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Research on the Path of Supply Chain Resilience Improvement under the Background of Anti-Globalization

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Abstract: Against the backdrop of deglobalization, multiple risks such as geopolitical conflicts and public health emergencies have compounded, exposing global supply chains to unprecedented vulnerabilities. This paper focuses on the driving logic and implementation path of supply chain resilience enhancement, with the background of supply chain restructuring caused by deglobalization. Through literature review and logical deduction, the paper systematically analyzes the internal mechanism of four core drivers: risk-driven, strategy-driven, technology-driven and market-driven. This study constructs an integrated resilience enhancement framework encompassing four pillars: layout optimization, operational reinforcement, technological empowerment, and ecosystem co-construction. It delineates the implementation dimensions and core values of each pillar, while revealing the supply chain's transition from efficiency-centric to security-efficiency equilibrium under anti-globalization trends. This framework provides theoretical underpinnings and practical references for enterprises to mitigate uncertainties and establish sustainable resilient supply chain systems.

Keywords: Anti-globalization; Supply chain resilience; Industrial chain security

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1. Introduction

Globalization once promoted the efficient allocation of global resources with trade liberalization and deepening of production division as its core, but in recent years, the anti-globalization trend has been fermenting, showing the characteristics of "protectionism escalation, regional barriers strengthening and supply chain localization". Since 2020, economies, including the United States have repeatedly imposed tariffs and established export control measures on technology. According to WTO data, global trade remedy cases surged to 312 in 2023, reflecting the escalating scale of trade disputes. Meanwhile, geopolitical conflicts have exacerbated supply chain fragmentation. Events like the Russia-Ukraine war and Sino-US tech rivalry have prompted multiple nations to adopt risk-averse supply chain strategies. For instance, the EU has launched its 'Strategic Autonomy' initiative, driving the regional

consolidation of critical industrial supply chains.

Domestically and internationally, the current trend of anti-globalization has expanded from policy to industry, impacting industrial supply chains through three pathways: risk transmission, structural fragmentation, and cost escalation. To more effectively resist the impact of external risks, a strong and resilient supply chain has become the basis of global competition. In July 2024, China released the "Decision of the CPC Central Committee on Further Comprehensively Deepening Reform and Advancing Chinese-Style Modernization." The document outlines measures to strengthen institutional frameworks for enhancing the resilience and security of industrial and supply chains, accelerate the development of self-reliant and controllable supply chains, advance technological breakthroughs and application of research outcomes across the entire supply chain, and establish a risk assessment and response mechanism for industrial and supply chain security [1].

It is evident that China has initiated strategic planning for its industrial and supply chains, with continuous enhancement of supply chain resilience becoming an emerging trend. The driving forces behind this development, as well as the specific measures China will implement to strengthen supply chain resilience, warrant more detailed research and analysis.

2. Review and comment on the research

2.1. Definition of supply chain resilience

The concept of resilience originated from Holling's 1973 proposal of "ecological resilience", which emphasizes a system's ability to maintain or transition to a stable state after disturbance. Later, it was extended to engineering, focusing on the speed and efficiency of restoring the initial state [2]. Based on the universal concept of resilience, supply chain resilience can be defined as the dynamic capability of a supply chain system to maintain core operational functions, respond swiftly, and efficiently restore normal operations, even optimize and achieve better performance, through a series of conscious, forward-looking strategic designs and reactive emergency measures when encountering internal or external disruptions. This dynamic capability ensures the continuous flow of products and services while achieving long-term competitive advantages.

2.2. Review of the research

Since the 1990s, the concept of resilience was introduced into supply chain management, initially focusing on risk resistance and recovery capabilities. In the 21st century, with the deepening of globalization and the increasing complexity of risks, research has incorporated adaptability and innovation capabilities, shifting from "passive response" to "active adaptation." As research progresses, its connotations continue to expand. The current strategies to improve the resilience of supply chain mainly focus on two aspects as follows: one is the ability of preparation, which is to identify and prevent potential risks; the other is the ability of recovery, which is to rebuild the function of supply chain and restore the stable operation after the interruption event.

In existing research, proactive risk management strategies have garnered significant attention. Scholars widely emphasize enhancing systemic risk prevention capabilities through rigorous supplier screening, maintaining supplier diversity, and improving supply chain flexibility [3]. Studies cover aspects such as suppliers' inherent risk resilience, the structural resilience of supply chain networks, and dynamic adjustment capabilities during operations. Particular focus is placed on analyzing factors influencing supply chain resilience in key industries to explore their capacity for stable supply. Another group of scholars conducts empirical analyses targeting specific

risk scenarios in key industries, such as supply chain disruptions and policy adjustments, verifying the positive impacts of redundant resources, information sharing, and supplier collaboration on resilience [4].

However, existing research on supply chain resilience enhancement approaches remains fragmented, with most studies focusing on localized explorations in specific domains rather than systematic analysis of the driving mechanisms behind supply chain resilience optimization. This paper systematically addresses several fundamental issues in supply chain resilience enhancement pathways, adopting a logical framework that integrates cause analysis and optimization path research.

