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Research on the Temporal and Spatial Coupling of China's Logistics Development, New Urbanization and Economic Growth

Shengzhu Li[1, a], Shiyu Xiao[1, b]

[1]School of Economics and Management, Chongqing University of Posts and Telecommunications, Chongqing, China, 400065, China

[a]lisz@cqupt.edu.cn, [b]shayexiao@163.com

Abstract

Fully tap the coordinated development potential of logistics, new-type urbanization and economic growth, construct a coupling and coordinated evaluation index system for logistics development, new-type urbanization and economic growth, and compare the three systems with panel data from 30 provinces (municipalities and districts) in China from 2004 to 2019 Coupled and coordinated development of spatiotemporal evolution characteristics for research. The results show that the comprehensive level of logistics, new-type urbanization and economic growth in various provinces and cities shows the characteristics of phased changes, and the overall trend is fluctuating and rising. There are obvious differences between the east and west of the coupling coordination level, showing a spatial distribution pattern of decreasing east-central and western levels. The coupling coordination degree of the three systems gradually increased, the spatial convergence effect of the coupling coordination level was significant, and the spatial correlation was continuously enhanced.

Keywords

Logistics development; New urbanization; Coupling coordination; Space-time evolution.

1. INTRODUCTION AND LITERATURE REVIEW

The modern logistics industry runs through the three major industries, and promoting the development of the modern logistics industry has become an important measure to adjust the economic structure, optimize and coordinate the allocation of resources, and promote the high-quality development of China's economy. In the new stage of China's economy and new-type urbanization from high-speed growth to high-quality development, logistics development also pays more attention to balance and efficiency. Promoting the integrated and innovative development of logistics and related industries, promoting the development of high-level new urbanization, and creating an industrial ecology of mutual assistance between logistics and economy are the only way to high-quality development. At the same time, the strategic adjustment of the spatial pattern of China's economic development and the acceleration of the urbanization process have put forward new requirements for the integration of interregional services and the efficiency of logistics services in urbanized areas for the construction of logistics system. Logistics development can effectively reduce economic operating costs, overcome differences in resource endowments, and promote the overall development of the region through the correlation and driving effect between urban and rural areas. The deep integration of logistics development, new urbanization and economic growth is of great significance to promote high-quality economic development.

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In the relationship between logistics development and economy, domestic and foreign scholars have carried out a series of research, Pardmore [1] believes that modern logistics enterprises can accelerate technology spillover, help regional industrial clusters, expand the labor market, stimulate industry innovation, and have a return and diffusion effect on economic growth. Pablo & Miguel[2], based on panel data from 34 countries from 2007 to 2012, proved that logistics is one of the important factors affecting economic efficiency, and if other influencing factors remain unchanged, for every 1% increase in logistics performance indicators, the technical efficiency of economic output will increase by 0.59%. Lean [3] and others found that economic development will drive demand for animal flow in the short term, and promote the development of logistics industry in the long term. Wu Zhihui et al. [4] used the logistics model to study the relationship between logistics and economic growth in China's Beijing-Tianjin-Hebei region, and showed that corresponding logistics industry development policies can be formulated according to different development stages of logistics industry development to better promote regional economic growth. Starting from the spatial correlation between logistics and economic growth, Shao Yang [5] demonstrated that there is a significant spatial correlation between GDP and logistics in various regions, and the GDP and logistics of adjacent regions show obvious spatial spillover effects. Zhou Qiliang et al. [6] found that the logistics industry in the Pearl River Delta region did not promote economic growth strongly, and suggested increasing investment in the infrastructure construction of the logistics industry. Li Baoku [7] and others found that there is a two-way Granger causal relationship between logistics and economic growth, and economic growth and the development of logistics industry not only play a positive role in each other, but also promote the development of logistics industry by economic growth. Shen Jiang [8] et al. used panel data from 1997 to 2008 to analyze the impact of logistics industry development on the optimization of industrial structure in central China by econometric model. It is found that the logistics industry can not only increase the proportion of the tertiary industry in the national economy, but also promote the optimization of the internal structure of the primary and secondary industries, and promote the upgrading and optimization of the entire industrial structure.

