



# Study on the Synergistic Development of Rural Logistics and Rural Economy Under the New Development Pattern

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**Abstract.** Logistics provides new impetus for rural economic development and puts forward new requirements for rural economy. Based on the panel data of 31 provinces (autonomous regions and municipalities) from 2015 to 2022, this paper constructs the evaluation index system of rural logistics and rural economic development, and analyzes the coordinated development level of rural logistics and rural economy in each region of the country by comprehensively adopting the entropy-weighted TOPSIS method and the coupled coordination degree model. The results of the study show that : the overall level of coupled and coordinated development of rural logistics and rural economy in the country shows a gradual upward trend, and the two show mutual promotion and mutual support effects, and the role of mutual promotion is gradually increasing. There is a big gap between the coupling and coordination level of rural logistics and rural economy among different regions, which is mainly characterized by the spatial distribution of "East>Central>West".

**Keywords:** rural logistics; rural economy; coupled coordination

## 1 INTRODUCTION

The report of the Twentieth Party Congress clearly pointed out the need to adhere to the priority development of agriculture and rural areas and to solidly promote the revitalization of rural industries. With the rapid development of rural e-commerce, the market transformation process of rural resources has been accelerated, providing new kinetic energy of wisdom for rural economic development. The construction of modern logistics system further introduces new products and theories into the countryside, accelerates the degree of market transformation in the countryside, and drives the transformation and upgrading of the rural economy. As an important link between rural economy and urban economy, rural logistics is an important foundation for promoting agricultural modernization, increasing farmers' income and developing rural economy. At present, domestic scholars mainly carry out in-depth research on rural logistics from the measurement of the level of development of rural logistics and the impact of two aspects of rural logistics. Regarding the measurement of the development level of rural logistics. Existing research results are mainly through a single indicator method[1] and

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composite indicator method[2] to establish the evaluation index system, entropy weight method[3] to measure the development level.

Research on the factors influencing the level of rural logistics development and their effects. Through the study, it is found that factors such as the level of infrastructure construction in rural areas[4] and the level of informationization[5] have an important influence on the level of rural logistics development. The improvement of rural logistics development level has a significant promotion effect on farmers' income[6] , urban-rural integration development[7] , rural economic growth[8] and so on.

Based on this, the evaluation index system is constructed based on the panel data of 31 provinces (autonomous regions and municipalities) from 2015 to 2022, the entropy weight method TOPSIS method is used to comprehensively measure the comprehensive development level of rural logistics and rural economy in all regions of the country, and the coupled coordination degree model is established to measure the degree of coordinated development between the two.

## 2 RESEARCH DESIGN

### 2.1 Indicator System Construction and Data Description

**Indicator System for Evaluating the Level of Rural Logistics Development.** Rural logistics is a logistics and transportation system based on the improvement of infrastructure facilities, government policy support, etc., with rural logistics as the main body of operation, information technology as the carrier, and the promotion of rural economic development as the fundamental purpose, the evaluation indicators are selected from four dimensions: infrastructure, informationization level, scale of development, and the economic environment, which in turn constructs the evaluation index system of the level of development of rural logistics, as shown in Table 1.

**Table 1.** Indicator system for evaluating the level of rural logistics development

target level	subsystems	Evaluation indicators	Indicator unit	Indicator properties	
Level of rural logistics development	infrastructure	kilometer mileage	kilometers	+	
		Fiber optic line length	kilometers	+	
		Rural delivery routes	kilometers	+	
	informatization level	Number of rural broadband access subscribers	ducal title meaning lord of 10,000 households		+
		Number of IPv4 addresses	ten thousand		+
		E-commerce sales	billions		+
	Scale of development	volume of freight	tons		+
		Freight turnover	gigatonne kilometer (unit of capacity of transport system)		+
		Total postal and telecommunication operations	billions		+
		Financial expenditure on transportation	billions		+

		Employed in the postal sector	man	+
economic environment		Per capita disposable income of rural residents	Yuan/person	+
		Consumption expenditure per rural inhabitant	Yuan/person	+
		Rural retail sales of consumer goods	billions	+
		Gross output value of agriculture, forestry, livestock and fisheries	billions	+

### System of Indicators for Evaluating the Level of Rural Economic Development.

With the modernization of rural governance and the continuous deepening of rural revitalization, the state's investment in rural infrastructure investment, rural industry investment, rural poverty alleviation and other aspects of the countryside has been increasing, and the economic strength of rural residents has become the basis of rural economic development, the added value of the primary industry, the proportion of the primary industry, the retail sales of consumer goods in townships and villages as a percentage of the retail sales of consumer goods in society as a whole, and the completion of the investment in fixed assets of rural households. Four specific indicators were selected to construct the evaluation index system of rural economic development level.

