



The Impact of Emerging Service Industry on the Economy of Henan Province from the Perspective of the Modern Logistics Development: Based on Multiple Regression Analysis

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Abstract. At present, the world is greeting a “service economy era,” and China has given the emerging service industry an important strategic position and development significance. This paper selects the development of the modern logistics industry as the representative of the current emerging service industry, takes the GDP of Henan Province from 2010 to 2019 as the measure of the Henan economy, and uses the essential indicators in the modern logistics industry to explore the impact of the development of modern logistics industry on the economic development of Henan Province. Combined with regression analysis, the policy support and institutional guarantee of Henan provincial government to the local modern logistics industry can effectively promote the social and economic development of Henan. The research of this paper plays a guiding role in the future development policy of the modern logistics industry in Henan Province. It helps to promote the further construction of Henan Province into a national logistics distribution center.

Keywords: emerging service industry · modern logistics · economic development

1 Introduction

At present, the development of the emerging service industry is highly valued in China. The reason is that the development of the emerging service industry is closely related to the transformation of economic growth mode and structural adjustment, stabilizing prices, ensuring people’s livelihood, and promoting reform [1]. In recent years, much literature has studied the impact of the emerging service industry on social and economic development. For example, Huang Weibing [2] found that from the current trend of international economic growth, the emerging service industry may become the most

significant industry globally and provide the sustainable driving force for the continuous development of economies worldwide.

In recent years, China has adopted different policies and guidelines to promote social and economic development. China attaches great importance to the development of the tertiary industry because vigorously promoting and developing the development of the tertiary sector can make China's overall economic model close to that of developed countries [3], expand domestic demand, and promote the upgrading of industrial structure. More importantly, it can boost employment and improve the overall employment rate of society to ensure and improve people's livelihood, promote social and economic development.

However, it is worth noting that the development level of the emerging service industry in different countries worldwide is different, which is reflected explicitly between developed and developing countries. In developed countries, the emerging service industry is multiplying. Take the United States as an example. By the end of 2004, the service industry accounted for 83% of the U.S. GDP, absorbed nearly 85% of the U.S. employment, and provided more service jobs in other sectors. In contrast, in China, He Zhengchu, Wu Yan and Zhang Mi [4] found that integrating China's production service industry and strategic service industry is not optimistic; that is, the development of China's service industry is still unbalanced.

According to the definition of the emerging service industry, emerging service industry refers to an industry that is born with the development of information technology and the emergence of a knowledge economy, the refinement of the social division of labor and the upgrading of consumption structure, or the transformation and upgrading of the traditional service industry with modern new technology, new business form and new service model, to provide high added value to the society Service industry to meet the high-level and diversified needs of society [1]. The modern logistics industry is a typical representative of the emerging service industry.

This paper selects Henan Province as the representative to study the impact of the logistics industry on the social economy. The reason is that Henan Province is located in the core area of central China. The market coverage is high, the radiation range is wide, the gathering capacity is strong, and the cost of logistics collection, distribution and distribution points is low. According to the conclusion of this paper, the development of the modern logistics industry in Henan Province in recent years can improve the level of economic development in Henan Province to a certain extent. Therefore, the research on the emerging service industry can play a particular guiding role in formulating China's economic policy in the future.

2 Data, Variables and Measurement Models

2.1 Gross Domestic Product

Gross domestic product in measuring the economic development of Henan Province, this paper will use the gross domestic product (GDP) data of Henan Province to reflect its economic growth. Economic growth can be studied in terms of "quantity" and "quality." Concerning improving "quality," economic indicators no longer focus on a single economic growth rate but people's average quality of life in a country or region. At

the “quality” level, it is difficult and subjective to measure the economic development of Henan Province. Therefore, this paper only measures the economic development of Henan Province from the perspective of “quantity.” Due to the availability and effectiveness of data, this paper uses the GDP of Henan Province from 2010 to 2019 to measure economic growth.

2.2 Cargo Volume Data

In the modern logistics industry research, scholars generally use the logistics demand index to measure the development speed of the modern logistics industry [5]. Among them, the running volume of goods can directly reflect the social demand for logistics. The higher the social demand for logistics, the more the corresponding goods turnover. Therefore, this paper will select the goods operation volume (TCV) of Henan Province from 2010 to 2019 as the index to reflect the regional logistics demand.

2.3 Total Mileage Data of Transportation Network

Modern logistics is developing rapidly. Theoretically, the quantification of logistics networks should exist in species transportation modes, including railway, highway, waterway, aviation, and pipeline transportation. However, in China, cargo transportation is still dominated by road, railway, and air transportation. Liu Nan and Li Yan [5] pointed out that the index of goods supply capacity can measure the development degree and trend of the modern logistics industry. With the development of China’s modern logistics industry, by the end of 2018, the total mileage of national roads was 4.8465 million km, an increase of about 2% year-on-year^①. Therefore, this paper defines the total mileage of transportation and logistics network in Henan Province as the sum of the total mileage of highway transportation and the total mileage of railway and air transportation as one of the indicators reflecting the development degree of modern logistics in Henan Province.

