Research on the Educational Integration of Resilient Supply Chain Network Theory and Higher Education

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Abstract: Amid escalating global economic uncertainties, supply chain vulnerabilities have become a critical constraint on corporate sustainability. The resilient supply chain network theory emphasizes enhancing supply chain resilience through redundancy design, flexible response mechanisms, and collaborative frameworks. Meanwhile, higher education faces the pressing need to cultivate interdisciplinary and innovative talents, requiring the transformation of cutting-edge industrial theories into educational resources. This paper explores practical pathways for integrating resilient supply chain network theory with higher education. By analyzing core elements of the resilient supply chain network theory and aligning with higher education's talent development objectives, it proposes innovative strategies to incorporate resilient thinking, risk management capabilities, and collaborative concepts into curriculum systems and teaching methodologies. Practical implementation demonstrates that this integration model effectively enhances students' comprehensive competencies and professional competitiveness, providing new insights for higher education reform.

Keywords: Resilient Supply Chain Network; Higher Education; Educational Integration

1. Introduction

Amid escalating global economic uncertainties, supply chain vulnerabilities have emerged as a critical bottleneck constraining sustainable development for both enterprises and nations. The global spread of COVID-19, escalating geopolitical tensions, frequent extreme weather events, and volatile raw material prices have created a convergence of "black swan" and "gray rhino" risks. The traditional lean supply chain model, which prioritizes efficiency and cost control, has exposed unprecedented vulnerabilities under these multifaceted challenges. Businesses now face cascading effects including inventory depletion, production halts, logistics disruptions, and sudden demand shifts, leading to revenue declines, market share erosion, and even bankruptcy restructuring. More profoundly, supply chain disruptions rapidly spill over into entire industrial ecosystems, triggering job losses, eroding investment confidence, and eroding social welfare-highlighting the economy's heavy reliance on supply chain resilience. Against this backdrop, the Resilient Supply Chain Network Theory has emerged as a solution. Its core principle lies in enhancing supply chains' recovery speed, adaptability, and innovation depth through redundancy design, flexible responses, and collaborative mechanisms, thereby achieving a paradigm shift from "rigid efficiency" to "resilient value". Redundancy design emphasizes reserving buffer capacity in multi-node, multi-path, and multi-source supply layouts to trade space for time. Flexible response leverages digitalization, modularization, and dynamic contracts to achieve real-time realignment of production capacity, logistics, and demand. Collaborative mechanisms transform competitive relationships into symbiotic ones through cross-organizational, cross-regional, and cross-cultural benefit-sharing and information co-governance. Together, these three elements form the "resilience triangle," providing theoretical guidance and methodological tools for enterprises to continuously create value in VUCA (Volatility, Uncertainty, Complexity, Ambiguity) environments [1-6].

However, the advancement and implementation of resilient supply chain network theory require not only strategic transformation and technological investment at the corporate level, but also the sustained supply of high-level, interdisciplinary, and innovative talents [7-10]. As the primary arena for talent cultivation, higher education is at a critical turning point transitioning from scale expansion to quality

enhancement, from disciplinary fragmentation to interdisciplinary integration, and from knowledge transmission to capability building. Confronted with the industry's demand for composite competencies encompassing "resilient thinking + supply chain skills + digital literacy + cross-border collaboration," traditional curriculum systems centered on disciplinary logic and lecture-based teaching methods have become outdated. How to transform cutting-edge achievements in resilient supply chain network theory into teachable, learnable, and assessable educational resources, and how to embed advanced competencies such as risk awareness, situational decision-making, and collaborative innovation into professional education, have become urgent challenges for higher education to address industrial transformation and contemporary issues. In other words, the resilient supply chain network theory not only provides solutions for businesses on "how to survive," but also offers a new perspective for higher education regarding "what kind of people to cultivate, how to cultivate them, and for whom to cultivate them." On the one hand, resilient thinking emphasizes maintaining cognitive flexibility, psychological resilience, and innovative impulses in highly uncertain environments, aligning with the cultivation of critical thinking, anti-fragility, and entrepreneurial spirit in education. On the other hand, risk response capabilities require individuals to possess comprehensive qualities such as systems thinking, data-driven approaches, and rapid iteration, reflecting the teaching reform direction of universities in interdisciplinary knowledge integration, real-world problem-solving, and digital tool application. Furthermore, the concept of collaborative cooperation transcends organizational boundaries, advocating dynamic interactions and value co-creation among multiple stakeholders under shared visions, mirroring the innovative models of project-based learning, industry-academia-research integration, and internationalized education in universities. Therefore, incorporating the resilient supply chain network theory into the discourse system of higher education is not only an educational response to industrial pain points but also a contemporary reconstruction of the essence of education [11-14].

