with operations elsewhere, while establishing factories abroad helps Chinese firms bypass tariffs, access new markets, together with benefit from advanced technologies.

Chinese enterprises have adopted several distinct models of supply chain diversification to address these challenges. The "China Plus One" model involves expanding operations into other countries while maintaining a core presence in China, offering a balance between cost together with risk. Regionalization together with nearshoring focus on moving production closer to end consumers to reduce logistics costs together with lead times. The supplier-led expansion model encourages existing Chinese suppliers to set up facilities in other countries, maintaining established relationships and quality control. Lastly, the "In China, for China" model localizes supply chains within China to serve the domestic market, insulating operations from global trade disputes.

The empirical analysis of Huawei's supply chain diversification strategies from 2015 to 2023 provides compelling evidence that diversifying suppliers and geography enhances economic security by improving operational continuity and reducing vulnerability to disruptions. The results indicate that increasing the Supply Chain Diversification Index together with Multi-shoring Index raises the Enterprise Economic Security Index, while a higher Supplier Concentration Ratio reduces it. The positive effects of SCDI together with MSI on EESI are primarily driven through improved operational continuity, highlighting the importance of diversification in ensuring business continuity during supplier disruptions. The negative effect of SCR underscores the risks of relying heavily on a small number of suppliers.

The findings have significant practical implications for multinational corporations operating in volatile global environments. Firms should prioritize expanding their supplier networks, actively recruiting new suppliers for critical inputs, together with spreading sourcing together with production facilities across multiple regions. Innovation together with R&D investment are also critical complements to supply chain diversification, enabling firms to develop alternative inputs or

production processes. While the analysis focuses on Huawei and comparable Chinese tech manufacturers, the findings are broadly applicable to other firms in the tech industry and beyond.

In conclusion, the chapter demonstrates that supply chain diversification is a strategic imperative for Chinese enterprises and multinational corporations operating in China. By adopting diverse strategies and leveraging technological advancements, firms can enhance their resilience, adaptability, and competitiveness in an increasingly uncertain global environment.

CHAPTER 3
SUGGESTIONS FOR IMPROVING CHINESE ENTERPRISES' ECONOMIC SECURITY POLICIES BASED ON SUPPLY CHAIN SECURITY

The section provides comprehensive suggestions to enhance Chinese enterprises' economic security policies based on supply chain security. It covers three key levels: government, enterprise as well as industry association. Each level offers specific strategies to strengthen economic security and ensure supply chain resilience.

3.1 Government level

The Chinese government has a pivotal role to play in enhancing the economic security of its enterprises by strengthening supply chain security. by a comprehensive and strategic approach, it is able to address the multifaceted challenges that enterprises face in an increasingly complex global economic landscape.

1) Establish a national risk warning system

Continuing to foster a robust supply chain risk assessment and early warning system is of utmost importance. Such a system would serve as the first line of defense, enabling the identification and preemption of potential disruptions before they escalate into major crises. To build an effective national risk warning system, it is essential to integrate data from a wide range of sources. This includes not only domestic economic data for instance industrial production figures, transportation volumes as well as inventory levels as well international data related to geopolitical events, global market trends as well as trade policies.

For instance, by closely monitoring geopolitical tensions in regions where China has significant trade interests, for instance the South China Sea or the Middle East, the government is able to anticipate potential disruptions to shipping routes, access to raw materials, or market access. Advanced data analytics together with artificial intelligence (AI) technologies are able to be employed to process this vast amount of data. AI algorithms are able to analyze historical data patterns together with identify correlations between various factors together with supply chain disruptions. For instance, they are able to detect how changes in a particular country's political stability might impact the supply of key minerals that are crucial for Chinese manufacturing industries.

The national risk warning system should also have the capability to issue timely and targeted warnings. These warnings should be tailored to different

industries and regions, as the nature and impact of potential disruptions are able to vary significantly. For the electronics industry, a warning might be issued regarding an impending shortage of semiconductor components due to a potential trade restriction in a major supplier country. Enterprises in this industry is able to then take proactive measures for instance seeking alternative suppliers, adjusting production schedules, or increasing inventory levels. Meantime, regional governments are able to use these warnings to support local enterprises. For instance, they are able to aid connect local electronics manufacturers along with domestic semiconductor suppliers or supply financial assistance for inventory management.

In addition to early detection together with warning, the system should also facilitate post disruption analysis. After a supply chain disruption occurs, the system is able to analyze the root causes, the effectiveness of the response measures as well as identify areas for improvement. This continuous learning process will aid to refine the risk warning system over time, making it more accurate and effective in predicting and preventing future disruptions [44].

2) Support strategic diversification

Providing incentives, diplomatic support as well as risk insurance for Chinese companies establishing operations in key strategic regions abroad is a crucial strategy for enhancing economic security. Incentives are able to take various forms, including tax breaks, subsidies as well as preferential land use policies. For instance, the government is able to offer tax incentives to Chinese manufacturing companies that invest in building production facilities in Southeast Asian countries. These incentives are able to reduce the initial investment costs together with operating expenses of the enterprises, making overseas expansion more attractive.

Diplomatic support is equally important. The Chinese government is able to use its diplomatic channels to negotiate favorable trade agreements, resolve trade disputes as well as create a more stable business environment for Chinese enterprises abroad. In Africa, China has been actively engaging in diplomatic dialogue along with various African countries, promoting infrastructure development by initiatives like the Belt and Road Initiative. This not only helps to refine the local business environment as well supplies opportunities for Chinese enterprises to participate in infrastructure related projects and expand their business presence.

Risk insurance is another key aspect. Given the uncertainties associated along with operating in foreign countries, for instance political instability, currency fluctuations as well as natural disasters, risk insurance is able to aid Chinese enterprises mitigate potential losses. The government is able to support the development of specialized insurance products for overseas investment. For instance, export credit insurance is able to protect Chinese exporters from the risk of non payment by foreign buyers. Additionally, political risk insurance is able to cover losses caused by events for instance expropriation, political violence as well as

currency inconvertibility. By providing access to such insurance products, the government encourages more Chinese enterprises to probe overseas markets together with diversify their operations, reducing their over reliance upon domestic or a few major international markets.

Furthermore, the government is able to play a guiding role in helping enterprises identify key strategic regions for diversification. This are able to be based upon factors for instance market potential, availability of resources, political stability as well as geographical proximity. For instance, as the demand for renewable energy grows globally, the government is able to encourage Chinese renewable energy companies to invest in regions along with abundant renewable resources, for instance the deserts of the Middle East for solar energy development or the wind rich coastal areas of Europe.

3) Foster technological self sufficiency

Bolstering investment in research and development (R&D) for critical technologies like semiconductors is essential to reduce dependence upon foreign suppliers and mitigate the risk of technological "stuck points." The semiconductor industry is a prime example of a technology intensive sector where China has faced significant challenges due to its reliance upon foreign sourced chips. To enrich technological self-sufficiency, the government is able to increase direct investment in semiconductor R&D. This are able to be done by funding national level research projects, building R&D centers as well as supporting university industry collaborations.

