

# Study on the Influencing Factors of Regional Logistics on Regional Economy in Shanxi Province

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**Abstract:** With the acceleration of the pace of Belt and Road construction and the strategic deployment of the high-quality development of China's logistics service industry, the logistics industry has occupied an increasingly important position in the whole national economy and even the world economy. Shanxi Province is rich in coal resources and has a large demand for logistics and freight transportation. Therefore, the economic growth of Shanxi Province has put forward higher requirements for the development and progress of the logistics industry. In this situation and background, the development of regional logistics will be of great help to the progress and growth of the overall industrial economy in Shanxi Province. This paper takes the theory of modern logistics, regional economic growth and regional coordinated development as guidance, and discusses the coordinated development of logistics industry and economic sustainable development in Shanxi Province. Firstly, a series of theoretical analysis on the coordinated development of modern regional logistics, regional economy and the correlation between regional logistics and regional economy with the aid of data analysis software stata and the research results are summarized and summarized, trying to make some suggestions for the sustainable development of logistics and economy in Shanxi Province.

**Keywords:** Shanxi Province; regional logistics; regional economy; and coordinated development.

## 1. Foreword

### 1.1. Research background

With the rapid advancement of the world economic globalization, the acceleration of the pace of Belt and Road construction and the strategic deployment of the high-quality development of China's logistics service industry, the logistics industry has occupied an increasingly important position in the whole national economy and even the world's economy. In the construction plan of "Belt and Road", in recent years, a large number of highway, railway, aviation and pipeline transportation routes, has enhanced the degree of connectivity, transportation and facilitation between China and countries along the routes. The launch and rapid expansion of China-Europe freight trains have laid the artery for the bilateral market of China-Europe. In this context, the development of the logistics industry can adapt to the needs of the world economic globalization and pace will play a crucial role, like the current developing country in China if you can quickly develop their own producer services, to enhance its comprehensive economic strength and international status has very important significance. Productive service industry has also gradually developed into a representative symbol of different regions in different countries, and become a symbolic part of regional economic capacity, and modern logistics industry precisely belongs to this category.

Shanxi Province is located in the central and western regions of China, rich in coal resources. For many years, it has continuously transported precious coal resources to various regions of China, so it has a great demand for logistics and freight, which also poses a greater challenge to the development of logistics industry in Shanxi Province. With the rapid development of China's economy and high-quality development, the income level of residents is constantly improving, the demand for consumer goods and logistics in various provinces is also increasing, and the relationship

between the development of regional logistics industry and regional economy is becoming increasingly close. Therefore, a scientific analysis of the internal linkage relationship between regional economy and regional logistics is of great significance to improve the economic development level of a region, and also helps to provide valuable reference significance for the local government, logistics management departments and other construction departments to make corresponding decisions.

### 1.2. Research significance

Experience facts show that the benefit of the logistics industry is closely related to economic development, through the regional logistics in theory and reality of carding and the development of regional economy, and the exploration of the collaborative relationship, beneficial to the regional logistics industry and economic high quality and high speed development to provide good reference and theoretical guidance, and enrich the coordinated development of regional logistics and regional economic theory research, the local government and the local logistics management department formulate relevant policies to provide good reference value.

#### (1) Theoretical significance

This paper in a lot of reading the scholars at home and abroad, on the basis of the modern regional logistics, regional economy and the coordinated development of both theory made a series of theory, combined with the logistics industry and economic development in Shanxi Province, select representative indicators, analyzes the regional logistics and regional economic coordinated development in Shanxi Province.

The analysis and review of related concepts and related theories can provide reference value for the subsequent research of regional logistics and regional economy, and also provide scientific basis for the local government to formulate specific policy objectives. Based on the concepts and theories related to the qualitative research, the regression model constructed by the data analysis software improves the

objectivity and scientificity of the research. Therefore, the research method of this paper has a strong theoretical significance, which reveals, enriches and deepens the linkage mechanism of the coordinated development of regional logistics and regional economy.