**Data Description.** With 31 provinces (excluding Hong Kong, Macao and Taiwan) as the research object, 2015-2022 is selected as the research interval. The raw data were mainly obtained from China Statistical Yearbook, China Urban Statistical Yearbook, China Rural Statistical Yearbook, and the statistical yearbooks of provinces and cities in previous years. For the problem of missing data in some years during the data collection process, the linear interpolation method was adopted to make up for it.

## 2.2 Research Methodology

**Entropy Weight TOPSIS Method.** As a multi-objective comprehensive evaluation method combining entropy weight method and TOPSIS model, entropy weight TOPSIS method can avoid the bias brought by subjective factors to a certain extent, and evaluate the sample data more accurately, comprehensively and scientifically.

**Coupled Coordination Degree Models.** The Coupled Coordination Degree Model (CCDM) is a research methodology used to measure the level of coordinated development between two or more systems that are interdependent as well as mutually constraining.

### 3 Empirical Analysis

#### 3.1 Analysis of the Level of Comprehensive Development of Rural Logistics and the Rural Economy

In this paper, the country is divided into three major segments in the east, middle and west, analyze the spatial distribution characteristics and temporal change trends of rural logistics and rural economic development level.

As can be seen from Figures 1 and 2, the overall level of rural logistics development and rural economic development in all regions from 2015 to 2022 shows a continuous improvement trend, but there are still significant regional differences. In contrast, the level of rural logistics development has a more obvious upward trend, and the level of rural economic development is more slowly, reflecting the imbalance and disharmony between rural logistics and rural economic development.

Compared with the eastern and central regions, the level of rural logistics and rural economic development in the western region is relatively low, indicating that there is still an imbalance in the development of rural logistics and rural economy, and that regional coordination needs to be improved. The weaker foundation of economic development in the western region, the imperfect construction of rural infrastructure, the inconvenient transportation due to the complex natural environment, and the obvious urban-rural dual structure have led to the lower and slower increase of the comprehensive evaluation index of rural logistics and rural economic development in the western region. The comprehensive evaluation index of rural economy in the western region from 2018 to 2022 has a high increase, and the development level of the rural economy has been rapidly improved, and the development gap with the east and central regions has been further narrowed. regions, further narrowing the development gap. With the implementation of the rural revitalization strategy, local governments have accelerated the promotion of characteristic agricultural industries, continued to improve the rural human environment, and continuously upgraded the level of services in medical care, health care, education and other areas, actively promoting urban-rural integration and fusion development.

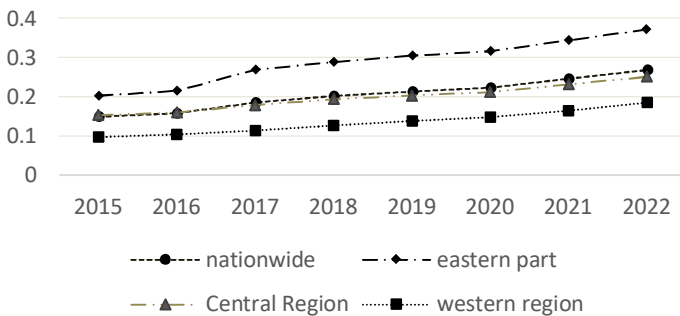


Fig. 1. Level of rural logistics development by region in China, 2015-2022

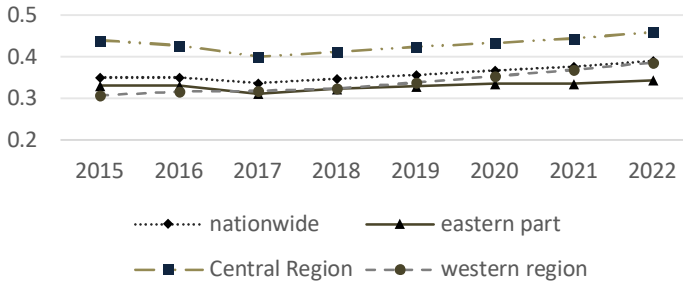


Fig. 2. Level of rural economic development by region in China, 2015-2022

### 3.2 Measurement Results of the Coupling Coordination Degree of Rural Logistics and Rural Economic Development

**Characteristics of Spatial and Temporal Distribution of Coupling Coordination Degree.** In order to further explore the dynamic changes in the coupling and coordination degree of rural logistics and rural economy as well as regional differences, the country as a whole is divided into three regions: east, central and west, and the development trend and spatial distribution differences in the coupling and coordination degree of rural logistics and rural economy in each province are analyzed, as shown in Figures 3 and 4.