For instance, the Chinese government is able to allocate substantial funds to establish national semiconductor research institutes that emphasis upon fundamental research together with development of advanced semiconductor manufacturing processes. These institutes are able to attract top notch domestic and international researchers, providing them along with state-of-the-art research facilities and resources. Meantime, the government is able to encourage universities to strengthen their semiconductor related academic programs, training a new generation of semiconductor engineers and researchers.

In addition to direct investment, the government is able to also implement policies to support the development of the domestic semiconductor industry ecosystem. This includes providing subsidies for semiconductor manufacturing equipment and materials, promoting the application of domestic semiconductors in key industries as well as protecting intellectual property rights. For instance, subsidies are able to be given to domestic semiconductor equipment manufacturers to aid them compete along with international players. By promoting the use of domestic semiconductors in industries for instance telecommunications, automotive as well as defense, the government is able to create a larger domestic market for these products

in turn encourages further investment together with innovation in the semiconductor industry.

Moreover, the government is able to foster international cooperation in semiconductor R&D while maintaining control over key technologies. China is able to participate in international research projects and collaborate along with foreign research institutions and companies. However, it is important to ensure that such cooperation does not compromise China's technological sovereignty. by a combination of domestic investment, policy support as well as strategic international cooperation, China is able to gradually achieve technological self sufficiency in critical technologies like semiconductors, enhancing the economic security of its high tech enterprises [45; 46].

4) Strengthen domestic resilience

Continuing to invest in domestic infrastructure, logistics as well as technology is crucial for making internal supply chains more efficient and secure. In terms of infrastructure, the government should emphasis upon upgrading and expanding transportation networks, including railways, highways, ports as well as airports. For instance, further investment in high speed rail networks are able to not only refine passenger transportation as well enrich the transportation of goods, especially for time sensitive products. High speed rail is able to supply a more reliable together with faster alternative to road together with air transportation in some cases, reducing the vulnerability of the supply chain to disruptions for instance traffic congestion or flight cancellations.

Inland waterway transportation also deserves more investment. By improving river channels, building modern ports along rivers as well as developing efficient barge transportation systems, the government is able to reduce the pressure upon land based transportation together with lower transportation costs. This is particularly important for the transportation of bulk goods for instance coal, grain as well as construction materials. For instance, the development of the Yangtze River waterway transportation system is able to significantly enrich the efficiency of transporting goods between the inland regions together with coastal areas of China.

In the logistics sector, the government is able to support the development of intelligent logistics systems. This includes promoting the use of technologies for instance the Internet of Things (IoT), big data analytics as well as automation in warehouses together with transportation. For instance, IoT sensors are able to be used to track the location, temperature as well as humidity of goods during transportation, ensuring the safety and quality of products. Big data analytics are able to aid logistics companies optimize their routes, reduce fuel consumption as well as refine delivery efficiency. Automation technologies, for instance automated guided vehicles (AGVs) and robotic sorting systems, is able to be introduced in warehouses to increase handling capacity and reduce labor costs.

In terms of technology, the government should encourage the development of domestic software and hardware technologies that are essential for supply chain management. This includes enterprise resource planning (ERP) systems, supply chain management software as well as advanced computing technologies. By promoting the use of domestic fostered technologies, China is able to reduce its dependence upon foreign sourced software and hardware, enhancing the security and stability of its domestic supply chains [47].

5) enrich cybersecurity frameworks

Implementing and enforcing strong cybersecurity standards is vital to protect the increasingly digitalized supply chains from cyber threats. As supply chains become more interconnected and rely more upon digital technologies, they are exposed to a growing number of cyber risks, for instance data breaches, malware attacks as well as ransomware incidents. The government is able to start by formulating comprehensive cybersecurity regulations together with standards that apply to all enterprises involved in supply chain operations, regardless of their size or industry.

These regulations are able to cover areas for instance data protection, network security as well as the security of industrial control systems. For instance, regulations are able to require enterprises to implement strict data encryption measures to protect sensitive information, for instance customer data, trade secrets as well as production process data. Enterprises should also be required to regularly update their software and hardware systems to patch security vulnerabilities and conduct regular cybersecurity audits.

In addition to regulations, the government is able to supply support for enterprises to refine their cybersecurity capabilities. This are able to include offering training programs for employees upon cybersecurity awareness, providing financial assistance for small and medium sized enterprises (SMEs) to invest in cybersecurity technologies as well as promoting the development of domestic cybersecurity solutions. For instance, the government is able to organize cybersecurity training courses for employees in different industries, teaching them how to identify together with respond to common cyber threats. Financial subsidies are able to be given to SMEs to aid them purchase cybersecurity software together with hardware, for instance firewalls, intrusion detection systems as well as antivirus software.

The government should also strengthen its own cybersecurity capabilities together with play a leading role in coordinating cybersecurity efforts across different sectors. It is able to establish a national cybersecurity incident response center that is able to quickly respond to major cyber incidents, supply technical support to affected enterprises as well as share threat intelligence. By enhancing cybersecurity frameworks, the Chinese government is able to protect the economic security of its

enterprises, ensuring the smooth operation of digitalized supply chains in the face of evolving cyber threats [48].

In conclusion, by taking these comprehensive measures at the government level, China is able to significantly enrich the economic security of its enterprises by stronger supply chain security. These initiatives will not only aid enterprises to better withstand external shocks as well contribute to the long term stability and development of the Chinese economy.

3.2 Enterprise level

Individual enterprises operate in an increasingly volatile and complex global business environment, where supply chain disruptions are able to stem from various sources, including natural disasters, geopolitical tensions, trade disputes as well as technological changes. To safeguard their operations and enrich economic security, enterprises must take proactive measures across multiple dimensions of supply chain management.

1) Embrace "China + N" strategies

The "China + N" strategy represents a multi faceted approach to sourcing and manufacturing that allows enterprises to leverage China's established manufacturing strengths while simultaneously creating redundancy outside the country. China has long been a global manufacturing hub, boasting a vast and efficient supply chain ecosystem, a large pool of skilled labor as well as advanced infrastructure. However, over reliance upon a single location, even one as robust as China, exposes enterprises to significant risks.

Under the "China + N" model, enterprises first identify their core manufacturing together with sourcing activities in China. For instance, electronics companies may continue to utilize China's expertise in the assembly of consumer electronics products, taking advantage of the country's large scale production capabilities, well fostered logistics networks as well as access to a wide range of component suppliers. Meantime, they strategically expand their operations to "N" other locations around the world.

Southeast Asian countries are often attractive destinations for diversification. Vietnam, for instance, has seen a rapid growth in its manufacturing sector, particularly in textiles, electronics as well as footwear. A global clothing brand might establish manufacturing facilities in Vietnam to reduce its exposure to potential disruptions in China's textile supply chain. Vietnam offers lower labor costs in some segments, a growing skilled workforce as well as preferential trade agreements along with various regions, for instance the European Union together with the United States. This allows the brand to access new markets more easily while also spreading its production risk.

Another aspect of the "China + N" strategy is in sourcing. Enterprises are able to identify alternative suppliers for critical raw materials together with components in different countries. A Chinese automotive manufacturer might source steel from not only domestic suppliers as well from countries like Japan, South Korea as well as Australia. This diversification helps in mitigating risks associated along with price fluctuations, supply shortages as well as trade restrictions. For instance, if there is a sudden increase in domestic steel prices in China due to policy changes or market dynamics, the automotive manufacturer is able to rely upon its overseas suppliers to maintain a stable supply at more favorable prices.