#### (2) Practical significance

Current our country economy is in the stage of rapid development, is to speed up the pace of towards high quality development, and the logistics industry as the basic industry in the whole social operation process, in many areas of supply chain node plays a very important role, international experience also shows that the role of the third source of profit will be more obvious. In the support of science and technology and the development of national economy in the background, regional economic balanced coordinated development, the trend of industrial division of labor and cooperation, production technology specialization level constantly improve, the logistics industry to promote industrial transformation and upgrading of economic and social development of important key driving force, and is to promote regional innovation and the key factors of common development of national economy, it can effectively to improve the local economic development and provide scientific guidance.

In Shanxi Province, China, for example to study the coordinated development of logistics industry and regional economy and linkage relationship, select relevant specific indicators to verify the coordinated development effect of regional logistics and regional economy in Shanxi Province, and further analyzes the specific degree of regional economy and regional logistics in Shanxi Province, find out the important coordination factors and uncoordinated factors, can more effectively promote the sustainable development of all walks of life in Shanxi Province.

### 1.3. Research methods

#### (1) Literature review method

This paper summarizes the theory of regional logistics and regional economic growth and the coordinated development of both, and makes sufficient theoretical preparation for the research of this paper.

#### (2) Combination method of qualitative and quantitative analysis methods

In the research process, this paper qualitatively analyzes the theory and the development status of Shanxi Province, and uses stata software to quantitatively study the relationship between logistics development and economy in Shanxi Province. The research process of the whole paper is more rigorous.

#### (3) Empirical analysis method

This paper collects the actual statistical data of the relevant indicators of logistics industry and economic development from 2010 to 2018 from the Bureau of Statistics of Shanxi Province, and makes a rigorous quantitative analysis of the linkage relationship by using econometric methods. The original data of the quantitative analysis indicators in this paper are all from the authoritative data published by the Bureau of Statistics, and the data have strong authenticity and reliability, so this is a very rigorous empirical analysis.

## 2. Literature Review

### 2.1. Domestic, related research

In recent years, as the importance of regional logistics in

China has been recognized and valued by more people, the research of domestic scholars on the coordinated development of logistics economy has gradually increased. The development of this research in China first started in the 1980s.

In the early stage, domestic scholars mostly made qualitative research on the synergy between the two from a macro perspective. With the rapid development of the Internet and science and technology, in recent years, domestic scholars are more comprehensive on this research, and tend to make quantitative analysis on the research of the sustainable development of various regions of the country.

In theoretical and qualitative research, Fan Lin put forward a point of view, namely when we think the degree of economic development level is directly affect the relationship between logistics and economic growth in one of one of the most important factors, that when our economic development level in a semi-developed state, the development of logistics and economic growth will promote each other, common development0.

Li Xiang deeply studied the theory of logistics growth pole and commented in the article, and discussed the development model of regional integration with relevant models, and provided good suggestions for this research, and put forward the development model of "whirlpool galaxy"[2].

Yang Mengjie in discussing the relationship between logistics industry and economy pointed out that modern logistics industry has a great influence on macro and micro economy and industrial economy[3].

Yue Yunkang, using the econometric model to study the mutual relationship between the development of logistics industry and economic growth, taking Shanxi Province as the key research object, judged the influence of the main economic indicators on the linkage between the two, and put forward that the regional logistics development and economic development have a positive role in promoting the development[5].

Mei-juan li in the paper points out a substantial significance of regional logistics is the specific administrative divisions into a geographical location and space, make full use of large and medium-sized and key core city of photovoltaic power grid radiation resource advantage, all kinds of goods from the starting entity to the destination for comprehensive logistics and service activities, serving the social and economic development of the region[12].