Against this backdrop, this study adopts the Elastic Supply Chain Network Theory as a starting point to explore its integration with higher education in talent cultivation practices. The research aims to provide theoretical support and practical references for nurturing new-era talents with risk resilience and innovative thinking. By applying this theory to higher education, it not only enriches the theoretical framework of talent development but also offers fresh perspectives and methodological guidance for educational reform. Moreover, it effectively enhances the quality of talent cultivation, enabling students to better adapt to the demands of future industrial development.

Theoretically, this study expands the application scope of resilient supply chain network theory, revealing its inherent logic and operational mechanisms in talent cultivation, thereby providing new perspectives and directions for related research. By establishing a theoretical framework integrating resilient supply chain network theory with higher education, it deepens our understanding of talent development patterns in higher education and drives theoretical innovation. Practically, the proposed educational approaches and strategies offer concrete operational guidelines for institutional reforms. Integrating resilient thinking, risk management capabilities, and collaborative concepts into curricula and teaching methods cultivates students' comprehensive competencies and professional competitiveness, equipping them to tackle challenges and innovate in complex environments. Furthermore, through case studies, the research validates the effectiveness and feasibility of this integration model, providing replicable experiences and frameworks for other universities to enhance overall higher education standards.

2. Core Elements and Educational Value of Elastic Supply Chain Network Theory

2.1 Core Elements of Elastic Supply Chain Network

The elastic supply chain network theory is an important theoretical framework to deal with the complex and changeable market environment and various uncertainties. It is based on three closely related and mutually supporting key dimensions, namely, redundancy design, flexible response and collaborative mechanism, which constitute the "immune system" of the

supply chain in the dynamic environment, and give the supply chain strong recovery ability and resource allocation optimization ability.

Redundancy design serves as the cornerstone of resilient supply chain networks. By deploying backup resources across all supply chain stages, it mitigates risks of supply disruptions caused by single-point failures or external contingencies. Multi-source sourcing exemplifies this approach, where enterprises establish partnerships with multiple suppliers rather than relying on a single provider. This ensures production continuity through rapid procurement from alternative sources when one supplier encounters issues. Another critical redundancy strategy is safety stock management, where companies maintain inventory reserves in warehouses to address sudden demand fluctuations or supply delays. For instance, an educational group recognized the vital role of redundancy in supply chain stability. By implementing an S2B2B platform to integrate supplier resources, they dismantled information silos in traditional supply chains, enabling efficient communication and collaboration among partners. Additionally, a multi-level inventory visualization system allows real-time monitoring of stock levels and precise tracking of inventory dynamics. Leveraging this system, the group optimized inventory strategies based on historical data and market forecasts, reducing stockout rates from 5% to 1.2%. This remarkable achievement demonstrates how redundancy design enhances supply chain stability, proving it's not merely about resource accumulation but about achieving efficient utilization through scientific management and optimization.