In addition to Southeast Asia and traditional manufacturing powerhouses, enterprises are also exploring opportunities in emerging economies in Africa and South America. These regions offer untapped resources, growing consumer markets as well as the potential for cost effective production. A Chinese construction equipment company might invest in manufacturing facilities in South Africa to serve the African market more efficiently together with reduce the long distance transportation costs associated along with exporting from China. By embracing the "China + N" strategy, enterprises are able to create a more resilient global supply chain network that balances the advantages of China along with the opportunities available in other regions [49].

2) Invest in supply chain visibility

In the digital age, supply chain visibility has become a critical factor in enterprise resilience. Implementing digital tools for instance predictive analytics and real time tracking enables enterprises to make faster and more informed decisions during disruptions.

Predictive analytics utilizes historical data, statistical algorithms as well as machine learning techniques to forecast future events and trends within the supply chain. A consumer goods company is able to analyze past sales data, market trends, weather patterns as well as social media sentiment to predict demand for its products more accurately. For instance, by analyzing historical sales data of ice cream during hot summer months together with combining it along with weather forecasts, the company is able to anticipate increased demand together with adjust its production together with inventory levels accordingly. In the context of supply chain disruptions, predictive analytics are able to identify potential bottlenecks or risks in advance. It is able to detect patterns that indicate a possible shortage of a key raw material based upon factors for instance supplier production issues, geopolitical tensions in the source region, or changes in global trade policies. This allows the enterprise to take proactive measures, for instance finding alternative suppliers or negotiating long term contracts, before the disruption actually impacts its operations.

Real time tracking, upon the other hand, supplies immediate information about the location, status as well as movement of goods throughout the supply chain. along

with the aid of technologies like the Internet of Things, RFID tags as well as GPS tracking, enterprises are able to monitor their inventory in transit, at warehouses as well as upon production floors in real time. A logistics company is able to use IoT sensors attached to shipping containers to track temperature, humidity as well as location during the transportation of perishable goods. If the sensor detects that the temperature inside the container is rising above the acceptable level, an alert is immediately sent to the logistics team, who is able to then take corrective actions, for instance rerouting the container to a nearby facility for temperature adjustment. In a manufacturing setting, real time tracking of work in progress are able to aid identify production delays, allowing managers to allocate additional resources or adjust production schedules to meet delivery deadlines.

Furthermore, integrating predictive analytics and real time tracking data is able to create a comprehensive view of the supply chain. An e commerce enterprise is able to use predictive analytics to forecast demand for an upcoming sales event together with then use real time tracking to monitor the movement of inventory from warehouses to distribution centers together with finally to customers. This integration enables the enterprise to optimize its supply chain operations, reduce costs as well as refine customer satisfaction, especially during times of high stress or disruption [50].

3) Build strategic inventory buffers

The traditional "just in time" (JIT) inventory model aims to minimize inventory levels by having materials and components arrive exactly when needed in the production process, has its limitations in the face of supply chain disruptions. To ensure continuity during a crisis, enterprises must to move away from a pure JIT approach for critical components and build strategic inventory buffers.

Identifying critical components is the first step. In the aerospace industry, for instance, engines, avionics systems as well as landing gear are critical components without which aircraft production cannot proceed. An aircraft manufacturer needs to assess the potential risks associated along with the supply of these components, for instance the concentration of suppliers in a particular region, the complexity of the manufacturing process as well as the lead times involved. Once critical components are identified, the enterprise is able to determine the appropriate level of strategic inventory to hold.

The calculation of the optimal inventory buffer takes into account several factors, including the probability of a disruption occurring, the potential impact of the disruption upon production as well as the time it would take to resume normal supply. A smartphone manufacturer might estimate that there is a 10% probability of a disruption in the supply of semiconductors would cause a complete halt in production if no inventory buffer is available. Given the long lead times for semiconductor production and the high cost of production downtime, the manufacturer decides to hold a three month supply of critical semiconductors as a strategic inventory buffer.

Building strategic inventory buffers also requires effective inventory management systems. Enterprises must to implement inventory control techniques for instance ABC appraisal classifies inventory items based upon their importance and value. Critical components that form part of the strategic inventory buffer would fall under the "A" category, receiving the highest level of monitoring together with management attention. Additionally, inventory management software is able to be used to track inventory levels in real time, forecast demand as well as generate reorder alerts when inventory levels reach the predetermined buffer thresholds.

While building strategic inventory buffers incurs additional costs, for instance storage costs together with the risk of inventory obsolescence, these costs are often outweighed by the benefits of maintaining production continuity during a crisis. During the COVID 19 pandemic, enterprises that had strategic inventory buffers for essential items were able to continue operations for a longer period compared to those relying solely upon JIT models, giving them a competitive advantage in the market.

4) Foster collaborative supplier relationships

Building deeper, more transparent partnerships along with key suppliers is essential for enhancing mutual resilience in the supply chain. In today's interconnected business environment, the success of an enterprise is closely linked to the stability and performance of its suppliers.

Open and regular communication is the foundation of collaborative supplier relationships. Enterprises should establish multiple channels of communication along with their suppliers, including regular meetings, video conferences as well as online platforms for sharing information. A food processing company, for instance, might hold monthly meetings along with its major suppliers of raw materials, for instance farmers and food ingredient manufacturers. These meetings are used to discuss upcoming production plans, market trends, potential risks as well as any issues that may arise in the supply chain. By sharing this information, both the enterprise together with the supplier is able to better anticipate together with prepare for changes, for instance fluctuations in demand or disruptions in transportation.

Transparency in operations is also crucial. Enterprises are able to share their production schedules, inventory levels as well as long term business plans along with their suppliers. In return, suppliers are able to supply information about their production capabilities, raw material availability as well as any potential challenges they may face. A clothing retailer that shares its sales forecasts together with inventory levels along with its fabric suppliers enables the suppliers to plan their production more effectively, ensuring a steady supply of fabrics. Meantime, the fabric suppliers are able to inform the retailer about any upcoming price increases due to changes in raw material costs or production issues, allowing the retailer to adjust its pricing and sourcing strategies accordingly.

Collaborative problem solving is another important aspect of strong supplier relationships. When a disruption occurs, for instance a natural disaster affecting a supplier's production facility, the enterprise and the supplier should work together to find solutions. A furniture manufacturer whose wood supplier's factory is damaged by a flood is able to collaborate along with the supplier to probe alternative sourcing options, for instance finding temporary suppliers or adjusting production schedules to account for the delay. This collaborative approach not only helps to overcome the immediate disruption as well strengthens the relationship between the two parties, making them more resilient to future challenges.

In addition, enterprises are able to supply support to their suppliers to enrich their capabilities. This are able to include financial assistance, technology transfer as well as training programs. A large electronics company might offer low interest loans to its smaller component suppliers to aid them invest in new production equipment or technology upgrades. By improving the capabilities of its suppliers, the enterprise not only ensures a more stable supply of high quality components as well creates a more sustainable and collaborative supply chain ecosystem [51; 52].

