

Study on the influence mechanism and spatial difference of high-quality development based on e-commerce technology on the resilience of county economy

Haotong Li ¹, Ying Meng ^{1, *}, Chihong Gong ^{2, #}, Siyi Xiong ^{1, #}, Haoyang Li ^{3, #},
Yixue Lu ^{1, #}

¹ School of Economics and Finance, Xi'an International Studies University, Xian, China, 710128

² School of Japanese Culture and Economics, Xi'an International Studies University, Xian, China, 710128

³ School of European Studies, Xi'an International Studies University, Xian, China, 710128

* Corresponding Author Email: mengyingv@126.com

#These authors contributed equally

Abstract. In the context of the vigorous development of the digital economy, the impact of e-commerce on the resilience of the county economy has attracted much attention. From the perspective of system theory, this paper constructs the theoretical analysis framework of "e-commerce - county economic resilience", and deeply explores its influence mechanism and spatial differences. The study found that e-commerce can improve the resilience of county economy by expanding the market, optimizing the industrial structure, promoting employment and entrepreneurship, and enhancing the ability to resist risks. Based on the panel data of counties from 2010 to 2020, a spatial econometric model was constructed and the empirical test showed that the agglomeration of e-commerce industry had a significant positive impact on the resilience of county economy and there was a spatial spillover effect. The agglomeration effect was the strongest in the eastern region, followed by the central region, and the weakest in the western region. The case study of Guanzhong region further verifies that the development of e-commerce can significantly improve the resilience of county economy, and innovation-driven and job opportunities expansion play an important intermediary role. Therefore, all localities should formulate e-commerce development policies according to local conditions and strengthen regional cooperation, so as to fully release the enabling potential of e-commerce for the resilience of county economy and promote the high-quality development of regional economy.

Keywords: E-commerce, County-level Economic Resilience, Spatial Econometric Analysis, Business Model Innovation, Regional Development Disparities.

1. Introduction

The rapid development of county e-commerce industry provides a new driving force for improving the quality of regional economic growth and enhancing economic tolerance. Like cross-border e-commerce, domestic county e-commerce also has significant industrial agglomeration and industrial efficiency characteristics, showing certain spatial differences. This indicates that there are certain differences in the degree of agglomeration and the level of collaborative development of e-commerce industry in different counties, and the mechanism and path of e-commerce enabling the resilience of county economy may be different.

In order to explore this problem, from the perspective of system theory, this paper constructs the theoretical analysis framework of "E-commerce - county economic resilience". First of all, e-commerce can enhance the ability of county economy to withstand external shocks and improve economic resilience and adaptability by optimizing industrial structure, enhancing innovation ability and expanding market demand [1]. Secondly, through such mechanisms as technology spillover and network correlation, e-commerce industrial agglomeration can enhance the synergistic coupling of

county industries and form an industrial ecology, thus improving the redundancy and diversity of the economic system and enhancing economic resilience.

In terms of empirical research, this paper selected 6 typical counties in the east, middle and west of China as cases, and compared and analyzed the relationship between the development of e-commerce industry in different regions and the resilience of county economy. The study found that the developed counties in the east have high industrial agglomeration, strong industrial correlation, strong economic resilience and adaptability, and high overall economic resilience. Less developed counties in central and western China have small scale of e-commerce industry, weak industrial correlation, insufficient economic impact resistance, and relatively low economic resilience.

In addition, using the panel data of counties from 2010 to 2020, a spatial econometric model was constructed to empirically test the impact of e-commerce industry agglomeration on the resilience of county economy. The results show that the agglomeration of e-commerce industry has a significant positive impact on the resilience of county economy, and this impact has a spatial spillover effect. Further spatial heterogeneity test showed that the agglomeration effect of e-commerce industry was strongest in eastern counties, followed by central counties, and weakest in western counties. This may be related to regional economic development level, industrial base, innovation environment and other factors.

