

Mechanisms for the Formation of Regional Economic Resilience in the Context of Green Transformation

Jie Han, Kai Duan

School of Economics and Management, Shangluo University, Shangluo 726000, Shaanxi, China

Corresponding author: Kai Duan (e-mail: 18309143855@163.com)

ABSTRACT Against the background of green transformation, enhancing regional economic resilience has become a critical requirement for achieving sustainable development and maintaining long-term competitiveness. Taking the textile industry as a representative case, this study systematically examines the formation mechanism of regional economic resilience from the perspectives of industrial transformation, innovation capability, resource allocation, and regional collaboration. The analysis identifies major constraints, including path dependence in traditional industries, insufficient green technology innovation, inefficient resource allocation, and regional development disparities. Based on these challenges, a resilience-enhancement framework is proposed that integrates industrial structure optimization, innovation-driven development, factor resource integration, and institutional coordination. The study highlights the role of interconnected innovation networks, information-sharing mechanisms, and cross-regional collaboration in strengthening adaptive capacity and improving risk response performance during green transformation. The findings indicate that resilient regional development depends on the coordinated evolution of industrial systems, innovation ecosystems, and resource circulation mechanisms. This work provides a theoretical and engineering-oriented perspective for understanding resilience formation in complex socioeconomic systems and offers strategic guidance for sustainable regional development under long-term environmental and structural transition pressures.

INDEX TERMS regional economic resilience, green transformation, innovation networks, resource allocation

I. INTRODUCTION

THE global economy is currently undergoing a green transformation, and the goal of carbon peaking and carbon neutrality has pointed to a new direction for regional economic development. Regional economic resilience, referring to the ability of an economic system to maintain stability, recover quickly, and achieve adaptive transformation in the face of external shocks, is becoming increasingly important. Under the backdrop of green transformation, the traditional high-energy-consuming and high-emission development model is no longer sustainable. How regional economies can improve their resilience and achieve sustainable development under the pressure of transformation has become a crucial issue that urgently needs to be addressed. Traditional manufacturing industries such as textiles are pillar industries in these regions, facing both serious challenges and development opportunities during the green transformation. This paper mainly studies the formation mechanism of regional economic resilience under the background of green transformation, analyzes its theoretical significance and practical challenges, explores feasible strategic paths, and provides theoretical reference and practical guidance

for high-quality regional economic development.

II. THE THEORETICAL SIGNIFICANCE OF REGIONAL ECONOMIC RESILIENCE UNDER THE BACKGROUND OF GREEN TRANSFORMATION

A. PROMOTING HIGH-QUALITY AND SUSTAINABLE ECONOMIC DEVELOPMENT

The construction of regional economic resilience under the background of green transformation provides a fundamental guarantee for high-quality and sustainable economic development. Economic resilience enhances the endogenous driving force of regional development, relies on improving the efficiency of resource allocation and increasing total factor productivity, and promotes the transformation of economic growth mode from extensive to intensive. Under the guidance of the concept of green development, the cultivation of economic resilience has enabled regional economies to get rid of excessive dependence on resource consumption and environmental damage, and turn to relying on technological progress, management innovation and institutional optimization to achieve growth [1]. At the same time, the improvement of economic resilience can increase the ability

of regional economies to cope with market fluctuations, policy changes and technological changes, and ensure the stable operation of the economic system in the process of transformation. This resilience enables the textile sector to resist short-term market shocks while adapting to long-term structural changes through green material innovation and low-carbon manufacturing, laying a solid foundation for regional economies to maintain competitiveness and achieve structural optimization through low-carbon innovation [2].

B. ENHANCE THE REGION'S ABILITY TO RESPOND TO RISKS

Regional economic resilience enhances the comprehensive ability of the economic system to face diversified risks. During the green transformation process, regional economies will encounter multiple risks such as policy adjustment risks, market demand change risks, and technology path selection risks. Resilient economic systems rely on diversified industrial structures, flexible resource allocation mechanisms, and sound risk warning systems to disperse and resolve various risks [3]. Specifically, these systems must operate through a "dual-track" mechanism: for general market shocks, they prioritize liquidity buffers and supply chain redundancy; for green policy shifts, they employ "regulatory stress testing" to simulate the impact of carbon price fluctuations and sudden emission standard upgrades on local industrial output. When external shocks occur, regions with strong resilience can quickly activate emergency response mechanisms, mobilize various resources to compensate and adjust, and minimize the negative impact of shocks. Economic resilience is the ability of a system to learn and evolve. Regions learn from crises, change their own structure and functions to improve their ability to cope with similar risks, thereby forming a virtuous cycle of risk response mechanism [4].