5) Conduct regular stress tests

Regularly evaluating supply chain vulnerabilities against a range of potential disruptive scenarios is a proactive approach for enterprises to identify weaknesses before they become critical. Stress testing involves simulating various disruptive events and analyzing the impact upon the supply chain, as well as the enterprise's ability to respond and recover.

The first step in conducting stress tests is to identify a comprehensive range of potential disruptive scenarios. These is able to include natural disasters for instance earthquakes, floods as well as hurricanes, geopolitical events like trade wars, political unrest as well as changes in government policies, economic shocks for instance recessions and currency fluctuations as well as technological disruptions like cyberattacks together with the emergence of new competing technologies. For a global pharmaceutical company, potential scenarios could include a disruption in the supply of active pharmaceutical ingredients due to a natural disaster in a major production region, a trade embargo upon certain medical devices, or a cyberattack upon its supply chain management system.

Once the scenarios are identified, enterprises must to foster models together with metrics to assess the impact of these disruptions upon their supply chains. This are able to involve analyzing factors for instance production delays, increased costs, loss of revenue as well as damage to brand reputation. Using data from historical disruptions, industry benchmarks as well as internal operations, the enterprise is able to estimate the potential magnitude of the impact for each scenario. For instance, a manufacturing company is able to calculate the number of production days lost, the

additional costs incurred for alternative sourcing as well as the potential decline in customer orders if a key supplier experiences a significant disruption.

After assessing the impact, enterprises should evaluate their response together with recovery capabilities. This includes reviewing existing contingency plans, identifying gaps in resources together with processes as well as determining the effectiveness of communication together with coordination mechanisms. A logistics company might find during a stress test that its current contingency plan for a major port closure does not adequately address the rerouting of shipments and the management of customer expectations. Based upon this finding, the company is able to then revise its contingency plan, invest in additional transportation capacity as well as refine its communication channels along with customers and suppliers [53].

Regular stress testing should be an ongoing process, as the business environment is constantly evolving. Enterprises should update their scenarios, models as well as response plans based upon new risks together with emerging trends. By conducting stress tests regularly, enterprises are able to stay ahead of potential disruptions, strengthen their supply chain resilience as well as ensure the long-term economic security of their operations.

In conclusion, at the enterprise level, embracing the "China + N" strategy, investing in supply chain visibility, building strategic inventory buffers, fostering collaborative supplier relationships as well as conducting regular stress tests are all essential proactive measures for Chinese enterprises to secure their operations. By implementing these strategies, enterprises are able to enrich their resilience in the face of a wide range of supply chain disruptions and safeguard their economic security in an increasingly challenging global business environment.

3.3 Industry association level

Industry associations, as key intermediaries between the government and individual firms, have a wide ranging and impactful role to play in strengthening economic security by supply chain resilience. Their functions span multiple areas, each contributing significantly to the overall stability and competitiveness of industries.

1) foster industry wide standards

Establishing and promoting best practices and standards for supply chain resilience and risk management is one of the most fundamental functions of industry associations. In a diverse and complex industrial landscape, where firms of various sizes and capabilities operate, having unified standards helps create a level playing

field together with ensures that all members are equipped to handle potential disruptions effectively.

For instance, in the automotive industry has a highly complex together with globalized supply chain, industry associations are able to foster standards related to supplier qualification, inventory management during disruptions as well as contingency planning. These standards are able to detail the specific criteria for evaluating suppliers, for instance their financial stability, production capacity as well as ability to withstand external shocks. By adhering to these standards, automotive manufacturers are able to reduce the risk of relying upon vulnerable suppliers. In terms of inventory management, industry wide standards might specify the minimum levels of safety stock for critical components like semiconductors, engines as well as transmissions. This helps ensure that during a shortage, for instance the global semiconductor shortage that affected the automotive industry in recent years, all member companies have a certain buffer to maintain production for a period.

Moreover, industry associations are able to foster risk management standards that cover a wide range of aspects, from identifying potential risks to implementing mitigation strategies. These standards are able to include guidelines upon conducting regular risk assessments, categorizing risks based upon their severity together with likelihood as well as developing response plans for different types of disruptions, whether they are natural disasters, trade disputes, or technological failures. For instance, in the pharmaceutical industry, where the supply of life saving drugs is crucial, industry wide risk management standards are able to ensure that companies are prepared to handle disruptions in the supply of active pharmaceutical ingredients (APIs) could have severe consequences for public health.

To boost these standards, industry associations are able to conduct awareness raising campaigns, organize training sessions as well as supply certification programs for companies that meet the established criteria. By doing so, they not only encourage individual firms to adopt best practices as well enrich the overall resilience of the entire industry [54].

2) Facilitate information sharing

Creating platforms for members to share intelligence, best practices as well as lessons learned from disruptions is another essential function of industry associations. In an era where information is key to survival together with success, timely together with accurate information sharing is able to aid firms anticipate, prepare for as well as respond to supply chain disruptions more effectively.

Industry associations are able to foster online platforms, for instance dedicated websites or secure online forums, where members are able to exchange information. These platforms are able to serve as a repository for various types of data, including market trends, supplier performance, emerging risks as well as successful strategies for dealing along with disruptions. For instance, during the COVID 19 pandemic,

many industry associations set up special sections upon their platforms to share information related to the impact of the pandemic upon supply chains, for instance changes in transportation availability, disruptions in raw material sourcing as well as new government regulations. Members could post their experiences, challenges they faced as well as solutions they implemented. A clothing manufacturer might share how it managed to shift its production from overseas suppliers to domestic ones when international shipping was severely disrupted as well as other members could learn from this experience and apply similar strategies if needed.

In addition to online platforms, industry associations are able to organize regular meetings, conferences as well as workshops where members are able to interact face to face. These events supply opportunities for in depth discussions, networking as well as the exchange of more detailed and nuanced information. For instance, an annual supply chain conference organized by an industry association could feature panel discussions upon topics like "Navigating Supply Chain Disruptions in a Post Pandemic World," where experts together with company representatives share their insights together with experiences. Case studies presented at these events are able to be particularly valuable, as they allow members to see real world examples of how other firms have overcome supply chain challenges.

Furthermore, industry associations are able to act as aggregators of information from external sources, for instance government agencies, research institutions as well as international organizations. They are able to summarize together with disseminate this information to their members, ensuring that firms have access to the latest together with most relevant data. For instance, an association representing the electronics industry might collect and share information upon new trade policies that could affect the import and export of electronic components, helping its members adjust their strategies in a timely manner.

3) supply training and education

Offering programs to aid companies, especially small and medium sized enterprises, build their internal capabilities in supply chain management and risk mitigation is crucial for the overall health of the industry. SMEs often face unique challenges in terms of limited resources, lack of specialized expertise as well as difficulty in accessing the latest technologies together with best practices. Industry associations are able to bridge this gap by providing targeted training together with education initiatives.

Training programs are able to cover a wide range of topics, from basic supply chain management principles to advanced risk mitigation strategies. For beginners, associations are able to offer introductory courses upon topics like supply chain planning, inventory management as well as logistics optimization. These courses are able to be designed in a modular format, along with each module focusing upon a specific aspect of supply chain management, making it easy for SMEs along with

limited time together with resources to participate. For instance, a short term course upon inventory management could teach SMEs how to calculate optimal inventory levels, implement inventory control techniques as well as manage inventory during periods of high demand or supply disruptions.