The overall rural logistics and rural economic coupling coordination development level of the country as a whole shows a gradual upward trend from the barely coordinated stage to the well coordinated stage, indicating that the correlation between rural logistics and rural economic development has gradually increased, and the two have shown mutual promotion and mutual support effects, and the mutual promotion effect has gradually increased. The coupling coordination degree of the east-central region from the barely coordinated level to the good coordination level, the eastern region of the coupling coordination level there is a more obvious fluctuation change in 2020 after a rapid increase in the rapid decline in 2021-2022 in general a slow increase in the trend; the coupling coordination degree of the western region is gradually from the mildly dysfunctional stage to the primary coordination stage of the development of the level of its coordinated development compared with that of the east-central region There is a certain gap. Compared with the eastern and central regions, the western region has a relatively weak level of economic development and a relatively low utilization rate of land resource development.

There is a large gap between the coupling and coordination degree of rural logistics and rural economy among various regions, mainly presenting the spatial distribution characteristics of "East > Central > West". Specifically, the coupling and coordination degree of rural logistics and rural economy in the eastern region of Hebei, Jiangsu, Guangdong and other provinces was at a high level in 2015, reaching a good degree of coordination, and then rapidly improved, with a relatively significant growth rate. The central provinces have gradually changed from barely coordinated to primary coordinated, and the coupling degree of coordination is lower than that of the eastern region

in all years. In the western region, the degree of coupling and coordination between rural logistics and rural economic development in Qinghai, Ningxia, Tibet and other provinces is still at a low level in general, and the growth is relatively slow.

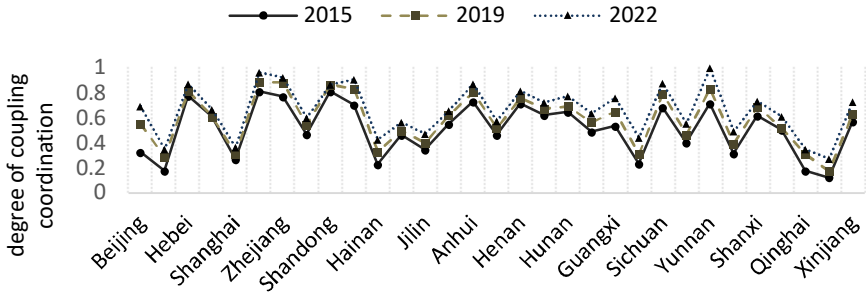


Fig. 3. Coupling Harmonization of China's 31 Provinces, 2015, 2019, 2022

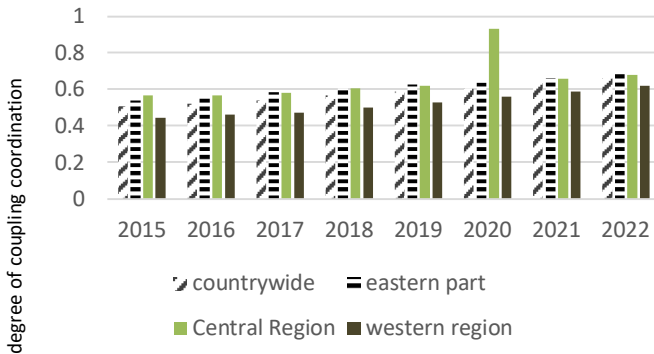


Fig. 4. Spatial distribution and dynamics of the degree of coordination of the coupling of rural logistics and rural economy

## 4 CONCLUSIONS AND RECOMMENDATIONS

### 4.1 Conclusion

Actively constructing a multifaceted synergistic pattern of rural logistics industry and rural economic development is an important guarantee for realizing high-quality rural economic development. Based on the provincial panel data from 2015 to 2022, the entropy weight TOPSIS method and the coupling coordination degree model are used to analyze the coupling coordination degree of rural logistics and rural economic development in each region of China, and further explore the dynamic evolution of the coupling coordination between the two. The following conclusions are drawn:

The overall rural logistics and rural economic coupling and coordinated development level of the country as a whole shows a gradual upward trend, the correlation

between rural logistics and rural economic development has gradually increased, and the two have shown mutual promotion and mutual support effects, and the role of mutual promotion is gradually increasing. There is a big gap between the coupling and coordination degree of rural logistics and rural economy among different regions, mainly presenting the spatial distribution characteristics of "East > Central > West".

## 4.2 Recommendations for Countermeasures

Based on the above research conclusions, the coordinated development of rural logistics and rural economy will still be in the stage of dynamic enhancement for a long time, and how to realize the common promotion of all dimensions, the efficient aggregation of information resources within each region, and the orderly flow of elemental resources between each region are the key contents of promoting the coordinated development between the two in the future, combining with the current status quo of the development of rural logistics, the following countermeasures are proposed:

- 1.Strengthening rural logistics infrastructure.
- 2.Strengthening the training of specialized rural logistics personnel to provide impetus for the development of rural logistics.
- 3.Improve the rural logistics development system.

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