In the study of the relationship between logistics and new urbanization, Sirgelmann[9] believes that urbanization can trigger the positive agglomeration of logistics and other service industries to promote their development. Behrends[10] identifies the development characteristics of urbanization from the perspective of logistics, and believes that the logistics industry is the key to promoting the balanced development of urbanization. Zheng Yongjun et al.[11] believe that the benign interactive development of modern circulation industry, including logistics industry, and new-type urbanization is an important way to achieve sustainable economic development and urban-rural integration. Huffman [12] and others used regression analysis and structural equation model to scientifically demonstrate the correlation effect and coordinated development mechanism between logistics industry development and urbanization rate. Fan Gang[13] believes that the urbanization process and logistics industry can promote industrial transfer, promote economic integration, and enhance the core competitiveness of cities and towns. Li Min[14] studied the coordinated development of logistics industry and urbanization from the perspective of macro system, and analyzed the connotation of coordinated development of urbanization and logistics industry. He Xingdong[15] pointed out that the development of the logistics industry is conducive to optimizing the industrial division of labor, promoting regional balance, attracting industrial agglomeration, increasing the attractiveness of urban population, and at the same time creating more employment opportunities and driving the development of new urbanization. Liang Wen [16] et al. used the empirical analysis of the Dubin model to show that logistics agglomeration has a significant positive driving effect on the urbanization of the region, and has a non-

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significant negative spatial spillover effect on the urbanization of neighboring provinces and cities.

The existing literature has made a lot of discussions on the level measurement, influencing factors, and realization paths between logistics and new urbanization, and the economy, but there is a lack of systematic and comprehensive analysis of the three. Based on this, this paper focuses on the relationship between logistics development and new-type urbanization in China, and uses the entropy method to measure the logistics development level, new-type urbanization level and economic growth level of each province. The coupling coordination model and ArcGIS spatial visualization method were used to explore the temporal and spatial differentiation characteristics of the coupling coordination degree of logistics industry development and new urbanization in different provinces and regions, aiming to promote the coordinated development of the three systems, in order to provide a decision-making basis for regional logistics development, new urbanization and high-quality economic development.

2. INDICATOR SYSTEM CONSTRUCTION AND DATA SOURCES

2.1. Construction of indicator system

This paper follows the principles of scientific, systematic, data availability and other index systems, combined with relevant research results [17-18], to construct an index system for logistics development, new urbanization and economic growth as shown in Table 1.

Starting from the three elements of supply capacity, industrial scale and growth potential, the logistics development subsystem index system selects 12 indicators to measure the level of logistics development. Then, the indicators of the new urbanization system are selected from the five levels of population, economy, space, public services, resources and environment of the development of the new urbanization. In the construction of the regional economic growth index system, this paper examines 9 indicators from four aspects: scale, efficiency, opening up and economic structure.

2.2. Data Sources

This paper selects panel data from 30 provincial-level administrative units in China (excluding Tibet). The data are derived from the "China Statistical Yearbook" and "China Urban Statistical Yearbook", "China Tertiary Industry Yearbook" and the statistical yearbooks of various provinces from 2004 to 2019, and some of the missing data refer to the statistical yearbooks of various provinces and cities for the same period. The data with different statistical calibers have been converted, and some missing values have been imputed using the corresponding year data.

2.2.1 Model Building

(1) Panel data entropy weight method

In this paper, the improved entropy value method is used for weighting, and the comprehensive evaluation value is calculated through the element layer of the first-level index, so that the measured comprehensive evaluation value is more scientific and effective. The specific steps are as follows:

Firstly, in order to eliminate the influence of different dimensional dimensions of each index data, the extreme value method is used to dedimensionally process the original data, and the data standardization processing formula is:

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Table 1. Evaluation index system