3. Analysis of the motivation of supply chain resilience enhancement under the background of anti-globalization

3.1. Risk driven

In the current era of anti-globalization reshaping the global supply chain landscape, "risk-driven" has become the most direct and urgent motivation for enterprises to strengthen supply chain resilience. The escalation of geopolitical conflicts and trade frictions serves as the core external driving force that compels the enhancement of supply chain resilience. In the wave of deglobalization, unilateralism and protectionism have turned supply chains into tools of geopolitical games: during the Sino-US trade war, the US imposed tariffs on China and implemented chip technology restrictions, leading to the supply cutoff of core components for companies like Huawei; the energy and food trade barriers triggered by the Russia-Ukraine conflict [5]. These cases have made companies realize that over-reliance on politically unstable regions as a single supply source or market essentially ties operational security to the uncertainties of geopolitical competition. In this context, strengthening supply chain resilience has become an inevitable choice for enterprises to reduce dependence on specific geopolitical regions and avoid becoming political game pieces. The core strategy is to weaken the ripple effects of geopolitical conflicts across the entire supply chain by "diversifying risk exposure points".

3.2. Strategic drive

In the context of anti-globalization reshaping the global industrial division of labor, "strategic drive" constitutes a forward-looking driving force for enhancing supply chain resilience [6].The strategic demands of national economic security and industrial autonomy have always been the top driving force for enhancing supply chain resilience. In the context of anti-globalization, the control of supply chains in key strategic industries has become a core arena of inter-state competition. The autonomy and controllability in sectors such as semiconductors, pharmaceuticals, rare earths, and new energy are directly linked to the fundamental logic of economic security. For instance, the U.S. CHIPS and Science Act incentivizes domestic chip manufacturers to expand production through subsidies and tax breaks, while the EU's Critical Materials Act strengthens supply chain control over resources like rare earths and lithium via regional coordination mechanisms.

This policy framework essentially establishes institutional constraints on industrial layout [7]. To align with policy directives, secure government resource support, and maintain market access qualifications, enterprises must proactively adjust their supply chain strategies. The core logic lies in enhancing localized control capabilities at critical stages to mitigate the impact of external supply chain disruptions on industrial security. Fundamentally, this approach embeds supply chain resilience development into the strategic framework of national economic security. The transformation from "efficiency first" to "balance of safety and efficiency" is the micro behavior driving force of supply chain resilience.

3.3. Technology-driven

In the process of supply chain restructuring caused by anti-globalization, technology-driven is the core driving force for enhancing supply chain resilience. The deep application of digitalization and visualization technologies is the key foundation for transforming supply chain resilience from 'empirical judgment' to 'precision control'. The complexity and transmissibility of supply chain risks under deglobalization require enterprises to possess end-to-end risk awareness capabilities, while the integrated application of technologies such as IoT, big data, blockchain, and AI provides the necessary infrastructure to realize this capability. For instance, the immutable nature of blockchain technology ensures the authenticity of supply chain data, while the integration of big data and AI enables the modeling and analysis of historical and real-time data to simulate the effectiveness of response strategies under various risk scenarios.

The value of this technology-driven approach lies in transforming the 'blind trial-and-error' in traditional supply chain resilience into 'precision-driven decision-making'. The advancement of automation and flexible manufacturing technologies has significantly enhanced the responsiveness and adaptability of supply chain resilience. This technology-driven flexibility enables enterprises to maintain supply stability through rapid adjustments at the production end when facing supply chain disruption risks. Essentially, it transforms the rigid constraints of the supply chain into elastic adaptation, thereby enhancing the system's adaptability in a deglobalized and volatile environment.

3.4. Market-driven

In the context of anti-globalization reshaping market cooperation rules, "market-driven" constitutes the terminal traction factor for enhancing supply chain resilience. The structural transformation in customer expectations has become a direct market driver for supply chain resilience [8]. Amid anti-globalization, repeated supply chain disruptions have prompted downstream clients to shift their supplier evaluation criteria from traditional cost and efficiency-focused approaches to incorporate "supply chain robustness" and "business continuity planning" into their assessments. For large manufacturing clients, supplier supply chain vulnerabilities are now recognized as potential business risks. In this context, enterprises 'efforts to enhance supply chain resilience essentially represent proactive responses to customer demands. By implementing resilience strategies such as establishing multi-source supplier networks and developing emergency delivery plans, the pressure from demand-side requirements transforms supply chain resilience from an 'internal management option' into a 'market entry barrier', establishing it as an irreplaceable core competitive advantage in business collaborations.

4. Path analysis of supply chain resilience enhancement under the background of anti-globalization

4.1. Layout optimization-from "lean globalization" to "resilient regionalization"

The core logic of layout optimization is to mitigate geopolitical risks and the vulnerability of over-reliance through adjustments in geographical distribution and network architecture, thereby addressing both risk-driven and strategy-driven objectives. Specifically, the railway bureau implements this through two key approaches as outlined.