### 2.2. Foreign countries, and related studies

The development of foreign logistics industry is much earlier than that of China, and they have relatively advanced achievements in the logistics related theory and policy formulation and implementation. When European and American countries entered the industrialization era ahead of schedule, the role of the logistics industry becomes more and more obvious. In the process of historical practice, various countries in the world have accumulated a lot of successful experience and advanced theories in various logistics branch industries such as logistics procurement, operation, storage, transportation and distribution. Foreign research on regional logistics or regional economy is mainly reflected in the level of enterprises. The operation data is based on the internal logistics operation based on the most advanced mathematical model.

From the perspective of logistics and transportation environment, Wei-Bin Zhang uses theoretical research and

empirical research to find that the transportation environment of goods plays an influential role in logistics activities, and the change of transportation environmental conditions will have a certain impact on the development of logistics industry and its economic growth[14].

Kajal Lahiri With strict procedures and indicators, we try to establish a series of index system related to the transportation industry to evaluate the operation status and future development of the transportation industry[15].

Kerrimn L.P.Mruss,B. SC, Peng used the advanced and rigorous demand prediction model to explain the prediction method of cargo transportation in a certain area, focused on the transportation situation of daily necessities in urban and rural roads, studied and compared various prediction methods of cargo transportation in the academic circle, and made some evaluation [16].

Syed Abdul Rehman Khan We believe that the energy industry has a close relationship with the logistics industry. With the developed countries of South Asia Regional Cooperation Alliance as the main research object, it focuses on fossil fuel as the energy source, and analyzes the correlation between green energy and regional logistics and the development of regional economy. The comprehensive utilization rate of non-green renewable energy sources such as fossil fuels should not be too high, otherwise the social environment will be destroyed. He proposed the development of green logistics, which is of great value for promoting social progress and the development of ecological benefits.

### 2.3. Literature review

A large number of domestic and foreign literature provides a strong reference value for the theoretical combing and empirical research of this paper. However, there is little research on the coordinated and linkage development of logistics industry and economic development in Shanxi Province in recent years. This paper uses the latest data released by the official Bureau of Statistics to study the latest situation of Shanxi Province from multiple dimensions, which has strong timeliness.

## 3. Related Basic Theory

Since the formation of the concept of logistics, many theories have been gradually formed in the study of regional logistics in the world. The following are the theories related to the research topic of this paper:

### 3.1. Theory of unbalanced development

The theory of unbalanced development is one of the basic theories of logistics planning in a certain region. It was put forward by German scholar Albert Hirschmann. He does not agree with the theoretical balance. He believes that the imbalance between real life and production exists. The unbalanced development imbalance in the past is one of the important reasons for the current economic imbalance, and the subsequent actions themselves have caused a lot of new imbalances, which require a series of adjustments. The growth of modern economy is essentially the growth process of various regions and departments, and each sector has a close input-output relationship.

Therefore, in the current situation of limited economic material resources, Hirschmann advocated the development of the industrial sector with "connection effect" to achieve economic growth.

Whether based on experience or theoretical research, there

is no doubt, that is, regional logistics is an important part of regional economy, and there is a very close correlation between the two. And, because "because the logistics industry itself involves a very wide range of industries, it can go deep into the industry."It is a large integration of various industries, with a large span, dynamic, separation and complexity of the characteristics. The economic industry of a region is strongly related to all the local industries, so there are many similarities between regional logistics and the development of regional economy. Therefore, the unbalanced development theory originally used in countries or regions can also lay the foundation for regional logistics planning and be used for regional logistics development planning.

### 3.2. Regional logistics development planning mode (based on the unbalanced development theory)

Since 1978, China has started a series of reforms, and reflected on the theoretical perspective of traditional planning economics, and implemented the reform of opening to the outside world and its economic system. Later, in the 1990s, under the background of the overall goal of the reform of the socialist market economic system with Chinese characteristics was increasingly completed, the gap between the economic development level of inland and coastal areas was increasingly lengthening, and this phenomenon gradually attracted wide attention. In order to effectively solve the problem of fair development among various regions, China has begun to implement the comprehensive and coordinated economic development strategy among various regions. Regional logistics, as an important part of a regional economy, its construction, planning and development should be restricted by the regional economy. Therefore, this paper should face up to the objective reality, according to the above unbalanced development theory, choose a reasonable planning mode conducive to the development of regional logistics.