C. PROMOTING COORDINATED ECONOMIC, SOCIAL, AND ECOLOGICAL DEVELOPMENT

Against the backdrop of green transformation, the creation of regional economic resilience has created favorable conditions for the coordinated development of economy, society and ecology. The improvement of economic resilience no longer only pursues the speed of economic growth, but also pays more attention to the quality of development and comprehensive benefits, and emphasizes the coordinated development of economic activities and the ecological environment. The resilient economic system relies on the development of circular economy, the promotion of clean production and the creation of green industrial chain to reduce resource consumption and pollution emissions, thereby improving the quality of regional ecological environment [5]. At the same time, the enhancement of economic resilience gives social development a solid material foundation, creates more high-quality jobs, and improves residents' income level and quality of life. Economic development promotes environmental protection and social progress, and

the inclusiveness and sustainability of regional development are constantly improved, ultimately forming a coordinated development pattern of economic prosperity, social harmony and ecological well-being [6].

III. CHALLENGES IN BUILDING REGIONAL ECONOMIC RESILIENCE

A. PRESSURES AND PATH DEPENDENCE ON THE TRANSFORMATION AND UPGRADING OF TRADITIONAL INDUSTRIES

Traditional industries face significant pressure to transform and upgrade during the green transformation process, and path dependence seriously hinders the development of regional economic resilience. Restructuring is not a one-time transition but a continuous, non-linear process of "creative destruction" and adaptation. The complexity of high-dependency regions means that as old technology is phased out, new systemic challenges emerge, requiring a permanent mechanism for structural evolution rather than a temporary fix. The production mode characterized by high energy consumption and high emissions has been deeply locked in by the technology system, equipment and facilities, and personnel skills, resulting in high transformation costs and risks. The experience, resources and capabilities accumulated by enterprises on the original development path cannot be directly transformed into advantages for green development, but instead become a burden for transformation. Local governments and enterprises generally maintain the status quo or carry out gradual improvements for short-term economic growth, but lack the motivation and determination to promote fundamental changes [7]. Traditional industries have many related enterprises, long industrial chains, and wide-ranging transformations, making coordination difficult. Some regions rely too much on traditional industries, resulting in a single industrial structure. When transformation is hindered, the entire regional economy will fall into systemic risks. Such dependence restricts the flow of resources to new green industries and reduces the ability of regional economies to adjust flexibly [8]. Pressure and Path Dependence Indicators for Transformation and Upgrading of Traditional Industries. As shown in Table 1:

TABLE 1. Pressure and Path Dependence Indicators for Transformation and Upgrading of Traditional Industries

Indicator Dimensions	Specific indicators	Highly dependent areas	Medium-dependency region	Low dependency region	Data Description
Industrial structure	The proportion of traditional high-energy-consuming industries (%)	65–75	45–55	20–30	The proportion of high energy-consuming industries in the secondary sector
	Industry Diversification Index	0.3–0.4	0.5–0.6	0.7–0.8	Calculated based on Herfindahl exponent
Transformation costs	Green transformation investment intensity (as % of regional GDP)	4.5–6.0	2.5–4.0	1.0–2.0	Ratio of green technology and equipment upgrade funding to regional GDP to ensure cross-phase comparability
	Initial Strategic Adaptation Phase (years)	8–12 (Continuous)	5–7 (Iterative)	3–5 (Ongoing)	Duration of the foundational structural shift; restructuring is recognized as a continuous, non-linear process of adaptive evolution rather than a fixed project with a terminal end date
Path locking	Proportion of employees in traditional industries (%)	55–70	35–50	15–30	The percentage of the workforce requiring skills retraining
	Fixed asset stagnation rate (%)	60–75	40–55	20–35	The proportion of fixed assets in total assets of traditional industries
Systemic risk	Number of companies related to the industrial chain	3000–5000	1500–2500	500–1000	Number of upstream and downstream supporting enterprises
	Regional economic volatility coefficient	1.8–2.5	1.2–1.7	0.6–1.1	GDP growth rate standard deviation

