International Core Journal of Engineering Volume 9 Issue 7, 2023
ISSN: 2414-1895 DOI: 10.6919/ICJE.202307_9(7).0045

Analysis of Industrial Association and Ripple Effects in China's Postal Industry

-- Based on the National Input-output Table in 2017

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Abstract

In this paper, through the use of input-output model, based on the 2017 national input-output table of China's postal industry industry association as well as the ripple effect of data analysis, China's postal industry and most other industrial sectors exist in the degree of forward and backward correlation is weak, but there is a more significant pulling effect on the business services sector, road cargo transportation and transport auxiliary activities sector; to the air The role of supply and promotion to air cargo transportation auxiliary activities, other transportation equipment sector and postal sector is more significant; road cargo transportation and transportation auxiliary activities industry sector and air cargo transportation and transportation auxiliary activities industry sector are the circumferential related industries of China's postal industry; the degree of induction and influence of China's postal industry are less than the average degree, so there is a weak driving and radiation capacity to the economy, and there is Greater development potential and space.

Keywords

Postal Industry; Industry Linkage; Ripple Effect.

1. Introduction

Along with the rapid development of China's e-commerce, China's postal industry has also been the rapid development of the postal industry as an important part of China's tertiary industry, has been a powerful force to promote e-commerce, while the postal industry as the main driving force of China's sustained economic growth, to solve the employment of society and adjust the industrial structure and other issues, has been highly valued by the party and the state, through continuous and in-depth reform, under the support of relevant national policies, the postal industry will face more opportunities. Through continuous and in-depth reform, with the support of relevant national policies, the development of China's postal industry industry will also face more opportunities.

About the postal industry, many scholars have done research, Yu Liangchun et al. through a profound analysis of the industrial and economic structure of the Chinese people's postal industry, in-depth interpretation of industry-related policies, in many issues, such as competitive business, ensure the implementation of China's postal industry service social obligations and development, etc., put forward some industrial management policies that are conducive to the healthy and sustainable development of China's postal industry [1]; Ni Linglin , Hu Hao et al. analyzed the existence of different spatial organization networks of different enterprises within China's express industry with many dimensions such as express flow and organization mode, and also analyzed their characteristics, and analyzed the current as well as future development strategies of China's express industry from

ISSN: 2414-1895 DOI: 10.6919/ICJE.202307_9(7).0045

the perspective of Internet of Things, mainly based on the background of today's era [2]; Lu Hongyan studied and discussed the internationalization characteristics of the postal industry under the perspective of global big picture, based on the The development path of China's current postal industry [3]; Zhou Xiaoli based on the background of e-commerce on the future development of the courier industry, and analyze the future opportunities and challenges that may face, for which a systematic analysis and develop corresponding countermeasures [4]; Li Gang on the basis of understanding the current situation of China's postal industry and a detailed summary of the laws of future economic development, the postal The future development trend of the industrial sector is studied [5]. The relevant research helps to understand the impact on the postal industry under the national economy, to understand the trend of change, the direct relationship between different industries, and thus to promote the development of the postal industry.

Analyzed in terms of industrial development correlation and wave as well as effect research, Zhao Xia scholars analyzed the correlation between the distribution industry and manufacturing manufacturing industry and concluded that the backward pulling effect of the distribution industry on the manufacturing industry is much stronger than the forward supporting effect, but at the same time shows an upward trend [6]. Zhao Xia also used input-output analysis to study the contribution of the distribution industry to economic growth and concluded that the contribution of the distribution industry to the primary industry is much stronger than that of other industries [7]. Based on the input-output table in 2010, Li Yangchao and Zhu Hailiang scholars analyzed the data related to the industrial linkage and industrial ripple effect of the distribution industry from the distribution and input structure of the distribution industry as well as the added value, and clearly concluded that although the current influence of the distribution industry has some limitations, the huge development drive of the distribution industry to the national social economy is a not to be underestimated [8]. Li Xiaochao and other Zhejiang in recent years, based on industry associations and dissemination of theoretical input-output tables, the postal industry in Zhejiang's industrial status, the change in the level of industrial relevance was analyzed, and conclusions related to the development of Zhejiang's postal industry [9].