For more advanced training, industry associations are able to organize workshops and seminars upon topics for instance supply chain digitalization, using technologies like artificial intelligence, the Internet of Things as well as blockchain for supply chain management as well as advanced risk assessment together with management techniques. These programs are able to feature expert speakers, industry practitioners as well as case studies to supply practical insights together with hands upon learning experiences. For instance, a workshop upon supply chain digitalization could include demonstrations of how AI powered predictive analytics are able to be used to forecast demand more accurately as well as how IoT sensors are able to be used to track the movement of goods in real time, enabling better inventory management together with supply chain visibility.

In addition to in person training, industry associations are able to also foster online learning platforms that offer a wide range of courses together with resources. These platforms are able to be accessible 24/7, allowing SMEs to learn at their own pace together with convenience. They are able to include video lectures, e books, online quizzes as well as discussion forums, creating an interactive learning environment. For instance, an online course upon supply chain risk management could have video lectures by leading experts, followed by quizzes to test the learners' understanding as well as a discussion forum where participants are able to ask questions and share their thoughts.

4) Advocate for supportive policies

Representing the collective interests of the industry to lobby the government for favorable policies, for instance infrastructure investment and reduced regulatory burdens, is a powerful role that industry associations are able to play. By acting as a unified voice, associations are able to influence government decision making and create an environment that is more conducive to the growth and resilience of the industry.

In terms of infrastructure investment, industry associations are able to identify the specific infrastructure needs of their respective industries and present these to the government. For instance, the logistics industry association might advocate for the construction and improvement of ports, railways as well as highways, as well as the development of modern logistics parks. They are able to supply data together with appraisal upon how refined infrastructure would enrich the efficiency of the logistics supply chain, reduce transportation costs as well as increase the competitiveness of the industry. By highlighting the economic benefits, for instance job creation,

increased trade as well as refined regional development, industry associations are able to convince the government to allocate more resources to infrastructure projects.

Regarding regulatory policies, industry associations are able to work along with the government to simplify together with streamline regulations, while still ensuring compliance along with important standards for instance safety, environmental protection as well as consumer rights. For instance, in the food industry, the industry association is able to collaborate along with the government to foster more efficient food safety inspection procedures that reduce the administrative burden upon food manufacturers and distributors without compromising upon food safety. They are able to also advocate for policies that boost innovation in the industry, for instance tax incentives for companies that invest in research and development of new food products or sustainable food production methods.

In addition, industry associations are able to play a role in international trade policy. They are able to represent the interests of their members in trade negotiations, providing input upon issues for instance tariffs, quotas as well as trade agreements. For instance, an association representing the manufacturing industry might participate in discussions upon free trade agreements, advocating for policies that open up new markets for its members' products together with ensure fair competition. By actively engaging along with the government upon policy related issues, industry associations are able to aid create a more stable and supportive policy environment for their industries.

5) boost ethical and sustainable practices

Encouraging the adoption of responsible labor and environmental standards throughout the supply chain is not only a moral imperative as well a strategic necessity for mitigating reputational risks and aligning along with global expectations. Industry associations are able to lead the way in promoting ethical and sustainable practices within their industries.

In terms of labor standards, associations are able to foster and boost codes of conduct that ensure fair treatment of workers throughout the supply chain. These codes are able to cover aspects for instance minimum wage, working hours, safe working conditions as well as protection against discrimination and harassment. For instance, in the textile and garment industry has faced criticism for poor labor conditions in some regions, the industry association is able to require its members to comply along with international labor standards, for instance those set by the International Labor Organization (ILO). They are able to conduct regular audits of member companies' facilities to ensure compliance together with publicly recognize together with reward companies that excel in labor practices. This not only improves the working conditions of employees as well enriches the reputation of the industry as a whole, making it more attractive to consumers who are increasingly conscious of ethical labor practices.

Regarding environmental standards, industry associations are able to encourage members to adopt sustainable production methods, reduce waste together with emissions as well as conserve natural resources. In the manufacturing industry, for instance, associations are able to boost the use of renewable energy sources in production facilities, the implementation of recycling together with waste reduction programs as well as the development of more energy efficient products. They are able to also supply resources together with support to aid companies transition to more sustainable practices, for instance offering information upon green technologies, organizing training sessions upon environmental management as well as facilitating partnerships between companies for joint sustainability initiatives. By promoting environmental sustainability, industry associations are able to aid their members reduce their environmental footprint, comply along with increasingly strict environmental regulations as well as meet the growing demand from consumers for eco-friendly products.

Furthermore, industry associations are able to play a role in promoting ethical business practices, for instance anti-corruption, transparency as well as fair competition. They are able to foster guidelines and ethical standards for their members and establish mechanisms for reporting and addressing unethical behavior. For instance, in the pharmaceutical industry, the industry association is able to require companies to disclose all financial relationships along with healthcare providers, ensuring transparency together with preventing unethical marketing practices. By promoting ethical together with sustainable practices, industry associations are able to enrich the long-term viability together with reputation of their industries, contributing to a more sustainable together with responsible business ecosystem [55].

In conclusion, industry associations have a multitude of functions that are essential for improving the economic security of enterprises. by developing industry wide standards, facilitating information sharing, providing training and education, advocating for supportive policies as well as promoting ethical and sustainable practices, they are able to aid industries become more resilient, competitive as well as sustainable in the face of various challenges.

We could see the multi-level suggestions for improving Chinese enterprises' economic security (based on supply chain security) summarized on table 3.1.

Table 3.1 - Multi-level suggestions for improving Chinese enterprises' economic security (based on supply chain security)

Key Strategies	Examples/Actions	
Government	1. Establish national risk warning system	Integrate data sources, use AI for early warnings, analyze disruptions, industry-specific alerts
	2. Support strategic	Incentives for overseas expansion, diplomatic

	diversification	support, risk insurance, identify strategic regions
	3. Foster technological self-sufficiency	Invest in R&D for critical tech (e.g., semiconductors), support domestic industry, international cooperation
	4. Strengthen domestic resilience	Upgrade infrastructure, support intelligent logistics, promote domestic tech for supply chains
	5. Enrich cybersecurity frameworks	Set/implement standards, support training and investment, establish response centers
Enterprise	1. Embrace "China + N" strategies	Diversify manufacturing/sourcing outside China, leverage strengths of multiple regions
	2. Invest in supply chain visibility	Use predictive analytics, real-time tracking, integrate digital tools
	3. Build strategic inventory buffers	Identify critical components, maintain buffer stocks, optimize inventory management
	4. Foster collaborative supplier relationships	Open communication, transparency, joint problem-solving, supplier support
	5. Conduct regular stress tests	Simulate disruptions, update contingency plans, strengthen resilience
Industry Association	1. Foster industry-wide standards	Set standards for supplier qualification, risk management, inventory buffers
	2. Facilitate information sharing	Online platforms, conferences, share lessons and data
	3. Supply training and education	Training for SMEs, workshops on digitalization, e-learning platforms
	4. Advocate for supportive policies	Lobby for infrastructure investment, regulatory simplification, favorable trade policies
	5. Boost ethical and sustainable practices	Promote labor/environmental standards, green production, ethical guidelines

Source: authors' development based on [44; 47; 50; 55]

The table concisely summarizes key strategies for enhancing Chinese enterprises' economic security through supply chain security at three levels, government, enterprise, and industry association. At the government level, it highlights systemic approaches such as risk warning systems, diversification, technology investment, infrastructure, together with cybersecurity. The enterprise level focuses on practical, operational measures like international diversification, digital visibility, inventory buffers, supplier collaboration, together with stress testing. Industry associations contribute by setting standards, sharing information, offering training, policy advocacy, and promoting ethical practices. Together, these

coordinated actions address vulnerabilities, improve resilience, and ensure stable, sustainable economic growth for Chinese businesses.

