

Study on the Influence of Logistics Development on High-Quality Economic Development

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Abstract. This paper studies the impact of the logistics development on the high-quality economic development. Firstly, we construct two systematic evaluation index systems of logistics development level and high-quality economic development level on the basis of the data of 31 provinces from 2011 to 2020, which is in order to establish a panel regression model to study its influence and action mechanism. Secondly, the results include: (1) logistics development can promote high-quality economic development. (2) The financial environment positively regulates the impact of logistics level on high-quality economic development. Finally, this paper gives policy suggestions from the perspective of overall logistics, infrastructure construction and scientific and technological development, which provides a new perspective for promoting the high-quality economic development.

keywords: logistics; high-quality economic development; panel regression model.

1. Introduction

Nowadays, the economy development in our country has entered the new period where efficiency is attached great importance. Meanwhile, modern logistics, as the connection point of production and consumption, whose industry totaled 33.52 billion yuan in 2021, is a vital support of industrial chain, value chain and supply chain, what is more, it is a crucial driving force of the national economic development. As a result, exploring its influence on economic quality development is conclusive to exploiting the logistics leading effect to the fullest, which also provides policy basis to explore feasible path of high-quality economic development.

2. Literature review and theoretical analysis

2.1 Literature review

The existing researches related to the topic can be categorized into the following three aspects:

Firstly, the features of logistics development are comprehensive, including cohesion role, overall role and advancing with The Times, so it can not be measured from a single aspect. Based on the entropy right method, Cui Hongkai constructs the evaluation index [1] of the logistics system from the dimensions of the input and output level and the development environment of the logistics industry. Hu Dongmei has established the evaluation system from the perspective of logistics development scale and logistics development quality [2].

Secondly, in terms of the measurement of high-quality economic development, Chinese economy has gradually realized the transformation from the high-speed growth to the high-quality development, so the construction of a reasonable and comprehensive evaluation system is an important means to measure the high-quality economic development. From the perspective of input-output efficiency, Ran Zheng [3] and other scholars selected the relevant indicators of total factor productivity as the proxy variable for the high-quality development of regional economy. Ma Ru [4] analyzed the overall trend of high-quality development of China's regional economy from five aspects of supply, demand, efficiency, operation and opening up. Considering the new development concept, large amounts of scholars [5] build a target system from the five dimensions, namely innovation, coordination, green, openness and sharing.

Thirdly, in terms of the influence mechanism between the logistics development and the high-quality economic development, Wang Mingming analyzed the internal correlation between logistics industry and regional economy, pointing out that the continuous updating of the operation mode of logistics industry can promote the vigorous development of regional economy [6]. Hu Dongmei studied the areas along the new coastal corridor in western China, constructing the general panel regression model and the spatial panel model, whose result demonstrates that the development of logistics industry has a significant positive role in promoting the regional economic development [2].

Through the above literature review, it is explicit that the existing researches provide relevant theories and empirical experience for analyzing the relationship between logistics development and high-quality economic development to some extent, but there are still the following aspects to be expanded, which is also the marginal contribution point of this paper:

(1) Most studies only concentrate on the interaction between logistics development level and economy, but researches on high-quality development need further analysis.

(2) No existing research has selected the combination of logistics infrastructure and scientific and technological development level as the main research body.

(3) Although extensive research has been carried out on logistics development and financial development, no single study exists which link them to examine their synergistic impact on high-quality economic development.

Therefore, this paper utilizes panel regression model based on the data of 31 provinces in 2011-2020, which is exploring the internal association between logistics development and high-quality economic development. What's more, we put the logistics development, financial development and high-quality economic development into one analysis framework, which enriches the research content and provides a new perspective where logistics and financial level promote high-quality economic development jointly.

2.2 Theoretical analysis of the impact of logistics level on high-quality economic development

Logistics has a pivotal role in bridging production and consumption, and it is fundamental to linking the first, second and third industry by means of strong economic system and wide coverage [7]. Also, the emerging idea of "green logistics" and "international logistics" are in accord with high-quality economic development connotation, which can be seen as a positive interaction in an indirect way.