B. INSUFFICIENT GREEN TECHNOLOGY INNOVATION CAPACITY AND RESOURCE ALLOCATION

Weak green technology innovation capabilities and inefficient resource allocation have become major obstacles to improving the resilience of regional economies. Currently, many regions lack sufficient investment in green technology research and development, lack vitality of innovation entities, and have an unsound collaborative innovation mechanism between industry, academia, and research, resulting in key core green technologies being controlled by others. The conversion rate of technological innovation achievements is low, and technological innovation is separated from industrial development, failing to form an effective technical support system. The resource allocation structure is unreasonable, with innovation resources excessively concentrated in a few fields and enterprises, and a large number of small and medium-sized enterprises lacking necessary technical support and financial security [9]. The financial system provides little support for green industries, and there is insufficient innovation in green financial products and services, highlighting the problems of difficult and expensive financing for enterprises. There are also obvious deficiencies in the allocation of human resources, with a lack of high-level green technology talents, a talent training mechanism that cannot meet the requirements of industrial development, and poor talent mobility. In addition, information asymmetry leads to low efficiency in resource allocation, and the role of the green factor allocation market mechanism cannot be fully utilized, affecting the innovation vitality and development potential of regional economies [10]. Current Status of Green Technology Innovation Capability and Resource Allocation. As shown in Table 2:

TABLE 2. Current Status of Green Technology Innovation Capability and Resource Allocation

Evaluation Project	Evaluation indicators	Eastern region	Central region	Western region	National average
R&D investment	Green technology R&D intensity (%)	2.8–3.5	1.5–2.2	0.8–1.4	2.1
	R&D personnel percentage (%)	8.5–11.2	4.3–6.8	2.1–4.0	6.2
Innovative output	Green patent grants (per 10,000 people)	15–25	6–12	2–5	10
	Technology transfer rate (%)	35–45	20–30	10–18	28
Resource allocation	Outstanding green finance loans (in RMB 100 million)	8000–15000	3000–6000	1000–2500	5500
	SMEs receiving support (%)	25–35	15–22	8–14	20
talent reserves	Green technology talent density	45–60	20–35	8–18	32

C. REGIONAL DEVELOPMENT IMBALANCES AND POLICY COORDINATION DILEMMAS

The uneven development between regions and the lack of policy coordination have seriously constrained the overall improvement of economic resilience. There are significant differences in resource endowment, industrial base, technological level, institutional environment and other aspects among different regions. Therefore, each region has different starting points and different paths in green transformation. Developed regions have taken the lead in green transformation by relying on their strong economic strength and technological advantages, while underdeveloped regions face various difficulties such as insufficient funds, backward technology, and talent shortage, resulting in a slow transformation process. Such development differences affect coordination within the region and also affect cooperation and coordination between regions [11]. In terms of policy, most regions start from local interests when formulating green development policies, lacking a global perspective and systematic thinking. This is fundamentally driven by the inherent conflict where local governments prioritize short-term GDP growth over long-term green compliance, leading to the “GDP-First” hurdle in regional economic policy. The problem of policy fragmentation is quite serious because environmental regulations are often perceived as a cost-burden rather than a driver of resilience. There is a lack of effective policy coordination between different departments and different levels of government, and even duplicate construction is caused by policy conflicts. The cross-regional coordination mechanism is not sound, and the cross-regional flow of resources and factors is affected by institutional barriers, and industrial transfer and cooperation are subject to many constraints. Moreover, the policy implementation is not uniform and the supervision and evaluation mechanism is incomplete. Some policies are only implemented in form and cannot achieve the expected results, thereby reducing the overall effectiveness of regional economic resilience [12]. The Evaluation of Regional Development Imbalance and Policy Coordination Effects is shown in Table 3:

TABLE 3. Evaluation of Regional Development Imbalance and Policy Coordination Effects

Evaluation Project	Evaluation indicators	Eastern region	Central region	Western region	National average
R&D investment	Green technology R&D intensity (%)	2.8–3.5	1.5–2.2	0.8–1.4	2.1
	R&D personnel percentage (%)	8.5–11.2	4.3–6.8	2.1–4.0	6.2
Innovative output	Green patent grants (per 10,000 people)	15–25	6–12	2–5	10
	Technology transfer rate (%)	35–45	20–30	10–18	28
Resource allocation	Outstanding green finance loans (in RMB 100 million)	8000–15000	3000–6000	1000–2500	5500
	SMEs receiving support (%)	25–35	15–22	8–14	20
talent reserves	Green technology talent density (persons/1,000 enterprises)	45–60	20–35	8–18	32