Target layer	Guidelines layer	Metrics layer	Metric type
Logistics development	Logistics supply capacity	Per capita fixed investment in logistics (yuan)	Positive
		Number of employees in the logistics industry per 10,000 people (person)	Positive
		Railway Operating Mileage (10,000/km)	Positive
		Highway Operating Mileage (10,000/km)	Positive
		Postal Outlets	Positive
	Scale of logistics industry	Total postal business (100 million yuan)	Positive
		Freight volume (10,000/t)	Positive
		Cargo turnover (10,000/t)	Positive
		Per capita local logistics expenditure (10,000 yuan)	Positive
		Civilian cargo vehicle ownership	Positive
	Logistics growth potential	Added value of logistics industry (million yuan)	Positive
		Proportion of added value of logistics industry in the tertiary industry (%)	Positive
New urbanization	New urbanization of the population	Proportion of urban population (%)	Positive
		Non-farm employment rate of resident population (%)	Positive
		Urban registered unemployment rate (%)	Positive
		Population density of urban areas (people/km2)	Positive
	New economic urbanization	Tertiary industry added value (100 million yuan)	Positive
		Per capita disposable income of urban residents (million yuan)	Positive
		Per capita consumption expenditure of urban residents (million yuan)	Positive
	New urbanization of space	Urban road area per capita (sqm)	Positive
		Area of parks and urban green spaces per capita (m^2/person).	Positive
		Urban water penetration rate (%)	Positive
		City gas penetration rate (%)	Positive
		Number of buses per 10,000 people (units)	Positive
		Telecommunication service penetration rate (%)	Positive
	Equalization of public services	Pension Insurance Coverage (%)	Positive
		Basic Medical Insurance Coverage (%)	Positive
		Community Service Agency Coverage (%)	Positive
		R&D funding (million yuan)	Positive
		Per capita education expenditure (10,000 yuan)	Positive
		Health technicians per 10,000 people	Positive
	Resource environment	Energy consumption per unit of GDP	Negative
		Green coverage rate of built-up area (%)	Positive
		Excellent ambient air quality rate(%)	Positive
		Harmless treatment rate of domestic garbage (%)	Positive
		Comprehensive utilization rate of industrial solid waste(%)	Positive
Economic growth	Total economic size	Gross Capital Formation (billion)	Positive
		Investment in fixed assets (million yuan)	Positive
	Level of economic efficiency	GDP per capita (yuan)	Positive
		Per capita local fiscal revenue (million yuan)	Positive
		Total retail sales of consumer goods per capita (10,000 yuan/person)	Positive
	The level of openness to the outside world	Total import and export trade (10,000 yuan)	Positive
	Economic structural characteristics	Non-agricultural added value as a percentage of GDP (%)	Positive
		Comparison factor of added value	Positive
		Industrial structure hierarchy coefficient	Positive

$$X'_{ij} = \begin{cases} \frac{X_{ij} - \min(X_{ij})}{\max(X_{ij}) - \min(X_{ij})}, & \textbf{Positve indicators} \\ \frac{\max(X_{ij}) - X_{ij}}{\max(X_{ij}) - \min(X_{ij})}, & \textbf{Inverse indicators} \end{cases} \quad (1)$$

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In equation (1), i is the evaluation object and j is the evaluation index; X_{ij} and X'_{ij} represent the initial and normalized corresponding index values, respectively. Under the jth indicator, the proportion of characteristics of the jth province Calculate the entropy value of item j:

$$e_{ij} = -k \sum_{i=1}^{m} P_{ij} \, Inp_{ij} \tag{2}$$

In equation (2), $\mathrm{K} = \frac{1}{Inm}$, X_j Variance coefficient: $g_j = 1 - e_j$.

Calculate the weight of the indicatorX_i,

$$W_j = \frac{(1-e_j)}{\sum_{j=1}^{n}(1-e_j)} \tag{3}$$

In equation (3), $W_j \in [0,1]$, and$\sum_{j=1}^{n} w_i = 1$. $W_j$is the normalized weight coefficient .

According to the entropy value method, the index weight is obtained, and the weighted sum method is used to calculate the comprehensive score of logistics development and urbanization development and economic growth.

(2) Coupling function

The coupling degree is used to describe the strength and weakness of the interaction between two or more systems, drawing on the concept of capacity coupling in physics, and inferring the coupling degree function of the two systems, $\mathrm{n} = 3$,which is the coupling degree model of logistics development - new urbanization level - economic growth, and $C \in [0,1]$, that is:

$$C_3 = \left[\frac{U_1 * U_2 * U_3}{x\left(\frac{U_1+U_2+U_3}{3}\right)^3} \right]^2 \tag{4}$$

On the basis of the existing research, the coupling degree was hierarchical, when $\mathrm{C} = 0$, the coupling degree of the system was minimal, and the systems were in a completely unrelated state and could not affect each other; When $\mathrm{C} = 1$, the system coupling degree was the largest, and there was a benign coupling between systems or internal elements of the system, and the system tended to develop in an orderly manner.