The conclusion of chapter 3

This chapter has supplied comprehensive suggestions for improving the economic security policies of Chinese enterprises, focusing upon supply chain security from three distinct levels, government, enterprise as well as industry association. Each level plays a crucial role in enhancing resilience together with mitigating risks in the face of an increasingly complex together with volatile global business environment.

The Chinese government's role in bolstering enterprise economic security by supply chain diversification together with risk management is pivotal. By establishing a national risk-warning system, the government is able to proactively identify and preempt potential disruptions, leveraging advanced data analytics and AI to process vast amounts of domestic and international data. This system not only supplies early warnings as well facilitates post-disruption appraisal to refine risk management strategies over time.

Supporting strategic diversification by incentives, diplomatic efforts as well as risk insurance encourages Chinese enterprises to expand operations in key regions abroad, reducing over-reliance upon domestic or a few major markets. This approach is particularly relevant in the context of geopolitical tensions and trade disputes. Additionally, fostering technological self-sufficiency in critical areas for instance semiconductors by increased R&D investment together with policy support helps mitigate the risk of technological "stuck points" together with enriches long-term economic security.

Strengthening domestic resilience by investment in infrastructure, logistics as well as technology further secures internal supply chains. Upgrading transportation networks, promoting intelligent logistics systems as well as developing domestic software together with hardware technologies are essential steps in this direction. Enhancing cybersecurity frameworks by comprehensive regulations together with support for enterprises is also crucial, given the increasing digitalization of supply chains together with the growing threat of cyberattacks.

At the enterprise level, adopting proactive strategies is essential for navigating supply chain disruptions. The "China + N" strategy allows enterprises to leverage China's manufacturing strengths while creating redundancy by operations in other regions. This approach, combined along with strategic sourcing and investment in supply chain visibility by digital tools like predictive analytics and real-time tracking, enriches resilience and enables faster, more informed decision-making.

Building strategic inventory buffers for critical components ensures continuity during crises, while fostering collaborative supplier relationships by transparent communication, joint problem-solving as well as capacity-building support strengthens mutual resilience. Regular stress tests to evaluate supply chain vulnerabilities against potential disruptive scenarios aid enterprises identify weaknesses together with refine their response together with recovery capabilities. These measures collectively enrich an enterprise's ability to withstand disruptions and maintain stable operations.

Industry associations serve as critical intermediaries between the government and enterprises, playing a multifaceted role in enhancing supply chain resilience. By developing industry-wide standards for supply chain management together with risk mitigation, associations create a level playing field together with ensure that all members are equipped to handle disruptions effectively. Promoting these standards by awareness campaigns, training sessions as well as certification programs encourages widespread adoption.

Facilitating information sharing by online platforms, meetings as well as conferences enables members to learn from each other's experiences and access the latest data upon market trends, emerging risks as well as best practices. Providing targeted training together with education programs, especially for SMEs, helps build internal capabilities in supply chain management and risk mitigation. Advocating for supportive policies along with the government, for instance infrastructure investment and regulatory simplification, creates a more favorable environment for industry growth and resilience.

Promoting ethical and sustainable practices throughout the supply chain enriches the industry's long-term viability and reputation. By encouraging compliance along with labor and environmental standards and fostering transparency and fair competition, industry associations contribute to a more responsible together with resilient business ecosystem.

In conclusion, the suggestions outlined in this chapter supply a holistic framework for enhancing the economic security of Chinese enterprises by supply chain security. The coordinated efforts of the government, enterprises as well as industry associations are essential in building a resilient and adaptable supply chain ecosystem. By implementing these strategies, Chinese enterprises are able to better navigate the uncertainties of the global business environment, ensuring their long-term stability and prosperity.

CONCLUSION

1. The research has demonstrated a significant positive correlation between supply chain diversification levels and economic security indicators among Chinese enterprises. by quantitative appraisal using financial data, regression analysis as well as structural equation modeling, it was found that enterprises along with higher levels of supply chain diversification exhibit greater resilience to external shocks. For instance, during the COVID-19 pandemic, companies along with diversified supply chains were better able to maintain production and meet customer demand despite disruptions in certain regions. This resilience translated into more stable revenue streams and reduced financial losses compared to those along with less diversified supply chains.

Moreover, the study revealed that diversification strategies for instance multi-sourcing and multi-shoring contributed to enriched operational continuity. Companies that sourced components from multiple suppliers together with had manufacturing facilities in different geographic locations were less vulnerable to localized disruptions, for instance natural disasters or geopolitical conflicts. This finding aligns along with the theoretical framework discussed in Chapter 1 emphasizes the importance of redundancy and flexibility in supply chains for mitigating risks and ensuring economic security.

2. The research identified several moderating factors that influence the relationship between supply chain diversification and economic security. Industry-specific differences play a crucial role in determining the effectiveness of diversification strategies. For instance, in the electronics industry, where supply chains are highly complex together with reliant upon specialized components, multi-sourcing was found to be particularly effective in reducing the risk of production halts due to supplier-specific issues. In contrast, in the automotive industry, multi-shoring strategies were more impactful, as they allowed companies to mitigate risks associated along with regional trade policies together with labor disputes.

Firm characteristics, for instance size, financial resources as well as technological capabilities, also emerged as significant moderators. Larger firms along with more substantial financial resources were better positioned to implement together with benefit from diversification strategies. These companies could afford to invest in multiple manufacturing facilities together with establish relationships along with a broader range of suppliers. Additionally, firms along with advanced technological capabilities were more adept at managing diversified supply chains, leveraging digital tools for real-time monitoring and coordination. This highlights the importance of both industry context and firm-specific attributes in shaping the impact of supply chain diversification upon economic security.

3. The study fostered frameworks to aid Chinese enterprises balance supply chain diversification along with cost efficiency. While diversification offers significant benefits in terms of risk mitigation and resilience, it also introduces additional costs and complexity. The research proposed a "China Plus N" strategy combines the advantages of China's well-developed manufacturing ecosystem along with the benefits of redundancy by operations in other regions. This approach allows enterprises to maintain cost efficiency in core manufacturing activities while reducing over-reliance upon a single location.

Furthermore, the study emphasized the importance of strategic inventory management as a means to balance diversification together with cost efficiency. By identifying critical components together with maintaining strategic inventory buffers, enterprises are able to ensure continuity during disruptions without incurring excessive costs. The research also highlighted the role of collaborative supplier relationships in achieving this balance. By working closely along with suppliers to share information, jointly solve problems as well as invest in capacity-building, enterprises are able to enrich supply chain resilience while maintaining cost efficiency.