IV. STRATEGIES FOR BUILDING REGIONAL ECONOMIC RESILIENCE UNDER THE BACKGROUND OF GREEN TRANSFORMATION

To systematically explain the formation path of regional economic resilience, this paper constructs a complete framework from challenge identification to strategy implementation and goal achievement. Figure 1 illustrates the complete process of how the three formation strategies work synergistically to jointly promote the enhancement of regional economic resilience.

A. OPTIMIZE AND UPGRADE THE INDUSTRIAL STRUCTURE. ADDRESS THE PRESSURE OF TRANSFORMATION AND PATH DEPENDENCE

The optimization and upgrading of industrial structure is the main way to solve the difficulties of transformation of traditional industries and improve the resilience of regional economy. First, we should accelerate the green transformation of traditional industries, use advanced and applicable technologies to upgrade production processes and equipment facilities in an all-round way, reduce energy consumption and pollution emission intensity, and improve the green competitiveness of industries. We should focus on promoting clean production in high energy-consuming industries, creating circular economy industrial chains, and achieving efficient use of resources and waste reduction, resource utilization, and harmless treatment. Second, we should vigorously cultivate and develop strategic emerging industries such as new energy, new materials, energy conservation and environmental protection, and form new economic growth points. We should rely on policy guidance, financial support, and factor guarantee to attract high-quality projects to settle in, accelerate industrial agglomeration, and form a green industrial cluster with competitive advantages [13]. Second, we should promote industrial integration, promote the integrated development of primary, secondary and tertiary industries, extend the industrial chain, enhance the value chain level, and improve the overall integrity of the industrial system and its ability to resist risks. Finally, we should establish a Dynamic Adjustment Mechanism for industries, moving away from the view of transformation as a project with a fixed end date. To operationalize this, regions must implement a “Real-time Industrial Health Index” that monitors resource efficiency and carbon intensity across sectors quarterly. Instead of static planning, this mechanism triggers automatic policy pivots—such as reallocating subsidies from plateauing traditional sectors to high-growth

green clusters—ensuring the industrial structure remains in a state of constant, green-oriented evolution. This approach provides solid industrial support for the resilience of the regional economy by maintaining its ability to self-regulate in the face of ongoing environmental and market shifts [14].

B. INNOVATION-DRIVEN DEVELOPMENT AND RESOURCE INTEGRATION. ENHANCING GREEN DEVELOPMENT CAPABILITIES

Strengthening innovation-driven development and improving resource allocation are important ways to enhance the region’s green development capacity and economic resilience. In terms of innovation-driven development, we should increase investment in green technology research and development to meet the benchmark R&D intensity targets (2.9–3.5%) required for successful transformation, establish a diversified investment mechanism, encourage enterprises to increase R&D investment, and guide social capital to invest in technological innovation. We should build a collaborative innovation system that integrates industry, academia, and research, support universities, research institutions, and enterprises to jointly create technology innovation platforms and laboratories. Crucially, these platforms must be designed as “Open Innovation Hubs” that allow for the cross-regional sharing of intellectual property and technical standards. This ensures that internal innovation capacity does not remain siloed but instead acts as a standardized “plug-and-play” resource for neighboring regions, facilitating the transition from internal R&D to regional synergy. We should improve the intellectual property protection system, mobilize the vitality of innovation entities, and create a favorable environment for innovation. In terms of resource integration, we should deepen Factor Market Reform to remove structural barriers to resource flow. This reform must be operationalized through the creation of a “Regional Green Factor Exchange,” a digital platform that standardizes the pricing and trading of carbon credits, green energy certificates, and eco-friendly intellectual property across administrative borders. By digitizing these factors, the region can ensure that innovation capital and high-level talent are not locked into legacy industries but are fluidly redirected toward high-efficiency green projects based on real-time market demand. Furthermore, we should develop green finance by innovating products that link loan interest rates directly to an enterprise’s carbon reduction milestones. We should strengthen the construction of talent teams, improve talent training and introduction mechanisms, and build a high-level innovative talent team. We should establish an information sharing platform to improve the transparency and efficiency of resource allocation and give full play to the decisive role of the market in resource allocation. By relying on innovation-driven development and resource allocation optimization, we can inject new vitality into the regional economy and improve the ability to cope with various risks [15].