Flexible responsiveness is the core competency of resilient supply chain networks. In rapidly evolving market environments, consumer demands are becoming increasingly diverse, personalized, and changing at an accelerating pace. This capability requires supply chains to swiftly adjust production, logistics, and inventory management to adapt to dynamic market shifts. Modular production stands as a key implementation approach, where companies break down manufacturing processes into independent modules. By flexibly combining these components according to market needs, they can rapidly produce diversified products. The ability to switch production lines enables businesses to transition between different products or tasks swiftly, reducing preparation time and costs. For instance, electronics manufacturers adopt modular production by designing components like smartphone motherboards, screens, and cameras as standalone modules. When specific features for a particular phone model gain popularity, companies can quickly adjust module combinations and increase production of relevant components to meet market demand. This agile responsiveness allows enterprises to gain competitive advantages in fierce market competition, seize opportunities promptly, and avoid losing market share due to delayed production adjustments.

Collaborative mechanisms serve as the cornerstone of resilient supply chain networks. These networks involve multiple stakeholders including suppliers, manufacturers, distributors, and retailers. The core principle of collaborative mechanisms lies in fostering close partnerships among participants to achieve information sharing, resource integration, and risk-sharing. Information sharing forms the foundation of these mechanisms. By establishing efficient information platforms, all parties can exchange critical data such as order details, inventory levels, and production progress in real time, thereby enhancing supply chain transparency and operational efficiency. Risk-sharing encourages collective risk management through measures like signing cooperation agreements and establishing risk funds, which help distribute risks and reduce the burden on individual entities. For instance, during global public health emergencies or other sudden crises, companies within the supply chain can collaboratively adjust production plans and share logistics resources through collaborative mechanisms. This ensures timely material supply and effectively mitigates the impact of crises on the supply chain.

2.2 Theoretical Mapping of Educational Value

Higher education is responsible for cultivating high-quality talents to meet the needs of social development. The talent training goal of higher education is highly compatible with the core elements of the flexible supply chain network theory, which provides a new theoretical perspective and practical path for the education of higher education.

Redundant design in higher education aligns with students' knowledge reserves and

diversified skill sets. In today's era of knowledge explosion, singular knowledge and skills prove inadequate to address complex social challenges. Just as redundant design in supply chains provides "safety stock" to cope with uncertainties, students' extensive knowledge reserves and diverse skill combinations offer more choices and safeguards for their future career development and life. Universities should optimize curriculum design, break down disciplinary barriers, offer interdisciplinary courses, and encourage students to select courses from different fields to broaden their knowledge base. Meanwhile, strengthening practical teaching components helps cultivate students' hands-on skills and problem-solving abilities, enabling them to master professional knowledge while acquiring multiple related skills and enhancing their capacity to handle uncertainties.

Flexible responsiveness in higher education aligns with fostering students' innovative thinking and problem-solving skills. The rapidly evolving market demands talents with creative mindsets to swiftly identify opportunities and propose novel solutions. Universities should cultivate an open and supportive innovation ecosystem, encouraging students to question conventions, explore boundaries, and develop both creative awareness and practical competencies. Initiatives like entrepreneurship education and academic competitions can ignite students' passion for innovation while enhancing their hands-on skills and teamwork abilities. Equally crucial is nurturing problem-solving capabilities-guiding students through the process of analyzing challenges, formulating hypotheses, testing theories, and ultimately resolving issues. This approach equips students to adapt swiftly and devise effective strategies when confronting complex and dynamic environments.