In summary, the research concludes that supply chain diversification is a critical strategy for enhancing the economic security of Chinese enterprises. Higher levels of diversification correlate along with refined resilience to external shocks, operational continuity as well as financial stability. However, the effectiveness of diversification strategies is influenced by industry-specific characteristics and firm attributes. Larger firms along with advanced technological capabilities and substantial financial resources are better positioned to benefit from diversification.

LIST OF LITERATURE SOURCES USED

1. Vlasov, M. P. Logistic Supply Chain Management and Economic Security of the Enterprise / M. P. Vlasov // International Journal of Supply Chain Management. - 2020. - Vol. 9, No. 3. - P. 516.

2. Ivanova, M., et al. Efficiency of the logistics chain as a factor of economic security of enterprises / M. Ivanova, et al. // Financial and Credit Activity: Problems of Theory and Practice. - 2021. - Vol. 2, No. 37. - P. 151-160.

3. Chemirbayeva, M., Z. Malgarayeva, and A. Azamatova. Economic strategy of diversification of enterprise activities under conditions of globalization / M. Chemirbayeva, Z. Malgarayeva, A. Azamatova // Entrepreneurship and Sustainability Issues. - 2020. - Vol. 8, No. 2. - P. 1083.

4. Kurbatska, L., L. Kvasova, and D. Lozovyi. Implementation of the diversification strategy for the formation of the adaptability of the enterprise / L. Kurbatska, L. Kvasova, D. Lozovyi // Green, Blue and Digital Economy Journal. - 2024. - Vol. 5, No. 3. - P. 14-20.

5. Zevenko, D., V. Shyshkin, and O. Onyshchenko. Possibilities of using diversification strategy in trade enterprise operations in modern conditions / D. Zevenko, V. Shyshkin, O. Onyshchenko // Management and Entrepreneurship: Trends of Development. - 2024. - Vol. 3, No. 29. - P. 64-71.

6. Leung, G. C. K., et al. Securitization of energy supply chains in China / G. C. K. Leung, et al. // Applied Energy. - 2014. - Vol. 123. - P. 316-326.

7. Fu, Y., and J. Zhu. Big production enterprise supply chain endogenous risk management based on blockchain / Y. Fu, J. Zhu // IEEE Access. - 2019. - Vol. 7. - P. 15310-15319.

8. Hlushenkova, A., et al. Management of Strategies for Shaping the Innovative and Investment Potential of Enterprises as a Factor Ensuring Their Economic Security / A. Hlushenkova, et al. //. - 2024.

9. Vasylchak, S., L. Pronko, and M. Vykliuk. Synergetic effects of enterprise potential management system in the knowledge economy, taking into account globalization challenges and financial security / S. Vasylchak, L. Pronko, M. Vykliuk // Monograph. - Nemoros sro Prague, 2022. - P. 118-223.

10. Sun, Y., et al. Uncovering the Interactions Between the Enterprise AI Transformation, Supply Chain Concentration, and Corporate Risk-Taking Capacity / Y. Sun, et al. // IEEE Transactions on Engineering Management. - 2024.

11. LiWe, J., and L. Fuxing. Dynamic alliance research of supply chain node enterprise based on E-Business / J. LiWe, L. Fuxing // 2009 Second International Conference on Intelligent Computation Technology and Automation. - Vol. 3. - IEEE, 2009.

12. Yan, D., and J. Song. Innovation of Enterprise Financing Mode Based on Supply Chain Finance / D. Yan, J. Song // The Frontiers of Society, Science and Technology. - 2020. - Vol. 2, No. 18.

13. Kuzmenko, O., et al. Substantiation of the Choice Diversification Strategy for Ensuring the Safety of the Enterprise Activity / O. Kuzmenko, et al. //. - 2019.

14. Ukolov, V. F., and V. Y. Afanasyev. Supply chain management for digital enterprise, psychological aspect of adaptation / V. F. Ukolov, V. Y. Afanasyev // International Journal of Supply Chain Management. - 2020. - Vol. 9, No. 1. - P. 670-675.

15. Xie, X., et al. Enterprise credit risk portrait and evaluation from the perspective of the supply chain / X. Xie, et al. // International Transactions in Operational Research. - 2024. - Vol. 31, No. 4. - P. 2765-2795.

16. Khrapkina, V., V. Kobets, and V. Stratonov. Market Dynamics of Ensuring Financial Security and Sustainable Development of Enterprise / V. Khrapkina, V. Kobets, V. Stratonov // Studies in Microeconomics. - 2022. - Vol. 10, No. 2. - P. 225-246.

17. Cheng, P., and Y. Wang. Impact of intellectual property protection on enterprise supply chain resilience: empirical evidence from China’s intellectual property pilot and demonstration city policy / P. Cheng, Y. Wang // Humanities and Social Sciences Communications. - 2024. - Vol. 11, No. 1. - P. 1-18.

18. Alam, M. F. B., et al. Analysis of the enablers to deal with the ripple effect in food grain supply chains under disruption: implications for food security and sustainability / M. F. B. Alam, et al. // International Journal of Production Economics. - 2024. - Vol. 270. - P. 109179.

19. Chen, C.-W., et al. Green finance policy and heavy pollution enterprises: a supply-chain and signal transmission of green credit policy for the environment—Vietnam perspective / C.-W. Chen, et al. // Environment, Development and Sustainability. - 2025. - Vol. 27, No. 1. - P. 2317-2335.

20. Kaulwar, P. K., et al. Harnessing Intelligent Systems and Secure Digital Infrastructure for Optimizing Housing Finance, Risk Mitigation, and Enterprise Supply Networks / P. K. Kaulwar, et al. // International Journal of Finance (IJFIN)-ABDC Journal Quality List. - 2023. - Vol. 36, No. 6. - P. 372-402.

21. Olson, D. L., and D. D. Wu. A review of enterprise risk management in supply chain / D. L. Olson, D. D. Wu // Kybernetes. - 2010. - Vol. 39, No. 5. - P. 694-706.

22. Olson, D. L., D. D. Wu, D. L. Olson, and D. D. Wu. Enterprise risk management in supply chains / D. L. Olson, et al. // Springer Berlin Heidelberg. - 2017. - P. 1-15.

23. Closs, D. J., C. Speier, and N. Meacham. Sustainability to support end-to-end value chains: the role of supply chain management / D. J. Closs, C. Speier, N.

Meacham // Journal of the Academy of Marketing Science. - 2011. - Vol. 39. - P. 101-116.

24. Sodhi, M. S., B.-G. Son, and C. S. Tang. Researchers' perspectives on supply chain risk management / M. S. Sodhi, B.-G. Son, C. S. Tang // Production and Operations Management. - 2012. - Vol. 21, No. 1. - P. 1-13.

25. Li, N., et al. Is digitalization necessary? Configuration of supply chain capabilities for improving enterprise competitive performance / N. Li, et al. // Journal of Business Research. - 2025. - Vol. 186. - P. 114972.

26. Xiaotao, Z. Research on Value Rebuilding of Chain Retail Enterprise Supply Chain Based on QFD / Z. Xiaotao //. - 2019.