Hypothesis 1: The logistics development level has a significant positive effect on the high-quality economic development.

In recent years, scientific and technological have emerged as powerful impulse for all walks of life, which can be applied to traditional logistics infrastructure so as to jointly improve logistics efficiency and augment profits, ultimately promoting high-quality economic development. However, there are differences in the contribution rate of the two factors. In contrast, the economy largely counts on the advance of science and technology to achieve the common growth of "quality" and "quantity".

Hypothesis 2: Compared with logistics infrastructure, the level of science and technology has a larger positive effect on the high-quality economic development.

Finance is the core of modern economy and is an essential way to promote the upgrading of industrial structure. On the one hand, the implementation of the inclusive finance policy has reduced the threshold and cost of the original financial services, stimulating the development of entrepreneurship and the real economy. Many logistics enterprises emerge thanks to this inclusive finance policy, thus creating a wide range of employment opportunities. On the other hand, digital finance can alleviate the information asymmetry which used to perplex financial institutions and users. Through timely and accurate matching along with information exchange of supply and demand data, the efficiency of financial resource allocation can be improved [8]. The efficiency of

logistics enterprises is improved in this link, thus indirectly promoting high-quality economic development.

Hypothesis 3: The joint effect of logistics development and financial development has a notable positive effect on the high-quality economic development level.

3. Model design

3.1 Indicator selection

3.1.1 Explained variable:

High-quality economic development level (ECO). Through contrast and analysis, this paper builds an evaluation system with five superior indicators and five inferior indicators from dimensions of innovation, green, development, coordination and sharing, estimating high-quality development level of different provinces in China on the basis of the entropy method.

Target layer	The standard layer	Measurement the indicators	Indicator direction	Indicator weight
The level of high-quality economic development	innovation	Number of new industrial products developed above designated scale	+	0.406
	greenness	Green coverage rate of the built-up area	+	0.082
	openness	Number of foreign-invested enterprises	+	0.223
	coordination	Percentage of the added value in the tertiary industry in the total gdp	+	0.243
	communion	Per capita disposable income	+	0.045

3.1.2 Interpretive variables:

Logistics development level (LOG). Having considered and compared the indicators adopted by previous studies, an evaluation index system is established to make a comprehensive and reasonable evaluation of the development level of regional logistics. The first-level index is the target layer, and the second-level index is the two dimensions, namely logistics infrastructure and logistics technology development level, which include 7 measurement indicators.

Target layer	The standard layer	Measurement the indicators	Indicator direction	Indicator weight
Logistics development level	Logistics infrastructure	Logistics industry fixed assets investment	+	0.102
		The population proportion of postal workers	+	0.065
		The number of postal business outlets	+	0.248
		Package number	+	0.144
	science and technology level	The proportion of Internet users	+	0.081
		R&D funds for internal expenditure	+	0.162
		Number of patents authorized	+	0.198

3.1.3 Regulatory variables

Financial Development level (FIN). This paper selects the year-end loan balance of financial institutions as the measurement index. The growth of finance can promote the flow of capital to various industries, which stimulates the logistics industry to a certain degree, along with promoting the high-quality economic development.

3.1.4 Control variables

In order to more accurately analyze the correlation between logistics development level and high-quality economic development level, this paper also controls the following variables which may affect the final results:

(1)the level of education (Edu), measured by the proportion of expected graduates. Labor who has received education for all-around development tends to master higher labor quality, which can improve the efficiency of production labor, thus indirectly promoting high-quality economic development.

(2)Urbanization level (Urb), measured by the urbanization rate. The expansion of urbanization can introduce more productivity and drive the development of rural economy, thus promoting high-quality economic development.

(3)Foreign trade scale (Ope), expressed by the proportion of total import and export to GDP.

