Empirical Study on the Coordinated Development of Rural Logistics and Regional Economy in Jiangxi Province

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Abstract: This paper takes Jiangxi rural logistics under the background of Rural Revitalization as the research object. We analyze the influences of the development of Jiangxi rural logistics on regional economy based on researching the relevance between the development of Jiangxi economy and rural logistics, which is beneficial for relevant departments' and businesses' scientific policy decisions, provides effective suggestions and advice and promotes the coordinated development of rural logistics and regional economy.

1 Introduction

Jinping Xi proposed the rural revitalization strategy in Report of the 19th National Congress of the Communist Party of China on Oct. 18th, 2017. Xi indicated that the problem of agriculture, rural areas and farmers is the fundamental problem related to the national economy and people's livelihood. It is obliged to take this problem as uppermost priority in CPC's work and to implement the strategy of rural revitalization. The State Council promulgated the No. 1 central document in 2018 on Feb. 4th, 2018, named "Opinions of the Central Committee of the Communist Party of China and the State Council on the implementation of the strategy of Rural Revitalization". Rural logistics infrastructure is relatively backward. Rural logistics talents are seriously scarce. The development of logistics information network also lags behind. It is obliged to accelerate the construction of the backbone network of rural logistics infrastructure and encourage businesses engaged in commerce, postal services, express delivery, supply and marketing, and transportation to increase their facilities and networks in rural areas. It is obliged to speed up the improvement of rural logistics infrastructure terminal network and to encourage advanced regions to build common distribution centers for rural areas. It is obliged to vigorously develop rural logistics, to promote the integration of urban and rural areas, and to effectively improve the consumption level of rural residents, the external circulation capacity of agricultural products, and the supply of agricultural means of production. It is obliged to develop rural logistics and strive to solve the "last mile" problem in rural areas. With the integrated development of Internet & Rural Areas, rural e-commerce develops rapidly, demand for rural logistics becomes more urgent, and the development prospects of rural logistics becomes wider.

The total area of Jiangxi Province is 166.9 thousand square kilometers and the permanent population reaches 46.476 million in 2018, with 20.44 million in rural areas accounting for 43.98%. Jiangxi is a large agricultural province, with cultivated land area accounting for 2.5% of the country and agricultural production accounting for about 4% of the country. Rural construction is the most important work of Jiangxi government. The development of rural logistics is affected by the consumption level of rural residents. Improving the consumption level of rural residents can promote the development of rural logistics. The continuous improvement of the consumption level of rural residents promotes the circulation of rural residents' living materials and agricultural products and the development of rural logistics. Therefore, enhancing the purchasing power of rural residents and improving the consumption capacity of rural residents will bring strong impetus to the development of rural logistics.

2 Methods

2.1 Selection of Indicators in Grey Relation Model.

There are many indicators affecting the development of rural logistics, such as the development level of rural logistics, the development level of rural education, the consumption level of rural residents, the investment level of rural logistics, the development level of rural finance, the government's investment on rural logistics and the informationization level of rural areas. Grey relation model needs selection and quantification of indicators. Here are the key indicators affecting rural logistics:

2.2 The Development Level of Rural Logistics

We approximately regard the quantity of agricultural and livestock products as total freight volume of rural logistics. Total freight volume represents the development level of logistics, denoted by F&H.

2.3 The Investment Level of Rural Logistics.

It is represented by investment of transportation, storage and postal service in rural fixed assets, which is denoted by TS&P.

2.4 The Consumption Level of Rural Residents.

It affects the flow of living materials from the city to the rural areas and then improve the need of rural logistics, which is represented by rural residents' per capita living consumption and denoted by AEC.

2.5 The Development Level of Rural Education.

It is represented by the number of rural labor force, who have diplomas of junior college or above. It is denoted by JCO.

We obtain key indicators of rural logistics between 2009 and 2018 in Jiangxi Province from Jiangxi Statistical Yearbook. GDP is the main consideration of the metric of economy development.