2.4 Total Data of Post and Telecommunications Services

The logistics industry is integrated. It is a composite service industry of transportation, warehousing, and information industry. Many industries involved are essential parts of China’s national economy, and the corresponding industry range is wide. In the research process of the development degree of the modern logistics industry, Henan post and telecommunications business volume (PTV) can be used to measure. This index can comprehensively reflect the total achievements of post and telecommunications business development in a certain period. The post and telecommunications business is an essential part of the modern logistics industry. Therefore, this paper will select PCV to measure the development speed of the logistics industry in Henan Province.

2.5 Empirical Model

The core explanatory variable of this paper is the GDP of Henan Province, which is different from the focus of previous literature. This paper focuses on the impact of the

overall development of the modern logistics industry on GDP. Therefore, this paper will not measure the development status and trend of some subdivided industries in the logistics industry but select the indicators that can represent the overall logistics development level of Henan Province. Based on the above hypothesis, the basic regression model proposed in this paper is as follows:

$$Y_{gdp} = \alpha X_{tcv} + \beta X_{mht} + \delta X_{pcv} + \epsilon_t \quad (1)$$

Among them, Y_{gdp} represents the GDP of Henan Province. According to the above analysis, the GDP may be affected by the logistics industry's development, and the logistics industry's development may be affected by factors such as TCV, MHT, and PCV. Therefore, X_{tcv} represents the cargo operation of Henan Province in the period, X_{mht} represents the total mileage of the transportation network within this period, and X_{pcv} represents the total amount of post and telecommunications business in Henan Province. According to scholars' research on the modern logistics industry, such as Liu Nan, Li Yan [5] and Zhang Wenjie [6], the development of the logistics industry is inseparable from the above factors. It is generally believed that the changes of TCV, MHT, and PCV are in direct proportion to the development of the logistics industry. However, due to too many variables affecting the logistics industry, including but not limited to the aforementioned variables, there may be problems such as missing variables. The random disturbance term will be introduced into the model ϵ_t , data source: Henan Statistical Yearbook.

3 Analysis and Test of Model Results

3.1 Regression Result Analysis

According to the basic regression model mentioned in Eq. (1) above, the output results obtained by regression analysis of the user data based on Eviews are shown in Table 1. The sample determination coefficient R-squared is 0.938, which means that MHT, PCV, and TCV can explain 93.8% of the total change of GDP in Henan Province. Therefore, the fitting degree of the regression line to sample points is better. The F statistic is 30.17536 and the p-value used is 0.0005 (less than 0.05), indicating that the overall linearity of the equation is significant. It can be seen from Table 1 that the p-value corresponding to the t-statistic of TCV variable is more significant than 0.05 (0.05 is the significance level given by the standard), indicating that the impact of TCV on the GDP of Henan Province is not significant, which is inconsistent with the results obtained by F statistics. In conclusion, the regression results may have multicollinearity, as shown in Table 1.

3.2 Variable Correlation Test

From the above analysis, it is speculated that the model may have multicollinearity. Therefore, this paper tests the correlation between explanatory variables to test the pairwise correlation between explanatory variables. The results of the Eviews analysis are shown in Table 2.

Table 1. Results of basic regression model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ϵ_t	-1.136E + 05	4.011E + 04	-2.831E + 00	2.990E-02
MHT	5.838E-01	1.446E-01	4.038E + 00	6.800E-03
TCV	9.359E-01	1.458E + 00	-6.417E-01	5.448E-01
PCV	2.420E-04	9.480E-05	2.551E + 00	4.340E-02

Table 2. Correlation between explanatory variables

Correlation coefficient	MHT	TCV	PCV
MHT	1.000E + 00	7.780E-01	6.767E-01
TCV	7.780E-01	1.000E + 00	9.772E-01
PCV	6.767E-01	9.772E-01	1.000E + 00

It can be seen from Table 2 that the correlation between explanatory variables is high. In order to test and deal with multicollinearity, the standard adopts modified Frisch for step-by-step analysis, and the results are shown in Table 3. According to Table 3 and the analysis and regression results of economic theory, with the addition of TCV, the goodness of fit and the modified goodness of fit decrease, indicating serious multicollinearity in the model. Therefore, MHT and PCV should be retained in the model, and TCV should be omitted. When only the explanatory variables MHT and PCV are retained, the variables are significant, the equation is significant, and the decision coefficient is 0.997. At the same time, the t-test results show that according to the economic theory analysis and regression results, it is easy to know that MHT is the most important explanatory variable.