3.2 Model construction

In order to explore the role of logistics development in high-quality economic development, the panel regression model is constructed:

$$ECO_{it} = \beta_0 + \beta_1 LOG_{it} + \beta_2 OPE_{it} + \beta_3 EDU_{it} + \beta_4 URB_{it} + \varepsilon_{it}$$

To further discuss the correlation effect of logistics development on high-quality economic development, this paper adds a cross term of logistics development level and financial development level to the theoretical model. The variables are treated logarithmically for the sake of improving the stability of variables and reducing the heteroscedastic variance:

$$ECO_{it} = \eta_0 + \eta_1 \ln LOG_{it} * FIN + \eta_2 OPE_{it} + \eta_3 EDU_{it} + \eta_4 URB_{it} + \varepsilon_{it}$$

Where i denotes each province, t denotes the year, $\alpha_0 \dots \alpha_4, \beta_0 \dots \beta_4$ are parameters to be estimated, ε_{it} are error terms.

3.3 Descriptive statistics of data sources and variables

To verify the universality and correctness of the hypothesis, this paper selected 31 provinces from 2011 to 2020 as research samples. The data sources are the China statistical Yearbook, China science and technology statistical Yearbook and the statistical year of provinces. For a few missing data, mean value is filled to get a complete data set, and the indicators are standardized to eliminate the adverse effects caused by diverse dimensions between variables.

4. Empirical analysis

4.1 Basic regression model

Before the empirical analysis, ADF unit root test was done for each variable in order to avoid pseudo regression, and the results showed that all indicators passed the test at the 1% significance level, which proved that the variables in this paper were stable and can be used in the further analysis. Next, the hausman test was applied to select which effect model should be used. The null hypothesis of this test is the random effect model, and the p-value of the test result is 0.000, which refuse the null hypothesis at the 1% level, so the fixed effect model should be selected. Then, in order to further verify the correlation between explanatory variables and control variables, the variance inflation factor test (VIF test) was conducted, and the VIF value of each variable was less than 5, which indicated that there was no multicollinearity among each variable, so empirical analysis can be conducted.

	Standardization coefficient	t	P	VIF	R ²
LOG	0.604	24.772	0.000***	1.821	0.9

	Standardization coefficient	t	P	VIF	R ²
OPE	0.399	12.866	0.000***	2.94	
EDU	-0.091	-3.926	0.000***	1.66	
URB	0.084	2.696	0.007***	2.995	

The regression results are shown in the figure. Both the interpretive indicators and the control indicators have significant effects on the explained variables. The coefficient of logistics development level is 0.593, reflecting its positive impact. The result can be explained in the following aspects: Firstly, with the continuous improvement of information degree, logistics can concordance the information flow, logistics and capital flow, so enterprises can obtain accurate control of the transportation, storage, packaging, handling, processing circulation, reducing the logistics cost and improving the production efficiency, which promotes economic development. Secondly, as a labor-intensive industry, each link of the logistics industry needs a lot of talents, so the logistics development has coined large amounts of employment opportunities, especially in developing countries and regions, the logistics industry to promote employment and reduce employment pressure plays an important role, to a certain extent, promote the common prosperity and economic development. Finally, the development of logistics can reduce the transportation cost and time cost of commodities, promote the trade activities between various regions, expand the market scale and increase the trade quota, which boost the development of the high-quality economy .

The coefficient of foreign trade scale, the proportion of urban population and the proportion of graduates are 0.651,0.215 and -0.125 respectively. Therefore, foreign economic scale and urbanization level have positive effects on high-quality economic development, while the education level has a negative effect to a certain extent.

4.2 Further discussion of the regression model

In the aforementioned panel,we speculate that high-quality economic development level is influenced by the logistics development level and other control variables, ignoring that the logistics development level can be composed of two aspects. This section will analyse the different impacts which logistics infrastructure and scientific-technological development exerts on high-quality economic development respectively.

	Standardization coefficient	t	P	VIF	R ²
URB	-0.041	-1.552	0.122	2.684	0.922
INF	-0.081	-3.074	0.002***	2.676	
TEC	0.866	34.069	0.000***	2.501	
OPE	0.332	12.689	0.000***	2.659	
EDU	-0.065	-3.52	0.000***	1.331	

The regression results are shown in the figure. Both the logistics infrastructure and science-technology level passed the test under the significance level of 5%, proving that both of them have an important impact on the high-quality economic development.