(3) Coupling coordination model

The degree of coupling can only reflect the interaction strength between the three systems, but cannot reflect the overall function or comprehensive coordinated development level of the three systems. Therefore, referring to the research of other scholars [19], this paper introduces the comprehensive evaluation index T to construct a coupling coordination model of logistics development-new urbanization-economic growth system, so as to further determine the synergy between the three major systems, and construct a coupling and coordination model that can objectively reflect the coordinated development level of the three systems, namely:

$$D = C * T \tag{5}$$

$$T = \alpha U_1 + \beta U_2 + \delta U_3 \tag{6}$$

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Among them, it is the degree of coupling coordination, which is the coupling degree, which is the comprehensive development level index of the three; and the comprehensive evaluation index of logistics development, new urbanization and economic growth system, respectively; As mentioned above, there are differences in the role of the three subsystems of logistics development, new urbanization and economic growth in coordinated development, logistics development is the leading factor, promote new urbanization and economic growth, in turn, new urbanization and economic growth require increased logistics development, so the assignment weight of the three pending coefficients is $\alpha = 0.4$, $\beta = 0.3$, $\delta = 0.3$.

In order to better illustrate the relationship between logistics development, new urbanization and economic growth, the coordination level is divided into 10 categories [20], covering all coupling coordination degrees from extreme imbalance to excellent coordination (Table 2).

Table 2. Coupling coordination grading standards

Coupling coordination interval (D)	Degree of coordination	Coordination level	Degree of coordinated development
0.0000~0.0999	Extreme dysregulation	1	maladjustment
0.1000~0.1999	High degree of imbalance	2	
0.2000~0.2999	Moderate outrange	3	
0.3000~0.3999	Mild disorders	4	
0.4000~0.4999	On the verge of imbalance	5	transition
0.5000~0.5999	Barely coordinated	6	
0.6000~0.6999	Junior coordination	7	harmonize
0.7000~0.7999	Intermediate coordination	8	
0.8000~0.8999	Well coordinated	9	
0.9000~1.0000	Quality coordination	10	

3. EMPIRICAL ANALYSIS

3.1. Comprehensive level of DEVELOPMENT manuscripts

Overall, from 2004 to 2019, China's logistics development, new urbanization and economic growth level have achieved certain results, showing obvious phased change characteristics, and the fluctuation of logistics development and new urbanization is smaller than the fluctuation of economic growth level.

The national logistics development level increased from 0.2083 in 2004 to 0.2699 in 2019, showing a fluctuating and rising trend, benefiting from the optimization and upgrading of industrial structure, continuous improvement of factor allocation and the gradual formation of a comprehensive and complete logistics network. From 2008 to 2012, the average value continued to decrease, of which the decline in 2005 was obvious, because China was affected to a certain extent in the process of gradual opening up after joining the WTO. Since 2013, it has been rising year by year, and the change has slowed down. Specifically, the level of development of the logistics industry in Guangdong, Jiangsu, Zhejiang, Shanghai, Shandong and other places is generally similar and at a high level, while the level of logistics development in Ningxia, Hainan, Gansu, Xinjiang, Qinghai, Yunnan and other places is relatively low. As far as the region is concerned, the eastern region due to strong economic strength, rich scientific and technological resources and a high degree of openness, the overall level of logistics is at a high level, compared with 2004, in 2019 the central and western regions and the northeast region logistics development level has improved, the growth potential is large, and the gap with the eastern region is gradually narrowing, thanks to the strengthening of the attention to logistics

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in the central and western regions in recent years, such as the "China Logistics Industry Development Medium and Long-term Plan (2014-2020)" It has promoted the improvement of the modern logistics service system, further increased the investment in financial logistics funds in the central and western regions, and optimized the structure of local logistics development.

The level of new-type urbanization is relatively stable, the level fluctuates between 0.1967~0.2468, and the steady rise is accompanied by the fluctuation decline. With the continuous growth of China's economy, the scale and radiation effect of cities and towns have been increasing, and the level of new urbanization development has gradually improved. From the perspective of development level, urbanization development shows greater heterogeneity, with a gradient decreasing from coastal areas such as East China and South China to inland areas such as southwest and northwest, which is related to the long-term unbalanced regional development strategy and the different economic foundations, resource endowments and environmental policies of each region. Especially in recent years, as the forefront of China's opening up to the outside world and the highland of economic and social development, the coastal areas have maintained a high level of urbanization development. From the perspective of development rate, the urbanization development in coastal areas has a relatively high starting point, but the speed is relatively slow, while inland areas such as northwest and southwest gradually narrow the gap with coastal areas in the process of economic level, industrial structure adjustment and upgrading.