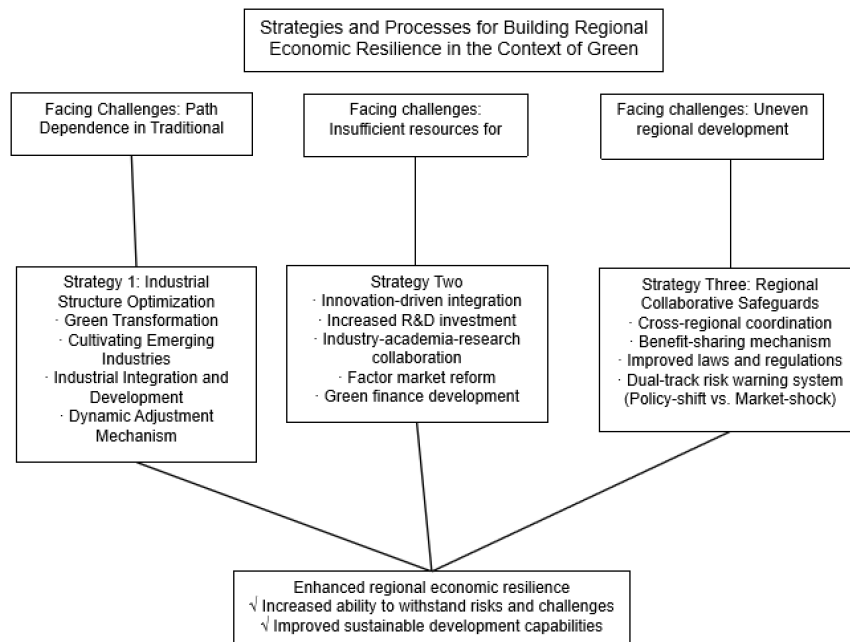


FIGURE 1. Flowchart of strategies for building regional economic resilience under the background of green transformation

C. BRIDGING INNOVATION AND COLLABORATION: THE REGIONAL FACTOR HUB

To overcome policy fragmentation, the transition from internal innovation to regional collaboration requires the establishment of “Regional Factor Hubs.” These hubs act as institutional bridges that translate local green technology breakthroughs into unified regional standards. By creating shared digital databases and mutual recognition of green patents, regions can transform isolated innovation entities into a cohesive network, ensuring that the development of one region’s green capacity directly fuels the collaborative resilience of the entire industrial cluster.

D. REGIONAL COLLABORATION AND INSTITUTIONAL SAFEGUARDS. BUILDING A RESILIENT SUPPORT SYSTEM

Establishing regional collaboration mechanisms and improving the institutional guarantee system are crucial foundations for building regional economic resilience. At the regional collaboration level, it is essential to break down administrative barriers and establish cross-regional coordination mechanisms to coordinate and promote integrated planning in areas such as industrial layout, infrastructure construction, and ecological environmental protection. A benefit-sharing and compensation mechanism should be established to promote paired assistance and industrial cooperation between developed and underdeveloped regions, fostering balanced regional development. Strengthening the sharing of innovation resources and technological exchange among regions is vital. This requires the elimination of “Digital Islands” caused by policy fragmentation through the creation of a Unified Regional Green Innovation Market. By standardizing the valuation of green technology assets across

provincial lines, internal innovation capacities are naturally incentivized to flow toward regions with higher demand, thereby turning localized R&D into a shared driver of regional economic resilience. A unified and open market system should be promoted to eliminate market segmentation, facilitate the free flow of goods and factors of production, and improve the efficiency of market resource allocation. From an institutional guarantee perspective, it is necessary to improve the legal and regulatory system for green development, strengthen institutional constraints and incentives, and provide legal guarantees for green transformation. A sound green development evaluation and assessment system should be established, specifically addressing the conflict of interest through the implementation of a “Green-Weighted Performance Appraisal”. This involves decoupling local official promotions from pure economic growth and instead incorporating high-penalty weights for environmental non-compliance and resource depletion. By incorporating green development indicators into performance evaluations, we can guide governments at all levels to establish correct performance and development perspectives that prioritize systemic resilience over nominal GDP gains. A sound supervision and accountability mechanism should be established to strengthen policy implementation supervision and ensure the effective implementation of all policies and measures. The system should differentiate between external shocks and internal policy transitions. For green policy shifts, the mechanism involves a “Policy Buffer Zone” where real-time monitoring of energy consumption intensity acts as a leading indicator, triggering early-stage fiscal subsidies or technical support before new environmental mandates fully take effect, thereby preventing a “compliance shock” to traditional sectors. A sound risk early warning and