## 4. Data Source and Variable Selection

### 4.1. Data source and variable selection

#### 4.1.1. Data sources

The data used in the empirical analysis of this paper are all obtained from the website of Shanxi Provincial Bureau of Statistics.

Based on the statistics of Shanxi Provincial Bureau of Statistics, the GDP of Shanxi Province will reach over 17,000 billion yuan in 2020, a certain increase compared with the previous year. Among them, the added value of the tertiary industry, including the logistics industry, is about 900 billion yuan, which accounts for about half of the regional GDP. It can be seen that the logistics industry, as the tertiary industry, occupies a very important proportion in the process of economic growth in Shanxi Province.

#### 4.1.2. Variable selection

(1) explained variables (selection of regional economic measurement indicators)

For the measurement of regional economic development benefits, we should establish a reasonable index system. Based on the actual regional economic development situation and previous theoretical research, this paper adopts GDP (GDP) as the research object of regional economy in Shanxi Province:

GDP is the indicator of economic development used by many countries in the world today. Its full name is GDP, which specifically refers to the total market price of all final products calculated by a country or region according to the market price in a certain period of time.

In contrast, GDP can reflect an alliance, and the economic strength of a country or a region is one of the key indicators recognized by the world to reflect the benefits of economic development at the current stage, and can more accurately measure the economic situation of a certain region.

GDP is summarized with several important considerations: it is measured by final products and services and does not include intermediate products; it is a concept of market value determined by market supply and demand; it is measured in money.

Although the current for GDP can accurately reflect a country or a region's economic strength level has a big debate, such as he can not reflect the green development in the region, environmental protection benefits, also cannot reflect the local cultural development level, such as some regional GDP value is very high, but gambling, so such an economic state is not the best state. Because the academic circle has not found a better indicator to measure the economic development, so using GDP is the most effective way to measure the level of national economic development at the current stage.

(2) Interpretive variables (selection of regional logistics indicators)

On the basis of reading a large number of relevant literature and basic concepts, Some reasonable logistics indicators were selected to study the benefits of regional logistics, With this region of Shanxi Province as the center, With a part of the logistics industry operation indicators that can be accurately

measured, To express the development status and development prospect of regional logistics in Shanxi Province, In addition, in the studies related to specific indicators, Some scholars also put these specific indicators together as a package of indicators to represent the systematic evaluation indicators to make a comprehensive measure of this research topic, These indicators involve many aspects, Such as freight demand, economic environment, environmental impact degree, and development benefits and other indicators.

In the process of studying the development level of regional logistics, accurate logistics indicators can be used to analyze, which is of great help to the local government to formulate relevant industrial policies and implementation. Strict theoretical research is helpful for the government to formulate relevant policies for the weak links in logistics. At the same time, it also helps large, small and medium-sized enterprises in the province to develop their own operation strategies and judge the external market situation through the attention and understanding of these relevant indexes, so as to choose the most suitable business and investment direction.

According to the above analysis, this paper selects the index cargo transportation volume as the research object of regional logistics development in Shanxi Province:

The quantity of cargo transportation, also known as the public, refers to the quantity of goods in transit calculated by the "ton" per unit weight. It is the main indicator that reflects the efficiency of logistics capacity, the relationship between the transportation sector and other departments of the national economy, and the business scale of the logistics industry.