Collaborative mechanisms in higher education cultivation correspond to students' teamwork and interdisciplinary integration capabilities. In real-world work, many projects and tasks require collaboration among professionals from diverse academic backgrounds. Universities should foster teamwork spirit and communication skills through activities like team projects and group discussions. Students should learn to leverage their strengths within teams, respect others' opinions and suggestions, and work collectively toward team goals. Moreover, with technological advancements and social progress, interdisciplinary issues are becoming increasingly prevalent, demanding students' interdisciplinary integration capabilities. Universities should strengthen interdisciplinary teaching and research, encourage participation in cross-disciplinary projects, and cultivate students' ability to analyze and solve problems from multiple disciplinary perspectives. This enhances their role positioning in complex systems, enabling better adaptation to future societal demands. For instance, Sichuan Agricultural University implements a dual-driven model of "ideological education + professional practice," integrating real-world issues like rural revitalization and grassroots governance into teaching. Students are guided to apply their knowledge, analyze problems from different disciplinary angles, propose solutions, and verify their feasibility through practice. Through this process, students not only deepen their understanding of professional knowledge but also develop teamwork spirit and interdisciplinary integration skills, forming a closed loop of "theoretical cognition-practical verification-value recognition." This vividly demonstrates the application of flexible thinking in educational cultivation.

2.3 Theoretical Mapping of Educational Value and Its Alignment with Wuhan Institute of Technology

Wuhan Institute of Technology's talent development objectives align closely with the principles of flexible supply chain networks. At the undergraduate level, the university emphasizes cultivating students' solid professional foundations and practical competencies, which resonates with the redundancy design philosophy. This approach builds a robust knowledge base and skill set for students, akin to maintaining a "safety stock" for career advancement, equipping them with multiple options to tackle challenges. For instance, students in the School of Chemical and Pharmaceutical Engineering not only master core disciplines like chemical engineering and pharmaceutical engineering but also acquire essential experimental skills and engineering practice knowledge, laying a solid foundation for future careers in these fields.

In graduate education, universities emphasize cultivating students' innovative thinking,

research capabilities, and problem-solving skills-key components aligned with the principles of flexible response and collaborative mechanisms. Flexible response requires students to swiftly adapt to emerging trends and challenges in their research fields, proposing innovative solutions. Collaborative mechanisms encourage students to engage in joint research with mentors, peers, and industry partners, pooling resources to tackle complex scientific challenges. For instance, graduate students in the School of Materials Science and Engineering must collaborate with peers from diverse disciplines to address issues like material preparation and performance optimization. They also work with enterprises to translate research findings into practical applications.

3. Integration of Business Administration Theory and Higher Education in Wuhan Institute of Technology

In today's complex and uncertain economic environment, the concept of flexible supply chain network is becoming increasingly crucial for corporate survival and development. Although Wuhan Institute of Technology has made some explorations in integrating business administration theory with higher education, there are still many negative situations that do not match the development needs of flexible supply chain networks, highlighting the urgency and necessity of integration.

3.1 The Curriculum System Lags behind the Transformation of the Elastic Supply Chain Network

Currently, the curriculum system of the Business Administration program at Wuhan Institute of Technology is updating at a sluggish pace, failing to keep pace with the rapid evolution of resilient supply chain networks. These networks emphasize redundant design, flexible responsiveness, and collaborative mechanisms, involving cutting-edge concepts such as multi-source supply, modular production, and information sharing. However, these critical knowledge points are either absent or remain at a theoretical level in the university's courses, lacking in-depth analysis and practical guidance. For instance, core issues like risk management and cost optimization in multi-source supply, as well as process reengineering in modular production, are rarely addressed in the curriculum. This results in graduates struggling to meet the practical demands of enterprises operating within resilient supply chain networks.

3.2 The Disconnect between Practical Teaching and Industry Realities is Severe

Practical training serves as the cornerstone for students to apply business management theories in real-world scenarios, yet Wuhan Institute of Technology (WIT) falls short in this regard. The institution's practical platforms, such as the Enterprise Management Simulation Lab, replicate environments that are worlds apart from actual flexible supply chain networks. These setups fail to enable students to experience complex operations like multi-level inventory visualization or rapid production mode switching. Moreover, partnerships with internship bases often remain superficial, as companies typically avoid involving students in core business processes. Consequently, students lack exposure to critical decision-making within flexible supply chain systems, resulting in ineffective development of practical skills and an inability to adapt to uncertainties.