From 2004 to 2019, China's economic growth level increased slightly, but the growth rate slowed down, from 0.2388 in 2004 to 0.3172 in 2019, showing an overall fluctuating upward development trend, indicating that China's economic growth is showing a good development trend, but there is still a lot of room for development. It is also in line with China's current strategy of seeking progress in the face of economic downward challenges, maintaining strategic concentration, and firmly taking the road of high-quality development. From the regional level, compared with 2004, the economic development level of the central region has grown rapidly, while the economic development level of the northeast region has declined significantly, which is directly related to the imbalance of the industrial structure, technological structure, demand structure and development model in the northeast region.

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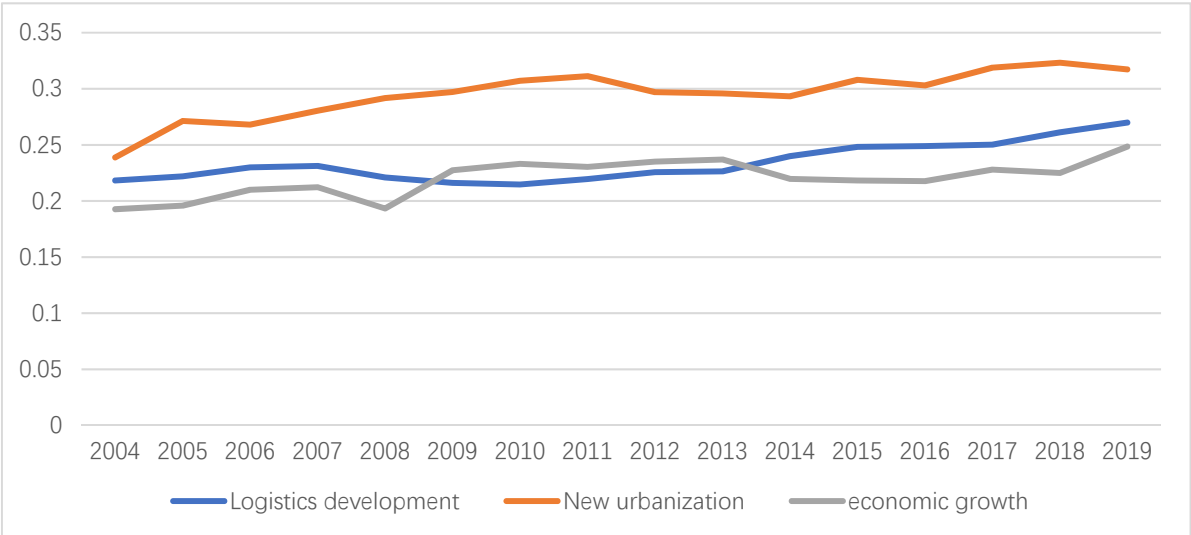

Figure 1. The comprehensive development level of the three systems from 2004 to 2019

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3.2. Three-system coupling analysis

A In this paper, four time nodes in 2004, 2007, 2011 and 2016 were selected to analyze the temporal evolution of the coupling and coordination degree of logistics development, new urbanization and economic growth in China, and the results are shown in Table 3. It can be seen that from 2004 to 2019, the coupling and coordination degree of logistics development, new urbanization level and economic growth level of various provinces (municipalities and districts) in China has not changed much, and the coupling coordination degree of the three major systems has steadily increased, from the bordering state of imbalance in 2004 (0.4866) to the barely coordinated stage (0.5228) in 2019, indicating that positive interaction is occurring between the three systems and there is a lot of room for development.

Specifically, from 2004 to 2019, the coupling coordination level of the three major systems remained basically unchanged in most provinces, indicating that the coupling coordination development relationship of the three was relatively stable, and the coupling coordination level of Qinghai, Xinjiang, Gansu and other provinces was slightly out of balance during this period. Jiangxi, Jilin and other provinces have always been on the verge of coordination; Inner Mongolia, Liaoning, Heilongjiang and other provinces have been barely coordinated; Beijing, Shanghai, Jiangsu, Guangdong and other provinces have basically been in a state of primary coordination. Among them, the coupling coordination level of the three systems in Beijing, Shanghai, Zhejiang, Jiangsu, Fujian and Guangdong has always been higher than the national average.

The coupling coordination between the three from 2004 to 2019 can be divided into two phases:

Although the logistics industry interacts with new urbanization and economic growth obviously, due to the lack of systematic logistics network layout, unreasonable transportation structure, imperfect infrastructure supporting and other problems, logistics has a weak driving force for urbanization and high-quality economic development, and the urbanization development model emphasizes the expansion of quantity and scale, and unilaterally pursues development speed The economic development model has not yet been completely transformed, and the promotion effect of the three has not yet been obvious, resulting in a slow increase in coupling and coordination.