Table 1.1 GDP in 2009-2018 of Jiangxi Province unit: 100 million yuan

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP	7655.18	9451.26	11702.82	12948.88	14452.2	15759.5	16780.9	18388.6	20006.3	21984.8

Table 1.2 Key indicators of rural logistics in Jiangxi Province

Indicator	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
F&H	1271.22	1385.5	1652.16	1755.89	1869.24	1958.96	2046.73	2205.82	2198.97	2221.397
TS&P	858.33	866.2	1753.09	1686.53	1800.76	2445.11	2444.92	2339.08	1464.99	2120.21
AEC	3532.66	3911.61	4660.09	5129.78	6075.2	6726.14	7688.44	8388.3	9230.21	10442.02
JCO	135	151	171	188	236	248	218	180	213	158

3 Empirical Analysis

3.1 Determine the Time Series of the Object Indicator and All Influencing Indicators

This empirical influencing indicator and the original object indicators are shown in table1.1and 1.2. Let $Y(k)$ denote GDP and $X_i(k)$ (i = 1, 2, 3, 4) denote F&H, TS&P, AEC, and JCO, where k is the time series.

3.2 Nondimensionalize the Original Data

We nondimensionalize the original data in Table 1.1 and 1.2 by dividing them by the mean data. We get the results shown in Table 1.3 by Equation

$$x_i(k) = \frac{X_i(k)}{X_i(l)}, k = 1, 2, \Lambda, n; i = 0, 1, 2, \Lambda, m$$

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Table1.3 Dimensionless indicators

Indicator	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
GDP	0.5133	0.6338	0.7847	0.8683	0.9691	1.0568	1.1252	1.2331	1.3415	1.4742
F&H	0.6847	0.7463	0.8899	0.9458	1.0068	1.0551	1.1024	1.1881	1.1844	1.1965
TS&P	0.4828	0.4872	0.9860	0.9486	1.0128	1.3753	1.3752	1.3156	0.8240	1.1925
AEC	0.5370	0.5946	0.7084	0.7798	0.9235	1.0225	1.1687	1.2751	1.4031	1.5873

3.3 Calculate the Correlation Coefficients of X0(K) and Xi(K)

We obtain the correlation coefficients of four influencing indicators and the object indicator, GDP by putting the dimensionless indicators into Equation

$$\xi_i(k) = \frac{\min\limits_i \min\limits_k |y(k) - x_i(k)| + \rho \max\limits_i \max\limits_k |y(k) - x_i(k)|}{|y(k) - x_i(k)| + \rho \max\limits_i \max\limits_k |y(k) - x_i(k)|}$$

, and setting ρ to 0.5, which are shown in Table 1.4 below.

Table 1.4 Correlation coefficients of Jiangxi's GDP and the indicators

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
F&H	0.6551	0.7441	0.7569	0.8095	0.8993	0.9999	0.9382	0.8815	0.6746	0.5387
TS&P	0.9176	0.6899	0.6175	0.8038	0.8844	0.5043	0.5650	0.7993	0.3846	0.5352
AEC	0.9359	0.8957	0.8118	0.7877	0.8799	0.9079	0.8850	0.8885	0.8432	0.7430
JCO	0.6215	0.6681	0.7378	0.7278	0.5418	0.5650	0.9369	0.5325	0.5970	0.3350

3.4 Calculate the Correlation Degrees and Sort Them.

We obtain the correlation degrees of all influencing indicators and GDP by putting the data in

$$r_i = \frac{1}{n} \sum_{k=1}^{n} \xi_i(k), k = 1, 2, \Lambda, n$$

Table1.4 into Equation . The results are shown in Table1.5 below.