Based on the above research, this paper takes China's postal industry industry association and wave theory as the entry point, based on the latest input-output data released by the National Bureau of Statistics, by using the method of input-output model, the postal industry in China's postal industry forward associated industries, backward associated industries, through the data to explore the more associated sectors with China's postal industry, and based on the calculated data, for China's postal Based on the calculated data, we put forward relevant and targeted countermeasure suggestions for China's postal industry, which has a more positive impact on accelerating the rapid development of China's social economy and greatly promoting the healthy, stable and long-term development of China's postal industry.

2. China's Postal Industry Industry Correlation Analysis

2.1 Backward Correlation of China's Postal Industry

The direct consumption coefficient mainly refers to the amount of another industry consumed in the production of a unit product of an industry [10], which can be expressed in the following form:

$$a_{ij} = X_{ij} / X_j \tag{1}$$

Where X_{ij} indicates the consumption of industry j products relative to industry i products, X_j indicates the total amount of output that can be produced by all products in industry j sector, then a_{ij} table unit j indicates the amount of product i that needs to be consumed if the product is

ISSN: 2414-1895 DOI: 10.6919/ICJE.202307_9(7).0045

produced. The direct consumption coefficient shows a positive relationship with the inter-industry association effect, that is, the larger the direct consumption coefficient, the greater the influence of the j industrial sector to drive the development of the j industrial sector.

The complete consumption coefficient mainly indicates that the production of products of one sectoral industry has a direct consumption of products of another sectoral industry and at the same time an indirect consumption due to other related industries, and the value of the complete consumption coefficient is expressed as the sum of the direct consumption coefficient and the value of all indirect consumption coefficients, and its formula can be expressed as [10]:

$$b_{ij} = a_{ij} + \sum_{k=1}^{n} b_{ik} a_{kj} \quad (i,\ j = 1,2...n) \tag{2}$$

Where a_{ij} is the direct consumption coefficient of production unit j products. $\sum_{k=1}^{n} b_{ik} a_{kj}$ is the coefficient of all indirect consumption of production unit j products.

To a certain extent, b_{ij} better reflects the pulling effect of a certain industrial product on other industrial products. the greater the b_{ij}, the greater the effect of j industry on i industry.

Through the Excel calculation of China's input-output table in 2017, the direct consumption coefficient as well as the complete consumption coefficient of China's postal industry industry, and the coefficients are ranked from largest to smallest, Table 1 below due to list the backward-related industrial sectors ranked in the top ten, respectively.

Table 1. Backward correlation between China's postal industry industry and various other industries

Name of industry sector	Direct consumption factor	Industry Sector Name	Complete consumption factor
Road freight transport and transport support activities	0.0671	Business services	0.0932
Post	0.0531	Road freight transport and transport auxiliary activities	0.0923
Business services	0.0462	Real estate	0.0684
Real estate	0.0417	Monetary finance and other financial services	0.0599
Air cargo transportation and transport support activities	0.0404	Postal services	0.0596
Printing and reproduction of recorded media	0.0252	Auto parts and accessories	0.0523
Other transportation equipment	0.0243	Refined petroleum and processed nuclear fuel products	0.0510
Multimodal transport and transport agency	0.0207	Air cargo transportation and transportation support activities	0.0490
Automotive parts and accessories	0.0193	Electricity and heat production and supply	0.0403
Refined petroleum and processed nuclear fuel products	0.0173	Retail	0.0357

ISSN: 2414-1895 DOI: 10.6919/ICJE.202307_9(7).0045

According to Table 1, it can be seen that road cargo transportation and transport auxiliary activities, postal, and business services are ranked more highly. Among them, the direct consumption coefficient of China's postal industry sector for the road cargo transportation and transportation auxiliary activities sector is calculated as 0.0671, which means that the postal industry sector needs to directly consume 671 yuan of the products or services of the air cargo transportation and transportation auxiliary activities sector to be able to produce products or services worth 10,000 yuan, while it needs to consume 531 yuan of the postal industry sector and 462 yuan of the products or services of the business The postal industry sector consumes $531 and the business services sector consumes $462. The results calculated by the statistical direct consumption coefficient show that there are 14 industrial sectors with values greater than 0.01, and 6 sectors have coefficients in the range of (0.04, 0.07). Thus, it can be seen that China's postal industry has relatively strong ties with five sectors, except for road freight transport and transport auxiliary activities, postal services, business services, real estate, air freight transport and transport auxiliary activities, and many other industries are not closely enough directly related to each other, so the postal industry in China has a low backward correlation effect with most industrial sectors.