To sum up, the rapid development of e-commerce has a positive impact on the resilience of county economies, but this impact is significantly different in space. To this end, it is urgent to formulate policies for the development of e-commerce industry according to local conditions, promote the development of industrial agglomeration in depth, and strengthen regional collaboration to build industrial ecology, in order to give full play to the potential of e-commerce to enable the resilience of county economy and achieve high-quality development of regional economy.

2. Basic concepts of e-commerce and county economy

2.1. Current situation of e-commerce development

China's cross-border e-commerce has experienced rapid development, from the rapid germination stage in 2008 to the peak stage in 2022, showing the characteristics of rapid spread from large and medium-sized cities to prefecture-level cities and county towns, with obvious spatial clustering effect. From 2008 to 2022, the scale of cross-border e-commerce transactions in China increased from 200 billion to 14.6 trillion, with a compound annual growth rate of 42%, far exceeding the GDP growth rate in the same period. Data show that in 2022, China's cross-border e-commerce accounted for 46% of the total foreign trade, becoming an important driving force for foreign trade.

In terms of industry distribution, the export cross-border e-commerce is still dominated by 3C, clothing, shoes and hats, and small household appliances, while the import cross-border e-commerce is dominated by maternal and child products, beauty makeup, and nutrition and health products. In 2022, cross-border e-commerce transactions in Guangdong, Zhejiang and Jiangsu provinces accounted for 62% of the country's total, showing a high degree of regional concentration. Among them, cross-border e-commerce transactions in Shenzhen, Guangdong province, reached 2,456.8 billion yuan, accounting for 16.8% of the national total. In terms of e-commerce platforms, the share of Alibaba International website in export B2B cross-border e-commerce is as high as 78%, while Amazon, eBay and Wish dominate B2C cross-border e-commerce [2].

In terms of the number of cross-border e-commerce enterprises, by the end of 2022, the number of cross-border e-commerce related enterprises in China exceeded 500,000, an 18-fold increase from 26,000 in 2018. Among them, the number of cross-border e-commerce enterprises in Zhejiang Province, Guangdong Province and Jiangsu Province exceeded 100,000, reaching 146,000, 113,000 and 108,000 respectively, and the three provinces accounted for 73.4% of the total number of cross-border e-commerce enterprises in the country. From the perspective of regional distribution, cross-border e-commerce enterprises show a spatial distribution pattern of "strong in the east and weak in the west", and cross-border e-commerce enterprises in eastern coastal provinces such as Guangdong,

Zhejiang, Jiangsu and other regions are highly clustered, and the development of central and western regions is relatively slow.

As an emerging industry and new business form, cross-border e-commerce has the characteristics of short industrial chain, strong employment absorption capacity, and obvious regional radiation driving role. China regards cross-border e-commerce as an important driving force for the transformation and upgrading of traditional foreign trade, actively introduces a series of supporting policies, gives preferential policies to cross-border e-commerce in terms of customs clearance, tax refund, foreign exchange, etc., builds comprehensive pilot zones for cross-border e-commerce, and sets up overseas warehouses for cross-border e-commerce. Under the incentive of policies, a large number of small, medium and micro enterprises have entered the international market through cross-border e-commerce platforms, forming a flexible and diverse cross-border e-commerce industrial cluster. Overall, China's cross-border e-commerce has entered a high-speed growth period and become a new engine to promote foreign trade growth and industrial transformation, but the problem of unbalanced regional development is still prominent.

2.2. Meaning of resilience of county economy

The resilience of county economy refers to the ability of county economic system to maintain stable and sustainable development in the face of shocks and disturbances. It is reflected in the comprehensive quality of coping with external shocks, adapting to environmental changes and restoring development vitality. It can be measured from the dimensions of economic structure, industry and employment. It is the key to the sustainable development of county economy. In the face of market fluctuations, natural disasters and other shocks, the county economy with high resilience recovered quickly and grew steadily. Those with low resilience are easily affected by the external environment, and their development fluctuates greatly or even declines. Enhancing the resilience of county economy is of great significance to narrowing the regional development gap and promoting the coordinated development of regions[3].