Table 1.5 Correlation degrees of influencing indicators

Indicator	correlation degree
F&H	0.7898
TS&P	0.6702
AEC	0.8579
JCO	0.6263

4 Results

We obtain R3>R1>R2>R4>0.5 from the calculation above. i.e., all key indicators of rural

logistics are well correlated with Jiangxi's GDP. Among them, the correlation degree of the consumption level of rural residents and Jiangxi's GDP is 0.8579, which suggests that the consumption level of rural residents affects the development of regional economy in Jiangxi Province most and their correlation is the highest. As the consumption of rural residents in Jiangxi was low, it has been improved with the living standards of rural residents and their requirements of consumer goods has also been greatly improved. The market of consumer goods for rural residents promotes the development of rural economy in Jiangxi. Therefore, the development of rural logistics is well correlated with the consumption level of rural residents. The correlation degree of the development level of rural logistics and Jiangxi's GDP is 0.7898, which suggests a high correlation. Jiangxi has a low development level of rural logistics. The development of rural economy needs modernized logistics, modernized technology and devices, and informationized construction of logistics networks. We can promote the development of rural economy by developing rural logistics and further promote the regional economy in Jiangxi Province. The investment level of rural logistics and Jiangxi's GDP is 0.6702, which also indicates a relatively high correlation. Finally, the correlation degree of the education level of rural areas and Jiangxi's GDP is 0.6702, which also indicates a relatively high correlation. We propose relevant strategies for the development of rural logistics in Jiangxi by the conclusions above.

5 Conclusions

5.1 Increase Investment in Rural Logistics Infrastructure in Jiangxi Province and Improve the Level of Rural Logistics Technology

Jiangxi has been increasing the investment on rural logistics infrastructure in the recent year, which lags behind developed provinces and cities though. In the present, Jiangxi's rural logistics transportation is mainly road transport. To address the problem of"last kilometer"in rural roads is the most important issue. Increase investment in the construction of rural roads, realize the simultaneous development of rural and urban logistics, and solve the problem of rural logistics distribution. Promote the integration of rural informationization network, improve the information level of rural logistics, and improve the efficiency of the operation of rural logistics system. Increase investment in modern logistics technology of rural logistics, improve the operation efficiency of rural logistics industry, and improve the level of rural logistics technology.

5.2 Strengthen the Cultivation of Jiangxi Agricultural Products Market and Promote the Development of Jiangxi Cold Chain Logistics

Jiangxi is rich in agricultural products and large-scale agricultural products market, but the lack of cold chain logistics facilities restricts the development of agricultural products market. The government should give full play to its functions, optimize the cold chain logistics network of Jiangxi Province, increase investment in cold chain logistics, build a batch of cold chain logistics parks for agricultural products, storage and storage centers for agricultural products preservation, and invest in cold chain transportation equipment. Encourage logistics enterprises to provide cold chain logistics services, establish cold chain logistics service center, and use advanced cold chain logistics technology. Cultivate a number of cold chain logistics enterprises with advanced technology and professional services to serve the local agricultural product market and promote the development of Jiangxi cold chain logistics.

5.3 Increase the Policy Support to Jiangxi Rural Logistics and Promote the Development of Jiangxi Rural Economy

The development of rural logistics in Jiangxi restricts the development of rural economy. The complexity, slowness and integrity of the development of rural logistics require the government to increase the overall planning of rural logistics industry, specify the development direction, plan the development route and formulate development policies. Through the government planning, reasonably layout the rural logistics nodes, build the rural logistics center, agricultural product

storage center, trade center and distribution center, further develop the rural logistics industry, establish the rural logistics system, promote the development of urban and rural logistics, promote the sales of agricultural products, and promote the development of rural economy through the support of a series of policies.

5.4 Increase the Training of Rural Logistics Talents in Jiangxi Province, and Improve The Education Level of Rural Residents in Jiangxi Province

The lack of rural logistics talents in Jiangxi restricts the development of rural logistics. The logistics industry needs compound professional talents, which requires high level of knowledge and professional skills. With the rapid development of logistics, a large number of logistics professionals are needed. However, the logistics entry into China is relatively late, and the development is relatively slow at the beginning. The introduction of logistics specialty into the University started in 2001. Jiangxi Nanchang University started to set up the logistics management specialty in 2006. The trained logistics professionals are far from enough, and there are fewer logistics professionals flowing into the rural logistics industry. Therefore, the key to the development of Jiangxi rural logistics industry lies in the cultivation of Jiangxi rural logistics talents and the solution to the shortage of Jiangxi rural logistics talents.

Acknowledgements

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