#### 4.2. Descriptive analysis

**Table 1.** Freight volume and GDP data of Shanxi Province from 2010 to 2018

a particular year	Freight volume (ten thousand tons)	GDP(Wan Yuan)	Highway freight volume (ten thousand tons)	Waterway freight volume (ten thousand tons)
2010	124677.00	92408000.00	60819.00	18.00
2011	137940.00	112846300.00	65201.00	41.00
2012	144622.00	121758300.00	73150.00	30.00
2013	156048.00	127204000.00	82834.00	28.00
2014	164924.00	128096600.00	88491.00	17.00
2015	161772.00	127934400.00	91240.00	17.00
2016	167082.00	129899100.00	102200.00	16.00
2017	189521.00	155284200.00	114880.00	20.00
2018	211503.00	168181100.00	126213.00	23.00

**Table 2.** Descriptive analysis of the relevant variables

variable	mean	standard deviation	least value	crest value
Y (G DP)	129000000.00	7344314.00	92400000.00	168000000.00
X(volume of transport)	162009.90	26343.15	124677.00	211503.00
X1	89447.56	22028.67	60819.00	126213.00
X2	23.33	8.31	16.00	41.00

#### 4.3. Model construction

Y deputy GDP

The X represents the amount of goods transported

Based on the above data, the model is  $Y = a + bX + e$  (where

e represents the residual)

## 5. Analysis of the Empirical Results

### 5.1. Basic regression

**Table 3.** Regression results

GDP	Coefficient	Std.err.	t	P>t	[95% conf.	interval]
fv	820.653	61.020	13.450	0.000	676.364	964.942
_cons	-3663666.00	10000000.00	-0.370	0.725	-27300000.00	20000000.00

Thus the regression is  $Y = -3663666 + 820.653X$

This model indicates that there is a clear positive correlation between freight volume and GDP. For every 10,000 tons increase in freight volume, GDP increases by about 8.2 million yuan. Freight volume has a strong amplification effect on the growth of GDP. The freight volume is an important index related to the development level

of the transportation industry. Therefore, this study shows that the regional logistics in Shanxi Province plays a great and obvious role in promoting the development of regional economy.

### 5.2. Discussion of the heteroscedastic difference problem

**Table 4.** The Result of Breusch–Pagan Test

Breusch–Pagan/Cook–Weisberg test for heteroskedasticity	
Assumption: Normal error terms	
Variable: Fitted values of GDP	
H0: Constant variance	
chi2(1) =	1.37
Prob > chi2 =	0.2411

Using the BP test, the results are shown in the table above, which shows that the chi-square statistics of BP test given  $\alpha = 0.05 = 1.37$ , the corresponding p-value is  $0.2411 > 0.05$ . There is no null hypothesis of heteroscedasticity in the accepted equation, indicating that there is no heteroscedasticity in the equation.

### 5.3. Discussion of endogenous issues

Endogenous problem. It is the problem that one or more explanatory variables in the model are related to the random disturbance term. The endogeneity of variables is always inevitable, and the problem caused by endogeneity mainly causes the inconsistency of parameter estimation.

Causes of the endogenous problems:

(1) missing variable

This is mainly because the actual problem of a variable is often affected by many variables, in the actual modeling process is unable to list all explanatory variables, in this case the influence of the missing variables is included in the error term, in the missing variables related to other explanatory variables, caused the endogeneity problem.

(2) measurement error

As for the problem of endogeneity caused by measurement error, based on the assumption of measurement error, the measurement error may be the measurement error of the variable y being explained or due to the measurement error of the explained electric quantity x. These two situations cause different results.

(3) Two-way interaction

This endogeneity problem caused by the most common in reality, the basic principle can be expounded for the explained variable Y and there is an interaction process between X, X value can cause the change of the value of Y, but the change

of Y will, in turn, affect X, so in the regression equation, if the impact of the residual term affects the value of Y, and the influence through Y to X, resulting in X and the residual term, also caused the endogeneity problem.

The problem of the endogeneity of the subjects in this paper should exist, because the explanatory variables and the explained variables should interact with each other, that is to say, the relationship between freight volume and GDP should be complementary.