The second phase, from 2010 to 2019, is a reluctant coordination phase; With the upgrading and adjustment of industrial structure, the joint role of logistics industry in new urbanization and economy is becoming more and more obvious, and at the same time, under the influence of policies and environment, new urbanization pays more attention to the coordination and integration of society, economy and ecology. After 2014, relying on mature e-commerce platforms, systematic circulation systems and intelligent service platforms, coupled with the "Medium and Long-term Plan for the Development of Logistics Industry (2014-2020)", the status of the logistics industry as a national basic strategic industry has been clarified, so that logistics has played a significant role in promoting the expansion of urbanization quantity and scale and economic growth, and economic growth has also promoted logistics development in reverse. At this time, the coupling and coordination relationship between logistics development, new urbanization and economic growth naturally changed from bordering dysfunction to barely coordinating.

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Table 3. From 2004 to 2019, China's logistics-new urbanization-economic growth coupling coordination degree

	In 2004	In 2008	In 2012	In 2015	In 2019
Beijing	0.65582	0.6356224	0.6684189	0.697511	0.647813
Tianjin	0.595947	0.5461602	0.5370891	0.494292	0.519876
Hebei	0.496794	0.500011	0.5319933	0.493035	0.539364
Shanxi	0.453873	0.4407918	0.4520627	0.459587	0.508521
Inner Mongolia	0.527748	0.5319794	0.5662776	0.500149	0.554161
Liaoning	0.515454	0.5059892	0.5407597	0.493967	0.528504
Jilin	0.441269	0.4224749	0.4355913	0.401692	0.47654
Heilongjiang	0.525377	0.5044606	0.5001165	0.580533	0.539117
Shanghai	0.755619	0.7264872	0.7229794	0.697549	0.781591
Jiangsu	0.66025	0.6803154	0.7074783	0.689007	0.727814
chekiang	0.583512	0.5699329	0.596172	0.603512	0.620438
Anhui	0.472122	0.4630107	0.4896791	0.496494	0.52638
Fujian	0.494972	0.4895545	0.5192458	0.531932	0.571005
Jiangxi	0.440733	0.4312832	0.4623892	0.451864	0.451361
Shandong	0.581187	0.5993389	0.6111256	0.589258	0.593862
Henan	0.467104	0.4922144	0.5120412	0.497385	0.523091
Hubei	0.477937	0.4810051	0.5012423	0.525872	0.537606
Hunan	0.498916	0.5284368	0.5512469	0.535755	0.521429
Guangdong	0.621042	0.6293338	0.637157	0.664736	0.695519
Guangxi	0.407969	0.3925529	0.4381132	0.409495	0.426567
Hainan	0.375849	0.3239096	0.3641759	0.386528	0.418912
Chongqing	0.419667	0.4372486	0.4707538	0.486796	0.509535
Sichuan	0.415178	0.4430128	0.4644053	0.477005	0.515332
Guizhou	0.352952	0.35209	0.3988791	0.399289	0.411268
Yunnan	0.41501	0.4075969	0.3992252	0.404379	0.455632
Shaanxi	0.403084	0.3932221	0.4339635	0.429343	0.460276
Gansu	0.343116	0.3483182	0.3682056	0.358638	0.356015
Qinghai	0.325977	0.3252439	0.3901065	0.385047	0.337352
Ningxia	0.38803	0.319011	0.3744066	0.367931	0.404963
Xinjiang	0.381893	0.3442994	0.3401764	0.353226	0.397128
mean	0.486638	0.480021	0.5050104	0.500296	0.522753