3.3 Lack of Practical Experience in Flexible Supply Chain Network Management Among Faculty

Teachers serve as organizers and guides in educational activities, where their knowledge structure and practical experience directly impact teaching quality. Some faculty members in the Business Administration program at Wuhan Institute of Technology have long focused on theoretical research, lacking hands-on experience in enterprises related to flexible supply chain networks. This results in insufficient understanding of industry trends and cutting-edge technologies. During lectures, they often resort to textbook-based teaching, failing to integrate real-world cases and challenges from flexible supply chain networks. Consequently, classroom content becomes dry and unengaging, making it difficult for students to grasp relevant knowledge. Moreover, this approach fails to cultivate students' innovative thinking or practical problem-solving skills. Such circumstances severely hinder the effective integration of business administration theory with higher education in the context of flexible supply chain networks, highlighting the urgent need for reform.

4. Elastic Supply Chain Network Theory and the Practice Path of Integration of Higher Education in Wuhan Institute of Technology

4.1 Curriculum System Reconstruction: Embedding Flexible Thinking Modules

4.1.1 Undergraduate curriculum system

In its undergraduate curriculum, Wuhan Institute of Technology has tailored specialized modules like "Fundamentals of Supply Chain Resilience Management" and "Risk Decision Simulation" to align with each discipline's unique requirements. For engineering majors such as chemical engineering and materials science, the institution integrates supply chain resilience principles into core courses. A prime example is the "Chemical Process Simulation" course, which incorporates case studies of chemical supply chain disruptions. This approach empowers students to design resilient production processes using their knowledge, thereby enhancing the resilience of chemical supply chains. For management majors, dedicated courses systematically cover the theories, methodologies, and applications of resilient supply chain networks, cultivating students' supply chain management mindset and risk mitigation capabilities.

Taking the undergraduate curriculum of the School of Chemical Engineering and Pharmaceutical Sciences as an example, in the course "Principles of Chemical Engineering," instructors guide students to explore how redundancy design can enhance production stability by explaining fundamental principles like material balance and energy balance in chemical processes. Through real-world case studies, they analyze how chemical enterprises implement flexible response measures-such as adjusting production schedules or switching processes-to mitigate losses during emergencies like raw material shortages or equipment failures. Additionally, students participate in group discussions and project-based learning, enabling them to apply the theory of resilient supply chain networks through hands-on practice.

4.1.2 Postgraduate curriculum system

In graduate programs, the curriculum will be enhanced with advanced courses such as "Advanced Supply Chain Elasticity Optimization" and "Supply Chain Elasticity Innovation Research," which deepen the teaching of flexible supply chain network theory. These courses not only focus on theoretical knowledge but also emphasize cultivating students' research innovation capabilities and problem-solving skills in complex scenarios. For instance, the "Advanced Supply Chain Elasticity Optimization" course guides students to apply mathematical modeling and optimization algorithms for quantitative analysis and design optimization of supply chain resilience. Meanwhile, the "Supply Chain Elasticity Innovation Research" course encourages students to explore the latest trends and developments in supply chain studies, fostering innovative research initiatives.

The Graduate Program at the School of Management offers a course titled "Supply Chain Finance and Resilient Risk Management," which integrates supply chain finance with resilient supply chain network theory to explore how to enhance supply chain resilience in financial contexts. Through this course, students will not only master the fundamental theories and methodologies of supply chain finance but also develop the ability to apply resilient thinking in analyzing risk challenges within supply chain finance and propose corresponding solutions.

4.2 Innovation in Teaching Methods: Strengthening Flexible Response Training

4.2.1 Undergraduate teaching methods

By employing diverse teaching methods such as Project-Based Learning (PBL), case studies, and simulated experiments, this approach simulates real-world supply chain disruptions to train undergraduates in rapid decision-making and resource integration. For example, in chemical engineering laboratory instruction, the "Chemical Supply Chain Disruption Emergency Response Experiment" project allows students to work in groups, simulating how chemical companies handle raw material supply interruptions. Students must swiftly adjust production plans, identify alternative suppliers, and optimize logistics distribution strategies based on actual scenarios, thereby enhancing their emergency response capabilities through hands-on practice.