At present, the development of county economy in China presents obvious spatial differentiation characteristics. The county economy in the eastern coastal region is developed, the pace of industrial structure optimization and upgrading is fast, and it has strong innovation-driven ability and market competitiveness, and the economic resilience is generally high. In the central and western regions, especially in the old, young, border and poor areas, the county economic foundation is weak, the industrial homogeneity is serious, the scientific and technological innovation ability is insufficient, the ability to withstand risks and external shocks is weak, and the economic resilience is relatively low. According to estimates, in 2019, the county economic resilience index of China's eastern, central and western regions was 0.532, 0.472 and 0.408, respectively, showing a spatial pattern of gradual decline from east to west. Therefore, based on the perspective of county economic resilience, taking targeted measures according to local conditions has important theoretical and practical significance for narrowing the regional development gap, promoting regional coordinated development, and promoting common prosperity.

3. Theoretical basis and research framework

3.1. Application of system theory in county economy

System theory is a scientific approach to the study of the behavior and structure of complex systems, focusing on the interactions between elements and structures from a holistic perspective. As the basic unit of national economy, county economy is a complex system. It is of great significance to analyze its development with system theory.

Regional economic development is a complex process of co-evolution of multiple sub-systems, involving many aspects such as population and resources. According to Bertalanffy's general system theory, county economic system is an open system, which exchanges material, energy and information with the outside world, and realizes structure optimization and function improvement by

interaction of internal elements. Holland's complex adaptive system theory provides a new perspective for studying the resilience of county economy, emphasizing the role of adaptation and learning mechanism in improving the anti-interference ability of the system.

E-commerce is a key part of digital economy and a new driving force for the high-quality development of county economy. From the perspective of system theory, e-commerce and county economy affect each other. E-commerce affects the sub-system of county economy by expanding market, optimizing industry and promoting factor flow. The development level, resources and location conditions of the county economy also shape the e-commerce industrial ecology, and the two are embedded and coupled with each other to jointly enhance the resilience of the county economy. With the help of Manson's multi-agent model, the interaction and emergent behavior between e-commerce entities and county economic system under different scenarios can be simulated, and the key path for e-commerce to improve the resilience of county economy can be found[4].

To sum up, using the general system theory, complex adaptive system theory and multi-agent model, the internal relationship between e-commerce and county economy can be systematically described, and its mechanism can be analyzed. This provides theoretical support for scientifically assessing the impact of e-commerce on the resilience of county economy and formulating policies according to local conditions, which is of great significance for promoting the high-quality development of county economy.

3.2. Research framework construction

In the study of the influence mechanism of e-commerce on the resilience of county economy, the key step is the combination of theoretical analysis and empirical analysis, which occupies a core position in the overall study. In order to achieve the research objectives, this paper first establishes the research question and clearly points out the promotion of e-commerce to economic resilience and its possible spatial differences. Subsequently, through a detailed literature review, we summarized the historical research, restored the previous understanding and exploration of the relationship between e-commerce and economic resilience, and provided a solid theoretical foundation for subsequent research.

In the theoretical analysis part, this study relies on system analysis and comprehensive evaluation method to explain in detail how e-commerce affects the resilience of county economy through different ways and mechanisms. In the context of economic globalization and the rapid development of information technology, e-commerce has played an important role in enhancing regional economic structural adjustment capabilities, market response capabilities and innovation capabilities, which have further enhanced economic resilience.

In the empirical analysis part, the research adopts a multi-stage process. Firstly, a multiple regression model is constructed, and GIS spatial analysis method is used to reveal the spatial differentiation characteristics of the impact of e-commerce on the resilience of county economy. A series of hypotheses are proposed to verify the specific effects of various elements of e-commerce on economic resilience and the spatial differences of benefits. In order to support these hypotheses, we conducted rigorous data collection and processing to ensure the accuracy and reliability of the research results [5-8].

Next, we set up an econometric model through scientific sampling and appropriate statistical methods according to the flow chart of e-commerce influence mechanism of county economic resilience. The model was validated using structural equation models and panel data analysis to ensure that the strength and direction of e-commerce's impact on economic resilience were accurately captured. Based on the empirical data, the analysis results reveal the specific performance of the impact of e-commerce on the resilience of county economy and the differences between regions.