emergency management system should be established to enhance risk identification and response capabilities. This system must include “Policy Integrity Monitoring” to detect instances where local growth targets circumvent national environmental standards. By utilizing third-party ecological audits and digital transparency platforms, the region can mitigate the risk of local protectionism and ensure that green transformation is not sacrificed for short-term economic

stability. Relying on regional collaboration and institutional innovation, a long-term mechanism supporting regional economic resilience can be created, providing strong guarantees for green transformation and sustainable development. Comparative Analysis of Regional Economic Resilience Indicators: Pre- vs. Post-Green Transition. A shown in Figure 2:

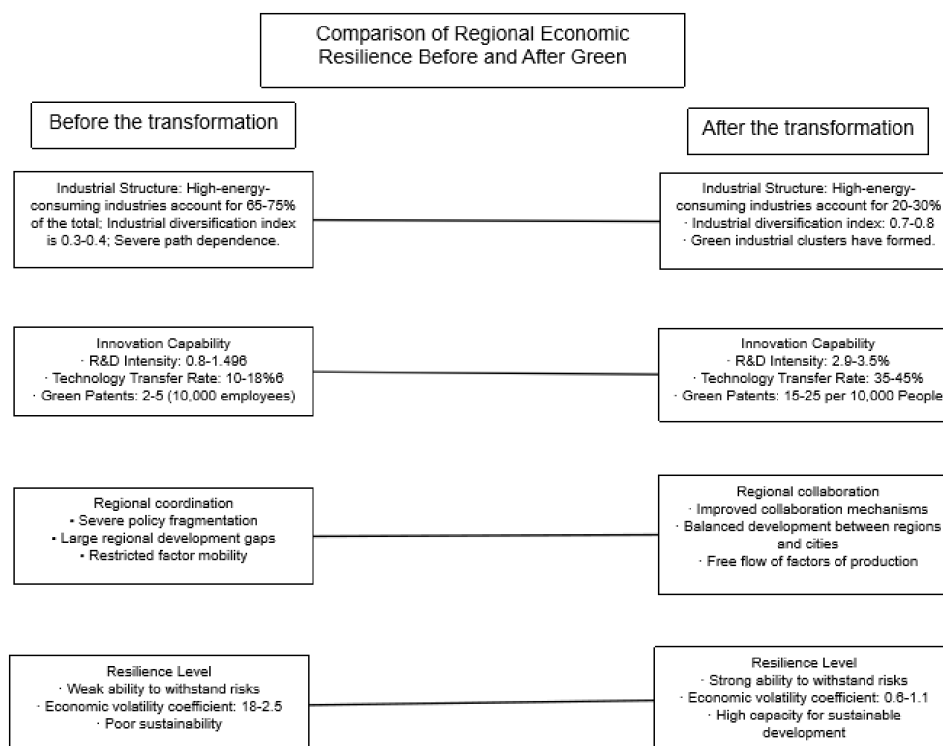


FIGURE 2. Comparative Analysis of Regional Economic Resilience Indicators: Pre- vs. Post-Green Transition

V. CONCLUSION

Building regional economic resilience under the backdrop of green transformation is a systematic project that requires the textile industry to advance comprehensively through theoretical understanding, problem diagnosis, and strategy implementation regarding sustainable fiber sourcing and eco-friendly manufacturing. The combined use of three methods—industrial structure optimization and upgrading, innovation-driven development, resource integration, regional collaboration, and institutional guarantees—can reduce the pressure of traditional industry transformation, improve the level of green economic development in the region, establish a resilient support structure, and enable the regional economy to achieve sustained and high-quality development. Going forward, it is necessary to deepen theoretical research, further explore practical experience, and improve and refine relevant policy systems to lay a solid foundation for building a more resilient regional economy.