(1) Establishing diversified supply sources: Enterprises implement supplier diversification strategies by building multi-regional supplier networks for critical materials, avoiding concentration of supply nodes in high-risk geopolitical areas, and expanding equipment procurement options beyond core supply bases.

Meanwhile, through nearshore/friendshore outsourcing strategies, they relocate production or procurement processes to geographically adjacent regions with stable political relations;

(2) Regional restructuring of supply chain networks: By centering on key consumer markets, enterprises establish regional supply chain ecosystems that enable closed-loop operations across design, production, and sales within the region, creating localized supply systems. Meanwhile, they replace traditional centralized "super factories" with distributed manufacturing, reducing physical supply chain distances and enhancing regional market responsiveness. This approach aligns with national strategies for industrial autonomy, achieving a balanced regional equilibrium between supply chain efficiency and security.

4.2. Operation reinforcement-from "zero inventory" to "strategic redundancy and agility"

Operational reinforcement is the core implementation path to enhance supply chain resilience. It is risk-driven and technology-supported, embedding buffer mechanisms and flexible capabilities in operational processes to mitigate the impact of sudden disruptions. Specifically, the railway bureau focuses on the following two aspects:

(1) The systematic implementation of strategic redundancy: Enterprises transcend the efficiency-first approach of "zero inventory" by establishing safety stock with risk-adjusted levels for strategic materials like chips and critical APIs, replacing extreme cost-cutting with inventory buffers. Simultaneously, through collaborative buffer capacity planning with suppliers or independent deployment of backup production units, they build a supply chain redundancy framework;

(2) Multidimensional enhancement of process agility: By leveraging modular and standardized flexible manufacturing technologies, enterprises enable rapid production line switching across product models, reducing both time and cost expenditures for production adjustments. Simultaneously, they strengthen collaborative planning mechanisms with upstream and downstream partners, achieving full-chain information synchronization through real-time sharing of demand forecasts, inventory data, and production schedules.

4.3. Technology empowerment-from "black box" to "end-to-end visualization and intelligent decision-making"

Technology empowerment serves as the core enabler for enhancing supply chain resilience. It not only represents a direct implementation of technology-driven solutions but also supports strategic planning optimization and operational enhancement. The specific implementation strategy focuses on the following two aspects:

(1) Establishment of end-to-end digital visualization: By deploying digital technologies, enterprises can track the location and status of goods, materials, and assets in real time, transforming the supply chain from an opaque "black box" into a transparent "glass box." This enables rapid identification of problematic nodes when risks arise, significantly reducing response time and providing a data-driven foundation for enhancing organizational resilience;

(2) Implementation of intelligent analysis and decision-making: By leveraging AI and big data analytics, we mine massive supply chain data to provide early warnings for supplier risks, logistics delays, and demand fluctuations, shifting management focus from reactive response to proactive prevention.

4.4. Ecological co-construction-from "single fight" to "value network synergy"

The co-construction of ecological system is a synergistic path to enhance supply chain resilience. It responds to

the dual demands of strategic and market drivers. The core logic is to break through the limitations of resources and capabilities of a single enterprise by building a collaborative value network. Specifically, the railway bureau focuses on the following two aspects:

(1) Deepening of strategic partnerships: Companies are transforming their relationships with core suppliers and clients from traditional buyer-seller transactions into strategic alliances featuring joint investment, data sharing, and risk-sharing. Simultaneously, they actively engage in industry-specific supply chain collaboration platforms or industrial alliances, leveraging collective resources and information sharing to build "collective resilience";

(2) Establish an ESG-oriented supply chain ecosystem governance framework: Through responsible procurement mechanisms, companies conduct ESG audits on suppliers to ensure compliance with environmental and labor rights standards.

5. Conclusion

This study systematically clarifies the driving mechanisms and implementation pathways for enhancing supply chain resilience in the context of deglobalization. The improvement of supply chain resilience results from the synergistic effects of multiple drivers: risk exposure serves as the direct impetus, strategic planning provides overarching guidance, technological advancement establishes foundational tools, and market dynamics create terminal traction. These four elements collectively propel enterprises to transition from passive risk response to proactive resilience development. In addition, the integrated four-pillar approach of "layout optimization, operational enhancement, technological empowerment, and ecosystem co-construction" demonstrates inherent synergy. Layout optimization restructures spatial configurations, while operational enhancement streamlines execution processes.

This study combines China's context with anti-globalization characteristics to expand the analytical framework of supply chain resilience drivers, constructs a systematic and practical improvement path system, and enriches the application scenarios of dynamic capability theory and supply chain management theory in uncertain environments. However, the research still has limitations, as it has not verified the implementation effects and adaptation conditions of each path through empirical data, and has insufficient discussion on the differentiated resilience improvement strategies for enterprises in different industries and regions. Future research could further select industries such as manufacturing and logistics to conduct in-depth analysis of the interaction mechanisms between digital technology and ecological synergy; combine the dynamics of geopolitical evolution to explore dynamic adjustment and optimization strategies for supply chain resilience, providing more targeted theoretical support for the stable and sustainable development of global supply chains.

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