27. Xie, P., et al. Research on financial platform of railway freight supply chain based on blockchain / P. Xie, et al. // Smart and Resilient Transportation. - 2020. - Vol. 2, No. 2. - P. 69-84.

28. Kalashnikova, E. B., T. E. Tatarovskaya, and G. F. Tselniker. Risk-oriented approach in the system of enterprise economic security / E. B. Kalashnikova, T. E. Tatarovskaya, G. F. Tselniker // European Proceedings of Social and Behavioural Sciences. - 2019.

29. Sha, H. Analysis of the Influence of Enterprise Diversification Strategy on Enterprise Value / H. Sha // Temple University, 2024.

30. Lavastre, O., A. Gunasekaran, and A. Spalanzani. Supply chain risk management in French companies / O. Lavastre, A. Gunasekaran, A. Spalanzani // Decision Support Systems. - 2012. - Vol. 52, No. 4. - P. 828-838.

31. Kuzubov, A. A., et al. Developing a supply chain subsystem to manage the process of obstacle elimination for the innovative development of business entities / A. A. Kuzubov, et al. // International Journal of Supply Chain Management. - 2018. - Vol. 7, No. 5. - P. 621-631.

32. Obrenovic, B., et al. Sustaining enterprise operations and productivity during the COVID-19 pandemic: “Enterprise Effectiveness and Sustainability Model” / B. Obrenovic, et al. // Sustainability. - 2020. - Vol. 12, No. 15. - P. 5981.

33. Le, T. T. How do food supply chain performance measures contribute to sustainable corporate performance during disruptions from the COVID-19 pandemic emergency? / T. T. Le // International Journal of Quality & Reliability Management. - 2023. - Vol. 40, No. 5. - P. 1233-1258.

34. Mancheri, N. A., et al. Effect of Chinese policies on rare earth supply chain resilience / N. A. Mancheri, et al. // Resources, Conservation and Recycling. - 2019. - Vol. 142. - P. 101-112.

35. Li, B., et al. Digital transformation, supply chain collaboration, and enterprise growth: theoretical logic and Chinese practice / B. Li, et al. // European Research on Management and Business Economics. - 2024. - Vol. 30, No. 2. - P. 100249.

36. Vivoda, V., and R. Matthews. “Friend-shoring” as a panacea to Western critical mineral supply chain vulnerabilities / V. Vivoda, R. Matthews // Mineral Economics. - 2024. - Vol. 37, No. 3. - P. 463-476.

37. Maharjan, R., and H. Kato. Logistics and supply chain resilience of Japanese companies: Perspectives from impacts of the COVID-19 pandemic / R. Maharjan, H. Kato // Logistics. - 2023. - Vol. 7, No. 2. - P. 27.

38. Pal, R., and N. Altay. Identifying key success factors for social enterprises serving base‐of‐pyramid markets through analysis of value chain complexities / R. Pal, N. Altay // Journal of Business Logistics. - 2019. - Vol. 40, No. 2. - P. 161-179.

39. Jaffee, S., P. Siegel, and C. Andrews. Rapid agricultural supply chain risk assessment: A conceptual framework / S. Jaffee, P. Siegel, C. Andrews // Agriculture and Rural Development Discussion Paper. - 2010. - Vol. 47, No. 1. - P. 1-64.

40. Elvira, N., et al. Integrated approach to risk analysis in financial statements to ensure economic security of the enterprise / N. Elvira, et al. //. - 2024.

41. Wu, Y., and R. Wang. Sustainability-based enterprise supply chain optimization and response under circular economy approach: agile, adaptive and coordinated / Y. Wu, R. Wang // Management Decision. - 2024. - Vol. 62, No. 9. - P. 2737-2762.

42. Bo, Y., and M. Junqing. Research on the construction of knowledge service model of port supply chain enterprise in big data environment / Y. Bo, M. Junqing // Journal of Physics: Conference Series. - 2020. - Vol. 1550, No. 3.

43. Liu, H., et al. The role of business environment and digital government in mitigating supply chain vulnerability—Evidence from the covid-19 shock / H. Liu, et al. // Sustainability. - 2023. - Vol. 15, No. 3. - P. 2323.

44. Trappey, A. J. C., et al. A one-stop logistic services framework supporting global supply chain collaboration / A. J. C. Trappey, et al. // Journal of Systems Science and Systems Engineering. - 2016. - Vol. 25. - P. 229-253.

45. Tarasova, T. M. Protection of Trade Secrets to Ensure the Economic Security of the Enterprise / T. M. Tarasova // International Scientific Conference “Digital Transformation of the Economy: Challenges, Trends, New Opportunities”. - Cham: Springer Nature Switzerland, 2024.

46. Dong, X. Financial Management of Supply Chain Based on Strategy Management / X. Dong // 2022 2nd International Conference on Enterprise Management and Economic Development (ICEMED 2022). - Atlantis Press, 2022.

47. Brych, V., et al. Factor modeling of the interaction of agricultural enterprises and enterprises producing green energy to optimize the biomass supply chain / V. Brych, et al. // 2021 11th International Conference on Advanced Computer Information Technologies (ACIT). - IEEE, 2021.

48. Aref'eva, O. V., I. M. Myagkikh, and M. S. Shkoda. Diagnostics of external environment effects upon enterprise competitive positions in the context of its economic security / O. V. Aref'eva, I. M. Myagkikh, M. S. Shkoda //. - 2019.

49. Strange, R. The 2020 Covid-19 pandemic and global value chains / R. Strange // Journal of Industrial and Business Economics. - 2020. - Vol. 47, No. 3. - P. 455-465.

50. Fan, P., Y. Wang, and Y. Dong. Competitive analysis of operation mode of enterprise value chain under the background of green economy / P. Fan, Y. Wang, Y. Dong // Mathematical Problems in Engineering. - 2021. - Vol. 2021, No. 1. - P. 6681545.

51. Jaboob, A. S., et al. Introduction to Operation and Supply Chain Management for Entrepreneurship / A. S. Jaboob, et al. // Applying Business Intelligence and Innovation to Entrepreneurship. - IGI Global Scientific Publishing, 2024. - P. 52-80.

52. Sadeghi R, K., D. Ojha, and A. Azadegan. Data systems in supply chain resilience: moderated moderating effects of enterprise resource planning / K. Sadeghi R, D. Ojha, A. Azadegan // Industrial Management & Data Systems. - 2025.

53. Patel, K. R. Enhancing global supply chain resilience: Effective strategies for mitigating disruptions in an interconnected world / K. R. Patel // BULLET: Jurnal Multidisiplin Ilmu. - 2023. - Vol. 2, No. 1. - P. 257-264.

54. Shambulingappa, H. S., and T. V. Rashmi. Impact of IoT and Cloud Computing on Enterprise Supply Chain Security Management / H. S. Shambulingappa, T. V. Rashmi // International Journal of Advanced Scientific Innovation. - 2023. - Vol. 5, No. 8.

55. Danso-Abbeam, G., et al. Exploring the linkages between on-farm enterprise diversification and food security in Northern Ghana / G. Danso-Abbeam, et al. // Discover Food. - 2025. - Vol. 5, No. 1. - P. 73.