3.3. Spatial evolution analysis of the degree of coupling coordination of the three systems

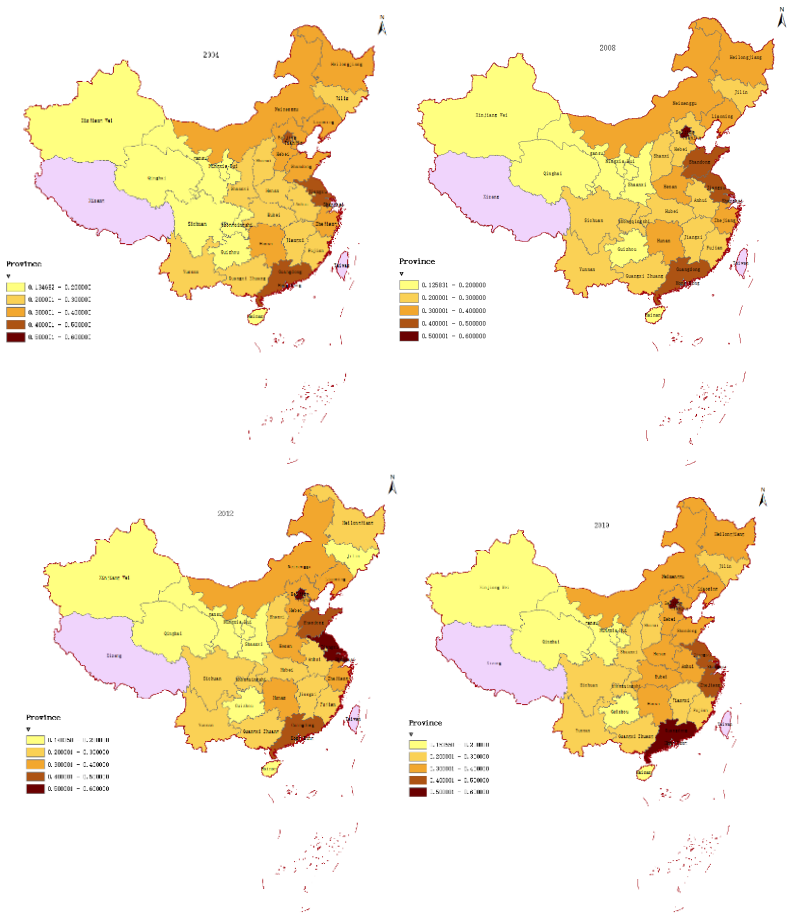

Figure 2. Coupling coordinates horizontal spatial evolution

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In order to further explore the spatial differentiation characteristics of the coupling coordination degree between logistics development, new urbanization and economic growth, this paper uses ArcGIS to analyze the coupling coordination level of 30 provinces and municipalities in China in 2004, 2008, 2012 and 2019, see Figure 2.

From the perspective of the distribution of coupling coordination levels, in 2004 and 2019, the coupling coordination degree of logistics development-new urbanization-economic growth in China changed from bordering imbalance to barely coordinating, and the number of provinces in 2004, 2008, 2012 and 2019 accounted for 33.3%, 40%, 53.3% and 56.6% of the total number of provinces, respectively, and the number of provinces in the mild dysregulation level accounted for 13.3%, 26.6%, 20% and 10% of the total, respectively. It shows that the level of coupling and coordination of the three systems varies greatly between regions, and measures should be taken according to local conditions to promote the development of the three systems to a higher stage of coupling and coordination.

At the same time, it can be seen that there is obvious spatial heterogeneity in the level of coupled and coordinated development of logistics development-new urbanization-economic growth in China. (1) From the perspective of the overall spatial distribution characteristics, the coordinated development of the three has been continuously improved, but the overall level of coordinated development is low, and the phenomenon of spatial differentiation is obvious. The area with low coupling coordination exists in a large area and has large spatial aggregation. The areas bordering and bordering the imbalance were distributed in the southwest and northwest regions in a continuous sheet, and the primary coordination areas showed a "T" shape distribution pattern in space. (2) The level of coupling coordination development shows a pattern of gradual decrease from east-central to west, and the high-value areas of coupling coordination are mainly distributed in Jiangsu Province, Shanghai and Guangdong in coastal and eastern regions; The areas with low coupling coordination were concentrated in Xinjiang and Qinghai Province in northwest China, Yunguichuan in southwest China and Hainan in South China, and the pattern was similar to the spatial distribution characteristics of logistics, new urbanization and economic growth, indicating that the coupling coordination degree of the three subsystems and composite systems was strongly correlated. (3) The coupling coordination degree distribution has a significant spatial convergence effect. The level of coupling and coordinated development in neighboring areas tends to be spatially consistent.

Therefore, continue to promote the strategic interaction between the western provinces and the eastern and central provinces, strengthen the connection between urbanization and logistics, weaken the "Matthew effect" of urbanization and economy on the coupling and coordinated development of logistics, and at the same time the eastern region should play a "catfish effect", break through geographical boundaries, achieve the efficient flow of logistics production factors, form a spatial spillover and radiation driving effect on the central region, and the western provinces should take advantage of the momentum to develop and realize the coordinated development of logistics infrastructure construction, logistics resource sharing and logistics policy consultation based on the entire region.