Finally, through the rational interpretation of the research results and the comparative analysis with the existing theories, we draw a series of innovative conclusions. These conclusions not only broaden the existing e-commerce research horizons, but also provide new theoretical basis and policy

suggestions to promote the resilience of county economy, showing the scientific and rational research methods.

4. The mechanism of e-commerce on the resilience of county economy

4.1. Path analysis of the impact of e-commerce on county economy

As an emerging industry, e-commerce plays a significant role in the development of county economy, especially in improving the resilience of county economy. Through O2O model, it reduces transaction costs, enhances customer stickiness, optimizes product structure, and affects county economy from many aspects:

Expand the market scope, county enterprises with the help of e-commerce platforms to break through geographical restrictions, products and services to the country and even the world, expand the market scale, increase sales revenue. For example, in 2019, Yiwu's cross-border e-commerce exports reached 33.75 billion yuan, accounting for 32.7% of Zhejiang's total cross-border e-commerce exports, and the market radiation exceeds 220 countries and regions.

To optimize the industrial structure, the traditional county economy is dominated by agriculture and manufacturing, and the development of e-commerce promotes the integration of three industries and drives the development of modern service industries. In 2020, the turnover of cross-border e-commerce in Zhejiang increased by 44.6% year-on-year, far exceeding the growth rate of the primary and secondary industries, injecting vitality into the county economy and promoting the upgrading of industrial structure.

Promote employment and entrepreneurship, e-commerce industry chain is long, covering multiple links, and can create a large number of jobs. In 2019, the number of e-commerce employees in Linyi reached 300,000, an increase of 25% year-on-year, and the entrepreneurial team was 12,000, which became an important force to absorb employment and drive entrepreneurship.

Enhance anti-risk ability, traditional county economy anti-risk ability is weak, affected by a variety of factors. With the help of big data analysis and precision marketing, e-commerce can improve the speed and flexibility of enterprise market response, strengthen the connection between county economy and external market, reduce dependence on local market, and disperse market risks.

In short, e-commerce has many positive effects on the improvement of county economic resilience. On the one hand, e-commerce can broaden the market space of county economy, optimize the industrial structure, and promote employment and entrepreneurship; On the other hand, e-commerce can also enhance the anti-risk ability of the county economy and improve the flexibility of responding to market changes. In the future, with the further integration and development of e-commerce and county economy, e-commerce will become an important engine to promote the high-quality development of county economy.

4.2. Discussion on the mechanism of enhancing the resilience of county economy

In the context of high-quality development, e-commerce, as an important part of the modern economic system, has a significant impact on improving the resilience of the county economy. By connecting market information, optimizing resource allocation and improving industrial structure, e-commerce can enhance the anti-risk ability and self-healing ability of county economy. In this paper, the toughness enhancement effect formula is used

$$R = \frac{1}{1 + \exp(-\sum_i w_i X_i)} \quad (1)$$

Where, R represents the resilience level of county economy and is the result value calculated by this formula, reflecting the degree of risk resistance and self-healing ability of county economy under the influence of e-commerce and other factors. w_i represents the weight coefficient of each influencing factor. Different factors that affect the resilience of county economy (such as different dimension indicators of the development level of e-commerce, etc.) have different importance

degrees, which are reflected by the weight coefficient. X_i represents various independent variables that affect the resilience of county economy, that is, the specific values of different influencing factors, which may include the degree of market information connection of e-commerce and the degree of resource allocation optimization.

Further in-depth analysis of the mechanism of e-commerce in enhancing the resilience of county economy, and explore its spatial distribution differences.

In the empirical analysis of county e-commerce development, indicators covering multiple dimensions of economic activities are selected as explanatory variables X_i , such as e-commerce transaction volume, logistics distribution efficiency, network coverage and user engagement, etc. Weight ω_i is determined by expert scores and historical data analysis. In terms of model construction, logistic regression model is selected as the basic framework to reveal the contribution degree of different variables to improving economic resilience. In the process of variable selection, Akaike information criteria (AIC) and Bayesian information criteria (BIC) were used to optimize the model, which ensured the balance between the conciseness and predictive power of the model.