AUTHOR CONTRIBUTIONS

Conceptualization –Jie Han and Kai Duan; methodology – Jie Han and Kai Duan; investigation – Jie Han and Kai Duan; writing-original draft preparation – Jie Han and Kai Duan. All authors have read and agreed to the published version of the manuscript.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding.

ACKNOWLEDGEMENTS

Not applicable.

REFERENCES

- [1] Z. Jingmin and L. U. Xiaoli, “Mechanism of impact and spatial effects of digital economy in enhancing tourism economic resilience,” *Progress in Geography*, vol. 43, no. 10, pp. 2004-2020, 2024, doi: 10.18306/dlkxjz.2024.10.008.

- [2] Z. Yang and W. Lan, "Mechanism and Path Analysis of Rural E-Commerce on Rural Economic Resilience," *Advances in Economics, Business and Management Research*, pp. 462-470, 2024, doi: 10.2991/978-94-6463-570-6_45.
- [3] W. Kai, Z. Yan, T. Jiaxin, et al., "Characteristics of change of the structural resilience of Chinas inter-provincial tourism economic network and the formation mechanism of differences," *Progress in Geography*, vol. 43, no. 12, pp. 2442-2456, 2024, doi: 10.18306/dlkxjz.2024.12.009.
- [4] L. Zhao, J. Shi, and Y. Tao, "The impact and mechanism of digital finance on urban economic resilience," *International Review of Financial Analysis*, vol. 106, Art. no. 104468, 2025, doi: 10.1016/j.irfa.2025.104468.
- [5] J. Qi, "The Mechanism of Enterprise Digital Transformation on Resilience from the Perspective of Financial Sustainability," *Sustainability*, pp. 16, 2024, doi: 10.3390/su16177409.
- [6] A. Garcia-Perez and M. P. Sallos, "Knowledge Management, Digital Transformation and the Resilience of the Firm," *Knowledge Management and Organizational Learning*, pp. 205-223, 2023, doi: 10.1007/978-3-031-38696-1_11.
- [7] S. Stellacci and G. Borsoi, "The Convergence of Resilience Culture and Digital Transformation in the Cities of Future," *Swarm Intelligence Applications for the Cities of the Future*, pp. 166-186, 2025, doi: 10.1201/9781032656786-10.
- [8] V. Iglesias, S. R. Smith, and D. Gibson, "A lesson in resilience: The abrupt digital transformation of society conferences in 2020," *Learned Publishing*, vol. 34, no. 1, pp. 35-42, 2021, doi: 10.1002/leap.1362.
- [9] J. Zhang, X. Miao, and T. Shang, "Impact mechanism of digital transformation on supply chain resilience," *Finance Research Letters*, vol. 76, Art. no. 106993, 2025, doi: 10.1016/j.frl.2025.106993.
- [10] M. A. R. Zaleta and L. C. Ochoa-Romerroll, "The Impact of Digital Transformation in Latin America and the Caribbean: Opportunities and Risks in a Context of Economic and Financial Resilience," 2025, doi: 10.20944/preprints202502.2110.v1.
- [11] Y. Lei, Z. Liang, and P. Ruan, "Evaluation on the impact of digital transformation on the economic resilience of the energy industry in the context of artificial intelligence," *Energy Reports*, vol. 9, pp. 785-792, 2023, doi: 10.1016/j.egyr.2022.12.019.
- [12] S. Mukherjee and S. Sanyal, "The Ethics of Green Transformation: A Business Resilience-Focused Approach," *Business, Management and Economics*, 2024, doi: 10.5772/intechopen.115028.
- [13] A. U. Putri, D. Mirani, and T. Khairunnisyah, "Digital Transformation for MSME Resilience in The Era of Society 5.0," *Iapa Proceedings Conference*, pp. 154, 2023, doi: 10.30589/proceedings.2023.886.
- [14] T. Xu, Z. Shen, H. Zhang, et al., "Digital HP finances role in the economic resilience of enterprises digital transformation," *Finance Research Letters*, pp. 63, 2024, doi: 10.1016/j.frl.2024.105312.
- [15] H. Long, H. Zhang, T. Wu, et al., "The Effect of Resource Restructuring on Supply Chain Resilience in the Context of Digital Transformation," *Systems*, pp. 13(5), 2025, doi: 10.3390/systems13050324.