Due to the existence of indirect consumption, the ranking of complete consumption coefficient also changed, business services, road freight transport and transport auxiliary activities and real estate are still firmly in the top positions, 7 industrial sectors appear in the top 10 list of complete consumption coefficient in the list of direct consumption coefficient, among which electricity and heat production and supply, monetary and financial services, and other financial services. Among them, three industrial sectors - electricity and heat production and supply, money and financial services, and retail trade - are in the top 10. In addition, there are 52 sectors with values greater than 0.005, 35 industrial sectors with values greater than 0.01, and 7 industrial sectors with values greater than 0.05. Therefore, it can be shown that the postal industry in China has a low degree of backward industrial linkage, i.e., the postal industry in China has a relatively small role in relation to other industries, but has a relatively large impact on the business service sector and road transport and transport auxiliary activities. The relative pulling degree of freight transport and transport auxiliary activities is high.

2.2 Forward Correlation of Postal Industry in China

(1) Direct allocation coefficient

The direct allocation coefficient is mainly defined as the proportion of the total output per unit produced by an industry allocated to another industry to make intermediate products in it [10], and its expression is:

$$h_{ij} = x_{ij} / X_i \tag{3}$$

Where x_{ij} is the amount of intermediate use provided by industry i to industry j, X_i represents the total supply of industry i, and the direct allocation coefficient h_{ij} represents the percentage of intermediate use allocated by industry i to industry j to the total output of industry i. The larger the h_{ij}, the more supply and use industry i can provide to industry j, and the more closely the industries are related.

(2) Complete distribution coefficient

The full distribution coefficient refers to the fact that the total output produced per unit in one industry is not only directly distributed to the sectors of other industries, but also indirectly distributed due to the interconnectedness of industries. Therefore, the value of the full distribution coefficient is the sum

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of the value of the direct distribution coefficient and the value of all indirect distribution coefficients, and the expression is as follows [10].

$$W = (I - H)^{-1} - I \tag{4}$$

H is the direct distribution matrix, I is the unit matrix, and W is the complete consumption coefficient matrix, where the element Wij is the complete consumption coefficient, which is a good measure of the forward linkage relationship. When W is larger, it means that industry i can provide more direct and indirect products or services to industry j, and the more obvious the effect of forward linkage between industries.

Table 2. Forward correlation between the postal industry in China and other industries

Sector name	Direct distribution factor	Sector name	Full distribution factor
Air cargo transportation and transport support activities	0.0893	Air cargo transportation and transport support activities	0.1084
Postal	0.0531	Postal	0.0596
Other transportation equipment	0.0364	Other transportation equipment	0.0521
Printed and recorded media reproduction	0.0279	Printed and recorded media reproduction	0.0368
Multimodal transport and transport agency	0.0210	Multimodal transport and transport agency	0.0259
Stevedoring and warehousing	0.0170	Stevedoring and warehousing	0.0253
Internet and related services	0.0162	Oil and gas extraction products	0.0221
Textile manufactured goods	0.0126	Internet and related services	0.0221
Road freight transport and transport support activities	0.0115	Mining support activities and other mining products	0.0197
Telecommunications	0.0086	Road freight transport and transport support activities	0.0159

It can be seen visually through Table 2 that the direct allocation coefficients of air cargo transport auxiliary activities, postal, other transportation equipment sectors, printing and recording media reproduction and multimodal transport and transport services are ranked relatively high, with direct allocation coefficients of 0.0893, 0.0531, 0.0364, 0.0279 and 0.0210 respectively, and these sectors are more closely related to the postal industry than other sectors are more closely linked to the forward correlation of China's postal industry. After processing, the data show that there are only 9 sectors with direct distribution coefficients greater than 0.01, which shows that the forward correlation effect between China's postal industry and most other sectors is weak. The top sectors in the full distribution coefficient are air cargo transportation and transportation support activities industry sector, postal industry sector, other transportation equipment and printing and reproduction media industry sector, and the above four industry sectors have the same ranking in the direct distribution coefficient, among which the oil and gas extraction products industry sector has advanced to the top ten list of the full

ISSN: 2414-1895 DOI: 10.6919/ICJE.202307_9(7).0045

distribution coefficient. In addition, 41 industry sectors have values greater than 0.005, 21 industry sectors have values greater than 0.01, 2 industry sectors have values greater than 0.05 and only one industry sector has a value greater than 0.1. Therefore, in line with the backward linkage, the forward industry linkage of China's postal industry also has the problem of low degree and short industrial chain, which also causes the supply and promotion of other industrial sectors in China. The supply and promotion role of other industrial sectors in China is weak.