In terms of data collection, this study mainly uses open data from the National Bureau of Statistics, the Ministry of Commerce and local e-commerce platforms to ensure the fairness and reliability of data. In the process of data processing, the missing values are processed, the outliers are identified and eliminated by the box diagram, and the variables are dimensionless by the standardized method, which ensures the accuracy of the comparison between different indicators.

In the analysis of spatial differences, the geographical weighted regression (GWR) model is introduced to explore the spatial heterogeneity of the influence of county e-commerce on economic resilience, and reveal the influence mechanism of factors such as economic and social development level, location conditions and infrastructure construction on the difference of the effect of e-commerce development. This study also uses spatial autocorrelation methods, such as the Moran 'I' index, to analyze the spatial agglomeration characteristics, and visually shows the hot and cold spots of e-commerce development through the Moran 'I' chart and LISA agglomeration chart of local indicators, providing differentiated development strategies for policy makers [9-10].

Finally, by combining in-depth theoretical discussion and empirical analysis, this paper provides a new perspective for understanding the mechanism of e-commerce in promoting the resilience of county economy, and has important theoretical and practical significance for promoting the high-quality development of county economy. Through scientific research methods and accurate data analysis, the research conclusions in this paper not only enrich the relevant theories of economic resilience, but also expand the application field of e-commerce research, and provide powerful data support and policy recommendations for relevant decision-making.

5. Spatial difference analysis and empirical research

5.1. Spatial autocorrelation test and analysis

E-commerce has become a key factor to promote county economic growth and enhance economic resilience, and it plays an indispensable role in regional economic development. In order to deeply analyze the influence mechanism of e-commerce on the resilience of county economy and the difference of its spatial distribution, this study adopts the spatial autocorrelation test method, and specifically uses Moran's I index to quantitatively evaluate the spatial correlation degree between the development level of e-commerce and the resilience of county economy. Moran's I index is an indicator that represents the tendency of spatial data to cluster or disperse, and is calculated as follows:

$$I = \frac{N}{\sum_i \sum_j w_{ij}} \cdot \frac{\sum_i \sum_j w_{ij} (X_i - \bar{X})(X_j - \bar{X})}{\sum_i (X_i - \bar{X})^2} \quad (2)$$

Where N represents the total number of regions, w_{ij} is the spatial weight matrix, X_i and X_j represent the observed values of regions i and j, respectively, and \bar{X} is the mean of the whole sample.

This formula can effectively test the spatial autocorrelation of the development level of county e-commerce, and then reveal its spatial conduction effect on economic resilience.

In this study, the spatial weight matrix was established based on the geographical proximity of counties and the strength of economic ties to ensure that the analysis results could truly reflect the spatial characteristics of e-commerce interactions among counties. In addition, with the help of geographic information system (GIS) technology, the research also draws the geographical distribution map of the development level of e-commerce in Northeast China, so as to visually show the spatial differences of e-commerce development level among different counties. The figure notes significantly highlight the spatial aggregation areas formed by counties with high development level and other counties, which provides an intuitive basis for further exploration of the differences in spatial distribution of e-commerce and county economic resilience.

In order to ensure the scientificity and rationality of the research conclusions, the empirical analysis is supported by a spatial econometric model, which can effectively control the influence of spatial dependence and spatial heterogeneity. In the model setting, it includes many control variables that may affect the resilience of e-commerce and county economy, such as regional per capita GDP, Internet penetration rate, logistics distribution efficiency, etc. In addition, in order to overcome the potential endogeneity problem, this study introduced the instrumental variable method for estimation, and ensured the accuracy and depth of the research results through a series of robustness tests.

In summary, this study deeply explores the impact mechanism of e-commerce on the resilience of county economy and its spatial differences. At the same time, scientific spatial autocorrelation analysis method is adopted, and GIS technology and spatial econometric model are combined to enhance the rigor of theoretical analysis and the accuracy of empirical research. The research results not only provide a detailed data analysis framework for subsequent scholars, but also provide a spatial analysis perspective with guiding value for local governments when formulating policies to promote the development of e-commerce and enhance the resilience of county economy(Figure 1).