3.3 Stationary Test

The results of the ADF test for explanatory variables and explained variables were unstable. In analyzing the above model, to effectively evaluate the impact of the development of the overall logistics industry on economic growth in Henan Province and to make the data results precise and convenient for empirical and subsequent comparative analysis, this paper first preprocesses the data. This paper will eliminate the price factor for all the above indicators. Because this paper selects the relevant data of Henan Province from 2010 to 2019, calculates the GDP deflator, and converts all the data into the constant price in 2010 for analysis to obtain the actual GDP.

At the same time, in the process of compressing the variable data scale, in order to ensure the stability and invariability of the data properties, reduce the data error, facilitate the subsequent data calculation, and reduce the absolute value of the data, this paper will take the natural logarithm of the variables as mentioned above. From the ADF

Table 3. Modified Frisch stepwise analysis results

Independent variables	ϵ_t	MHT	TCV	PCV	R^2	Adjusted- R^2
Step1	-1.944E + 05	8.792E-01	—	—	8.597E-01	8.422E-01
	1.155E + 04	—	1.340E + 00	—	8.245E-01	7.806E-01
	-9.039E + 03	—	—	2.271E-01	9.375E-01	9.219E-01
Step2	2.012E + 05	-8.463E-01	2.893E + 00	—	8.768E-01	7.947E-01
	-6.786E + 04	2.660E-01	—	1.734E-01	9.996E-01	9.993E-01

Table 4. ADF unit root test results

Independent variables	MHT	TCV	PCV
Level	0.839	0.453	0.998
1st difference	0.081	0.110	0.277
2nd difference	0.031	0.000	0.043

unit root test, we know that $ygdp$ is a second-order single integer time series with general stationarity. The results of the ADF unit root test are shown in Table 4.

4 Policy Suggestions

At present, China's modern logistics industry is in its infancy, there is still a significant gap compared with developed countries, and China's logistics enterprises have a small business scale and low market share [7]. For Henan Province, the development of logistics industry in Henan Province needs not only the operational guidance and participation of the Henan provincial government but also the participation of local logistics enterprises in Henan Province to create a good market environment and a good policy and regulatory environment for the development of modern logistics industry in Henan Province, to promote the leapfrog development of logistics industry. Specifically, it can be constructed from the following aspects:

4.1 Establish and Improve the System of Laws, Regulations and Policies

The development and organization of the modern logistics industry are inseparable from government functional departments such as transportation, trade, customs, industry, and Commerce and taxation. Only by formulating and coordinating various laws, regulations,

and policy systems to develop the modern logistics industry can we form a coordinated and unified whole [8].

At the same time, the modern logistics industry covers a wide range. The logistics industry and many industries in the market economy can be interrelated, such as the electronic communication industry. The relationship between various industry subjects is complex. The government should actively guide the development of the industry and do an excellent job in the coordination between different industries to form a development situation of mutual promotion, mutual benefit, and win-win, Provide more powerful service support for the service industry and socio-economic development of the province.

4.2 Strengthen the Introduction and Training of Talents in the Logistics Industry

At present, professionals in the logistics industry in Henan Province are scarce. At the annual meeting of Henan Supply Chain Management Association held in 2012, it was also clearly pointed out that the lack of talents has become a bottleneck restricting the development of logistics in Henan Province [9]. Therefore, Henan provincial government needs to actively face the whole country and even the world to introduce high-quality logistics talents; through the cultivation and introduction of talents, accelerate the transformation and development of the logistics industry in Henan Province.

5 Conclusion

To sum up, this paper studies the impact of modern logistics development on the economy in Henan Province. The results show that the development of the modern logistics industry in Henan Province will lead to the economic growth of Henan Province, that is, the growth of GDP. In addition, this paper also found that among the explanatory variables selected in this paper, the total mileage of the transportation network is the most important among the selected indicators. Reflected in the modern logistics industry in Henan Province, the development of the total mileage of transportation network can promote the economic development of Henan Province relatively more obviously. The research of this paper plays a guiding role in the economic development and policy implementation of Henan Province.

The limitation of this paper is that only a few indicators in the modern logistics industry are selected to study the whole modern logistics industry. For the modern logistics industry, the indicators that can reflect the development of the industry are inseparable from the development of other industries because the modern logistics industry spans many different industries, including the mobile communication industry, information service industry, and so on. In this paper, three types of data are selected as indicators of the development of the modern logistics industry to evaluate its impact on economic development. To a certain extent, the promotion role brought by other industries is also attributed to the development of the logistics industry, which may virtually enlarge the economic utility brought by the development of the modern logistics industry. In testing the stability of the data, The stationarity reflected by the data is general. Additionally, this paper only selects data on the development of Henan's logistics industry between 2010 and 2019, so the comprehensiveness of the data should be improved.

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