### 5.4. Inspection of heterogeneity (heterogeneity of transportation mode)

In view of the different modes of cargo transport and the regional particularity, it is necessary to study the impact of different modes of transport on economic benefits. In this paper, the cargo transport volume is divided into road transport volume and waterway transport volume. By introducing the data of Shanxi Province, a new model is established to detect the heterogeneity.

Measure the effect of water transport on GDP

Build model  $Y = Cx_1 + d$  (where  $x_1$  represents the amount of water transport)

The regression equation was used to establish  $Y = -437828.7x_1 + 1.40e + 08$

It can be seen that, because the water transport volume in Shanxi Province is very small, the influence of the water transport volume on GDP in this regression is negatively correlated.

Measure the impact of road transported freight volume on GDP

Build model  $Y = Mx_2 + W$  (where  $x_2$  represents road transport freight volume)

The regression equation  $Y = 950.143x_2 + 4.43e + 07$  was

obtained using s tata

It can be seen that the impact of road transport freight volume on GDP is positively correlated.

When the study subject was road transport, there was a positive correlation between the explanatory variables and the explained variables. When the subject was water transport, there was a negative correlation between the explanatory variables and the explained variables. Therefore, it can be judged that there is heterogeneity between highway freight volume and waterway freight volume.

## 6. Conclusions and Suggestions

### 6.1. Conclusion

According to the empirical analysis above, we can find that the significant synergistic linkage relationship exists between the regional economy and the regional logistics in Shanxi Province, which is specifically manifested in the positive correlation between the total amount of cargo transportation on GDP. However, due to the influence of geography and other factors, different transportation modes will have different effects on GDP in Shanxi Province. The positive impact of road transport freight volume on GDP is very significant, but water transportation is not. Therefore, in order to effectively improve the coordinated and sustainable development of regional logistics and regional economy in Shanxi Province, we must pay attention to the situation of cargo transport by road transportation and reduce the investment in waterway transportation.

### 6.2. Suggestions

(1) Focus on the government leadership role and policy research on the coordinated development of regional logistics and regional economy

Under the guidance of the government, the province should give full play to the advantages of traditional industries, stimulate economic growth, the market main body to seize their own management, the key to complement each other, on the basis of steady, keep forward drive, to realize the overall regional economy in Shanxi Province, high quality high speed development to make important efforts.

In order to effectively solve the problems of internal supply chain disharmony in China's logistics service industry, First of all, we should consider both enterprises and the government. Accelerate the reform of the logistics industry management system, Government departments should strengthen the support and guidance for some leading logistics companies and small and micro logistics companies together, At the same time, give full play to the leading function of some leading logistics companies and the diffusion function of small and micro logistics companies, Smooth the flow of logistics information and resources in the market, Unified logistics standards (such as the current logistics industry for container pallet standards has not fully formed a unified standard similar to the container, This will cause a lot of waste of human and material resources for the containers, Making the container logistics very inefficient), Make the logistics service quality rise to a higher level, Then to improve the development and operation level of regional logistics in Shanxi Province.

Secondly, from the perspective of social and economic sustainable development of Shanxi Province, Shanxi Province belongs to inland areas, and because of a large number of digging coal operation, air pollution problem in

Shanxi Province, so the governments at all levels should effectively control the source of air pollution and effectively control the environment with the corresponding policies and measures, especially in Shanxi Linfen air pollution areas should focus on the coordinated development of logistics and environment.

(2) Use the level of science and technology to optimize the logistics structure and pay attention to the efficiency improvement of road transportation

In the current era of big data, the survival of any industry is inseparable from the support of information technology, and the logistics industry is no exception, so we should strengthen the construction of public information service platform, integrate the information, equipment, technology and other resources of physical logistics, improve the informatization level of logistics industry, optimize the structure of logistics industry, improve the informatization degree of various modes of transportation, improve the transportation efficiency, and promote the further transformation and upgrading of the logistics industry.

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