Meanwhile, the virtual simulation experimental teaching platform is utilized to conduct virtual simulation experiments on supply chain resilience management. Students can simulate various supply chain scenarios in a virtual environment, such as market demand

fluctuations and natural disasters. By adjusting supply chain parameters, they can observe the resilience changes of the supply chain, thereby gaining a deeper understanding of the principles and applications of resilient supply chain network theory.

4.2.2 Teaching methods for graduate students

To cultivate innovative thinking and global perspectives among graduate students, we employ pedagogical approaches including seminar-style instruction, academic lectures, and international collaborative exchanges. Regular academic symposiums are organized to facilitate knowledge sharing of research findings and methodologies, thereby enhancing scholarly interaction and cooperation. Renowned domestic and international experts are invited to deliver lectures on campus, presenting cutting-edge research advancements and frontier technologies in supply chain resilience, which significantly broadens students' academic horizons.

Furthermore, graduate students are encouraged to participate in international collaborative research projects and engage in joint research with postgraduate students from foreign universities. Through international cooperation and exchange, they can gain exposure to diverse research methodologies and academic cultures, thereby enhancing their scientific innovation capabilities and global competitiveness. For instance, postgraduate students from the School of Materials Science and Engineering collaborated with their international counterparts on a novel materials development project. During the research process, both groups jointly explored research strategies, shared experimental data, and achieved significant research outcomes through collaborative efforts.

4.3 Building Collaborative Mechanisms: Establishing an Industry-Education Integration Ecosystem

4.3.1 Undergraduate collaborative education

Wuhan Institute of Technology is establishing a collaborative education platform with enterprises in chemical engineering, materials science, and pharmaceutical industries, adopting a "shared risk and shared benefits" approach. Through initiatives like internship base development and joint training programs, undergraduates gain hands-on experience in resilient management within real corporate supply chain networks. For instance, the university has partnered with a major chemical company to set up an internship base, where students participate in production management and supply chain planning. This immersive experience allows them to understand the company's operational models and resilient management strategies, effectively bridging theoretical knowledge with practical application. Meanwhile, the institution implements an "order-based" talent development model, customizing training programs to meet corporate needs and cultivate urgently required professionals. For instance, in collaboration with a pharmaceutical company, it established a "Pharmaceutical Engineering Order Class," where the company participates in curriculum design, instructional guidance, and practical training. Graduates are directly employed by the company, achieving seamless alignment between talent cultivation and industry demands.

4.3.2 Collaborative education for graduate students

Graduate students are encouraged to participate in corporate research projects and industry-academia collaboration programs, working alongside corporate researchers. Through such partnerships, they can apply theoretical knowledge to real-world research, enhancing their problem-solving skills. Meanwhile, companies can leverage universities' research capabilities to address technical challenges in production, achieving mutual benefits. For instance, graduate students from the School of Mechanical and Electrical Engineering collaborated with a machinery manufacturing company on the "Key Technologies for Intelligent Manufacturing" project. Under the guidance of corporate researchers, they designed and developed intelligent manufacturing systems, thereby improving their research and engineering skills through hands-on project experience.

Furthermore, establishing graduate research stations and joint laboratories provides students with a robust platform for hands-on scientific practice. These collaborative facilities are jointly developed and managed by academic institutions and industry partners, with researchers from both sides jointly supervising graduate projects. This approach enables students to access cutting-edge corporate equipment and technologies, gain insights into

industry research demands and development trends, and build a solid foundation for their future career advancement.