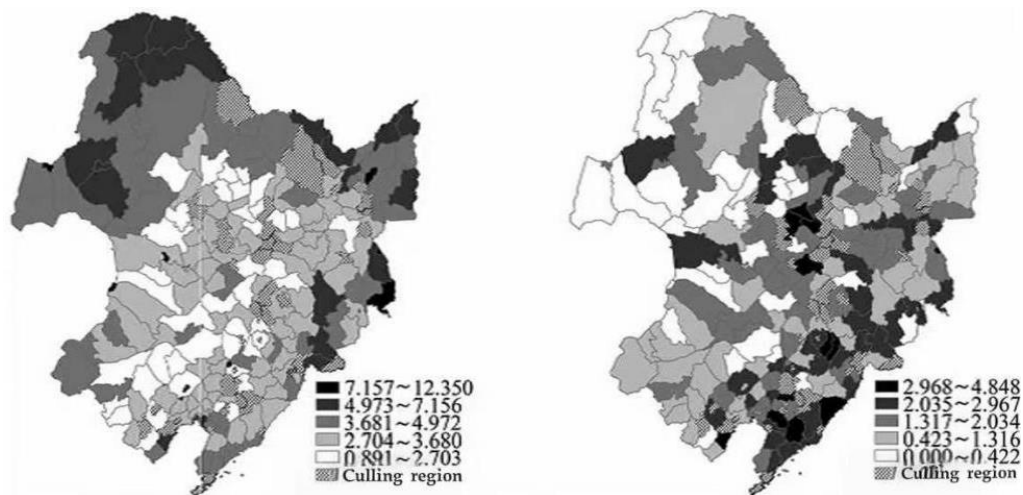


Figure 1. The geographical distribution of the development level of e-commerce in Northeast China

5.2. Case studies and empirical tests

In order to establish the heterogeneity and internal logic among different regions, the economic coupling degree calculation formula is used to study the influence mechanism and spatial difference of county e-commerce on economic resilience

$$C = \frac{P}{T} \times 100\% \quad (3)$$

Where, C stands for economic coupling degree, which is used to measure the degree of economic interaction and dependency between different counties, in the form of a percentage. P usually represents the actual strength value of economic ties between different counties, which reflects the actual situation of economic ties between counties under the influence of e-commerce and other

factors. T generally represents the maximum possible strength of economic ties between different counties.

The degree of economic interaction and dependence among different counties is quantitatively analyzed. Taking the resilience of county economy as the response variable Y , the relationship between the dependent variable and the multi-dimensional indicators of e-commerce development is established by using multiple regression analysis model. Through quantitative method, we can reveal the response ability and resilience of county economic system under the impact of e-commerce.

This study selected Guanzhong area as a case for empirical analysis. Firstly, the weight distribution and evaluation of the development level of e-commerce are carried out by the comprehensive use of analytic hierarchy process (AHP) and principal component analysis (PCA) to ensure the objective measurement of the comprehensive strength of county e-commerce. The data indicators in the table of "Guanzhong County E-commerce Development Ranking" are taken as the research basis, such as e-commerce transaction volume, the number of e-commerce platforms, etc. These data indicators comprehensively reflect the development status of e-commerce in each county. Then, geographical weighted regression (GWR) model is used to explore the spatial distribution relationship between e-commerce development and county economic resilience, and reveal the formation mechanism of spatial differences.

In the process of model construction, a robust standard error adjustment method is adopted to ensure the stability of the estimation results for the heteroscedasticity problem. In addition, by introducing Lagrange multiplier test of spatial autocorrelation, the interference of spatial dependence on model estimation is eliminated. Based on the full sample data, the robustness test was conducted by using spatial Dubin model (SDM) and spatial error model (SEM). The results show that the development of e-commerce has a significant positive effect on improving the resilience of county economy.