The coefficient of the logistics infrastructure construction level is-0.054, reflecting that it deters the economy from developing in a high-quality way to some extent. There are two likely causes for the differences between the results and our speculation. On the one hand, this discrepancy could be attributed to a certain hysteresis. It can be a long period from the capital investments in logistics infrastructure to really promoting the development of the logistics industry, so the empirical results are not consistent with the actual development; On the other hand, another possible explanation for the results may be the lack of appropriate policy guidance. Logistics infrastructure construction

efficiency varies in different regions, so the investments and planning in logistics infrastructure should also be tailored to local conditions. Some less developed areas ignore the local development status quo, inclined to fall into "imitative investments", which contributes to repeated investment and blind comparison[11]. So the empirical analysis demonstrates that it significantly deters the high-quality economic development. In 2020, the cumulative value of fixed investment in China's logistics industry reached 6,969.5 billion yuan, with a year-on-year growth of 1.4%, which is the lowest in nearly eight years, confirming that the focus of logistics development has gradually shifted from the traditional logistics infrastructure to the new logistics developing mode driven by science and technology.

The coefficient of science and technology level is 0.795, demonstrating that it is momentous in promoting the development of high-quality economy. It seems reasonable due to that ever-accelerating development of science and technology can enhance the productivity of resource allocation and facilitate the appropriate allocation of resources, so as to optimize the industrial structure, thus realizing the shift of economic development from factor-driven to innovation-driven mode[13].

4.3 Regulatory effect model

	Standardization coefficient	t	P	VIF	R ²
OPE	0.44	9.144	0.000***	2.17	0.675
URB	-0.104	-1.914	0.056*	2.778	
lnLOG*FIN	0.628	15	0.000***	1.647	
EDU	-0.088	-2.292	0.023**	1.382	

The interaction term between financial level and logistics level is positive and passed significance test, which implies that the development of logistics and finance can jointly furtherance high-quality economic development. There are plenty of reasons accounting for it. To begin with, inclusive finance can effectively and comprehensively provide services for all social groups, reducing the threshold for logistics enterprises to obtain financial services, and rural logistics organization mode is continuously optimized and improved [14] with the support of financial funds, which is conducive to the high-quality economic development. In addition, with the ever-accelerating development of digital finance, logistics enterprises can control the information more accurately in the market and the risk screening ability can be enhanced to a large extent. As a result, the unexpected expenditure can be spared, which improves the overall efficiency and development level of logistics industry, ultimately promoting the high-quality economic development.

5. Policy suggestions

In view of the above analyses, this paper makes the following policy suggestions:

5.1 Reasonably promote logistics development and high-quality economic coordinated development

The scoring results show that the level of high-quality economic development in southeast China is relatively high, so we should take advantage of its development advantages, play its role of economic radiation which can drive the development of the logistics industry in the surrounding areas, thus enhancing the development of high-quality economy.

The state should attach importance to the logistics development, giving more support to logistics enterprises at the macro level, and formulating relevant preferential policies.

5.2 Each province should adapt measures to local conditions in logistics infrastructure construction.

For the more developed areas, the logistics infrastructure has been relatively perfect, and the transformation from traditional logistics to new intelligent logistics should be further realized; For the less developed areas, the logistics development level needs to be improved, but instead of blindly following the development strategy of developed areas, they should promote the integration of logistics development and high-quality economic development based on their own advantages.

5.3 Increase the input in the elements of scientific and technological innovation

This paper verifies that the development of science and technology contributes significantly to the high-quality economic development, while China's current level of science and technology still has a huge room for improvement. Therefore, for the economically developed areas, we should continue to expand the intensity and scale of science and technology investment, and speed up the construction of logistics big data platform. For economically underdeveloped areas, policy makers should increase the government's innovation and research funds, strengthen the support for innovation, rectify the shortcomings of science and technology. Also, they should formulate special subsidies or encouraging policies related to scientific research to introduce and retain innovative talents.

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