5. Practice and Enlightenment

5.1 Quantitative Performance of Student Competency Enhancement

5.1.1 Undergraduate competency enhancement

Practical data demonstrates that the undergraduate education model at Wuhan Institute of Technology, which incorporates the theory of flexible supply chain networks, has significantly enhanced students' comprehensive competencies. In problem-solving skills, undergraduates have achieved outstanding results in various academic competitions. For instance, in the "National Undergraduate Chemical Engineering Design Competition," the university's student team applied the theory of flexible supply chain networks to design highly adaptable chemical production solutions, earning the national first prize. Regarding teamwork, participation in project-based learning and internships has greatly improved students' collaborative awareness and capabilities. In industry-academia collaboration projects, students demonstrated close teamwork to complete tasks, receiving high praise from enterprises. In terms of career competitiveness, undergraduates involved in industry-education integration programs showed significantly higher employment rates with better job quality, with many securing positions at renowned companies.

5.1.2 Postgraduate competency enhancement

Graduate students have demonstrated significant improvements in scientific innovation capabilities and problem-solving skills for complex challenges. In terms of research achievements, they have published numerous papers in top-tier academic journals both domestically and internationally, yielding a series of groundbreaking scientific accomplishments. For instance, graduate students from the School of Materials Science and Engineering have made breakthroughs in novel material development, with their research findings featured in internationally renowned academic journals. Regarding international collaboration, students have broadened their global perspectives and enhanced their communication skills through participation in international research projects and academic exchanges. Some have even secured opportunities to pursue doctoral degrees or postdoctoral research at foreign universities.

5.2 Inspiration from the Educational Reform of Wuhan Institute of Technology

5.2.1 Goal-oriented

With the cultivation of "risk-resistant innovative talents" as its core mission, the institution breaks down disciplinary barriers to establish an interdisciplinary curriculum system for undergraduate and graduate programs. The curriculum design not only emphasizes the transmission of specialized knowledge but also prioritizes the development of general education and interdisciplinary courses, fostering students' comprehensive competencies and innovative capabilities. For instance, the interdisciplinary course "Supply Chain Resilience and Innovation Management" integrates knowledge from chemical engineering, management, computer science, and other fields, cultivating students' cross-disciplinary thinking and problem-solving skills in complex scenarios.

5.2.2 Technology empowerment

By leveraging emerging technologies such as digital twins, blockchain, and big data, we establish supply chain simulation platforms and research practice platforms to achieve "virtual-real integration" in practical teaching and scientific innovation. Through virtual simulation experiments, students can simulate various supply chain scenarios in a virtual environment, conduct elastic design and optimization experiments, and enhance their practical and innovative capabilities. Meanwhile, big data technology is utilized to analyze students' learning processes and research data, providing precise guidance and support for teaching and research.

5.2.3 Ecological Co-construction

By collaborating with enterprises and communities to build an "educational community," we transform the "collaborative mechanism" in supply chain resilience into a resource-sharing mechanism. We will further strengthen partnerships with businesses, expand collaboration areas and methods, and establish closer industry-academia-research partnerships. Simultaneously, we will actively participate in community development and public welfare initiatives, converting the school's research achievements and talent advantages into concrete actions that serve society, thereby

enhancing students' sense of social responsibility and mission.

6. Conclusion

The theory of resilient supply chain networks provides a new theoretical perspective and practical framework for the reform of undergraduate and graduate education at Wuhan Institute of Technology. Through curriculum restructuring, innovative teaching methods, and collaborative mechanism development, the university can cultivate new-era talents with redundant design capabilities, flexible response awareness, and collaborative spirit. At the undergraduate level, embedding resilient thinking modules and innovative teaching methods enhance students' problem-solving skills, teamwork abilities, and professional competitiveness. At the graduate level, deepening curriculum systems, strengthening flexible response training, and building collaborative education platforms improve graduate students' research innovation capabilities and complex problem-solving skills. In the future, Wuhan Institute of Technology can further explore differentiated approaches to resilient education models across different disciplines, continuously optimize educational reform plans, and provide its unique solutions for global supply chain resilience enhancement and high-quality development of higher education.

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