Aiming at the internal mechanism of the relationship between the development of e-commerce and the resilience of county economy, this paper uses the intermediary effect model to analyze the influence of the three intermediary variables of e-commerce environment construction, innovation drive and employment opportunity expansion on the two ways of action. It is found that the improvement of innovation driving force and the expansion of employment opportunities play an important positive mediating role in economic resilience while optimizing the county e-commerce environment. This verifies that e-commerce, as a new type of business activity, is of great significance in promoting the upgrading of county economic structure, improving employment structure and improving regional innovation ability.

The comprehensive empirical results show that e-commerce not only directly enhances the economic resilience of the county, but also indirectly affects the stability and growth of the county economy through multiple paths. Therefore, the government needs to formulate targeted policies to optimize the county e-commerce environment, strengthen innovation-driven and employment support, so as to further consolidate and enhance the resilience of the county economy. In future studies, more influencing factors and potential interaction effects should be considered, as well as the possible impact of differences in policies and resource allocation among different regions on research results.

6. Conclusion

This study focuses on the impact of e-commerce on the resilience of county economy, comprehensively uses a variety of research methods, and has obtained rich results. In theory, based on the system theory, the internal relationship between e-commerce and the resilience of county economy is analyzed, which lays a theoretical foundation for the research. In terms of research methods, spatial autocorrelation test and various models are used to deeply explore the relationship and spatial differences between them. During data processing, multi-source data are extensively collected and scientific processing ensures research accuracy. It is found that e-commerce can significantly improve the resilience of county economy, and there are obvious spatial differences. It

plays a role by expanding the market and optimizing the industrial structure, and the positive impact of industrial agglomeration on economic resilience shows the characteristics of strong in the east and weak in the west. The case of Guanzhong region further validates the positive role of e-commerce, and it is clear that innovation-driven and job expansion play an important intermediary role.

Future studies can incorporate new factors to improve the influencing factor system, pay attention to the differences between counties in different development stages, and strengthen cross-regional comparison to promote coordinated development. Policy makers should optimize the e-commerce environment based on local realities, strengthen innovation and employment support, promote the deep integration of e-commerce and county economy, narrow regional disparities, and move towards common prosperity.

References

- [1] Zhang X H. Cross-border e-commerce: Inter-provincial industrial agglomeration and industrial efficiency evaluation [J]. *Western China*, 2021, (02): 12 - 21.
- [2] Wang Feng. A Cross-border E-commerce Platform business model optimization Research [D]. Anhui University of Finance and Economics, 2023.
- [3] ZHAO Q K. Study on spatio-temporal differentiation of county economic development in Sichuan Province [J]. *Anhui Agricultural Sciences*, 2017, 45 (29): 226 - 231.
- [4] Du Z Y. A systematic study on the impact of regional economic development on private enterprises at district and county levels [J]. *Chinese Business Theory*, 2020, (12): 174 - 175.
- [5] Tang Jixin. Spatial spillover effect of economic resilience on high-quality economic development in nine provinces along the Yellow River Basin [D]. Inner Mongolia University of Finance and Economics, 2024.
- [6] EB Zavyalova, VA Volokhina, MA Troyanskaya, et al. A humanistic model of corporate social responsibility in e-commerce with high-tech support in the artificial intelligence economy [D]. *Humanities & Social Sciences Communications*, 2023.
- [7] Chen Lingming. Study on the influence and spatial effect of digital economy on high-quality development of regional economy [D]. Hunan University of Science and Technology, 2022.
- [8] Wang X, Zhang H, Shi M. The mediating role of supply chain digitization in the relationship between cross-border e-commerce development and regional economic growth [J]. *Finance Research Letters*, 2025, 75106830-106830.
- [9] Jihyun C, Seung J L, Saehoon K. How has COVID-19 impacted the economic resilience of retail clusters? Examining the difference between neighborhood-level and district-level retail clusters[J]. *Cities*, 2023, 140104457 - 104457.
- [10] Hao Z, Fu J, Xin J Y. Striking a balance between supply chain resilience and supply chain vulnerability in the cross-border e-commerce supply chain [J]. *International Journal of Logistics Research and Applications*, 2023, 26 (3): 320 - 344.