From the perspective of the spatial evolution of coupling coordination, the number of provinces with barely coordinated coordination increased in 2019. For example, Hebei, Shanxi, Anhui, Fujian, etc.; In 2008, 2014 and 2019, the number of provinces in primary coordination experienced an upward trend, and spatially continued to move to the central and northeastern directions, and the provinces with mild imbalance were mainly concentrated in the western region of China, and the spatial evolution characteristics were not obvious. On the whole, the development of provincial logistics in China, new urbanization and economic growth is slow.

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4. CONCLUSION AND POLICY RECOMMENDATIONS

4.1. CONCLUSION

All This paper uses the relevant statistical data of 20 provinces and cities in Chinese mainland from 2004 to 2019 to analyze the evolution characteristics of development level by constructing a measurement model of urbanization and logistics development-new urbanization-economic growth. On this basis, the coupling coordination model is used to quantitatively measure the coordinated development level of logistics development, new urbanization development and economic growth, and the temporal and spatial coupling evolution characteristics between the three are analyzed. The results show that:

First, on the whole, from 2004 to 2019, China's logistics development level and new urbanization level fluctuated and changed, the economic level rose slowly, and the overall showed a steady upward trend, and there was a certain correlation between the development and change characteristics of the three subsystems.

Second, the coupling coordination degree of China's logistics development-new urbanization-economic growth is between bordering dysfunction and barely coordinating, the relationship is relatively stable, the coupling coordination degree has been greatly improved, the best coupling coordination degree is located in the eastern region, the worst is in the western region, and there are obvious regional differences in the coupling and coordinated development of provinces.

Third, the spatial distribution of China's logistics development, new-type urbanization and economic growth coupling coordination degree is basically consistent with the "Hu Huanyong line", and the overall situation is "eastern> central> northeast >west", and the spatial distribution shows strong spatial aggregation and correlation.

4.2. Policy recommendations

According to the temporal and spatial evolution characteristics of the level of coordinated development of logistics development, urbanization and economic growth, combined with the "Medium- and Long-term Plan for the Development of the Logistics Industry (2014-2020)" and the "National New-type Urbanization Plan (2014-2020)", the functional positioning and functional division of labor of all provinces and cities in logistics development and new-type urbanization are further clarified; Through the overall planning of infrastructure construction and logistics network layout, promote the coordinated development of urbanization and logistics industry to drive economic growth, and propose differentiated coordinated and optimized countermeasures for various provinces and municipalities in China according to the heterogeneity of the coordinated development level of the three:

First of all, the central and some western provinces and cities can be used as multiple growth poles for the development of new urbanization, promote the development of logistics industry in various regions through the layout of regional logistics networks, and form a development form with urban agglomerations as the main body.

Second, give full play to the excellent geographical location of the eastern region, develop the hinterland economy, and bring about the radiation driving role brought by the high degree of openness;

Third, fully make the central region a link of interconnection between the eastern and western regions, improve the degree of openness of the eastern region, establish exclusive transportation channels with the western region, and the western provinces should take advantage of the momentum to develop and realize coordinated development based on infrastructure co-construction, resource sharing and policy consultation based on the entire region.

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In this way, the aggregation effect of resource and factor flow brought by new urbanization is stimulated to the maximum extent, and more demand is effectively released, and the improvement of new urbanization and logistics efficiency is promoted. At the same time, it is necessary to vigorously promote the reform and innovation of the logistics industry and the high-quality economic development, strengthen the integration and penetration of logistics and new urbanization and the linkage development, and promote the three to a higher level of coupling and coordination.

From the perspective of system theory, the logistics development-new-type urbanization-economic growth is regarded as an open and complex system, and the coupling coordination state between the three subsystems and its spatiotemporal evolution characteristics are quantitatively analyzed at the provincial scale, which makes up for the shortcomings of the current macro-scale research units in academia and the lack of research on the coupling relationship of the three systems, but the threshold range of mutual coercion and coupling between the three subsystems is not solved. Therefore, it is the direction that should be focused on in the future to construct the theoretical and technical framework of the interaction coupling effect of the three as a whole, and further analyze the stress strength, coupling law, critical threshold, and optimal regulation between the three subsystems.

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