In addition, it is obvious that the consumption and distribution coefficients of road freight transport and transport auxiliary activities sector, air freight transport and transport auxiliary activities sector, and postal sector are larger, which can indicate that these industrial sectors are the circularly related industries of China's postal industry, and have more significant forward and backward related effects with China's postal industry.

3. Analysis of the Ripple Effect of China's Postal Industry Industry

Inducedness coefficient refers to an industry's production activity, which is affected by the production and activities of other industries as a result of the interrelated relationship between industries. It can be quantified as the increase in the output of the final product of an industry that is more affected by the simultaneous increase of one unit of output in each industry sector in the national economy. The inductance coefficient is mainly applied to measure the breadth and depth of forward linkages of an industry in the system [10].

$$\text{Inductance coefficient of an industry} = \frac{\begin{array}{c}\text{The average value of the horizontal inverse}\\ \text{formation coefficient for this industry}\end{array}}{\begin{array}{c}\text{Average of all industry}\\ \text{cross - line reversal coefficients}\end{array}} \tag{5}$$

$$\text{It is: } \phi_i = \frac{\sum_{j=1}^{n} \overline{g_{ij}}}{\frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} \overline{g_{ij}}} \quad (i = 1,2,3..n) \tag{6}$$

In this equation, when ϕ_i>1, it means that the influence of industry i on other industrial sectors is higher than the average level, while when ϕ_i<1, it means that the influence of industry i on other industrial sectors is lower than the average level.

The coefficient of influence describes the degree of influence of an industry on other industries, which is expressed as the degree of ripple effect on the production demand of other industries in the economy when an industry increases one unit of output. The influence coefficient is mainly applied to measure the depth and breadth of backward linkages of an industry in the system [10].

$$\text{Impact factor of an industry} = \frac{\begin{array}{c}\text{The average of the longitudinal inverse}\\ \text{array coefficients for this industry}\end{array}}{\begin{array}{c}\text{Average of all industry vertical}\\ \text{inverse array coefficients}\end{array}} \tag{7}$$

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$$\text{It is: } \delta_j = \frac{\sum_{i=1}^{n} \overline{b_{ij}}}{\frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{n} \overline{b_{ij}}} \quad (j = 1,2,3...n) \tag{8}$$

In this equation, when δ_j>1, it means that the influence of industry i on other industries is higher than the average; when δ_j<1, it means that the influence of industry i on other industries is lower than the average.

Table 3. Sectoral impact and inductance coefficients

Department Name	Influence degree	Department Name	Sensitivity
Computer	1.4323	Electricity, heat production and supply	4.8947
Audio-visual equipment	1.3882	Electronic components	4.5602
Communication equipment	1.3824	Agricultural Products	4.3233
Radio and television equipment and radar and supporting equipment	1.3614	Money Finance and Other Financial Services	4.1427
Culture, office machinery	1.3411	Business Services	3.9937
Knitting or crochet and its products	1.3186	Basic chemical raw materials	3.3917
Electronic components	1.3120	Refined petroleum and processed nuclear fuel products	3.1279
Other electrical machinery and equipment	1.2903	Non-ferrous metals and their alloys	3.0554
Household appliances	1.2867	Wholesale	2.8437
Transmission and distribution and control equipment	1.2534	Retail	2.7423

As can be seen from Table 3, among the subdivided sectors in China, the top ten in terms of impact degree from largest to smallest all belong to the secondary industry, and the value of the impact coefficient is greater than 1, indicating that these industrial sectors have greater radiation strength and a more complete industrial chain compared to other industrial sectors. Through the impact coefficient calculated by the input-output table in 2017, the impact coefficient of China's postal industry industry is 0.8278, which is 117th among 149 industrial sectors in China, which shows that the impact of the ripple effect brought by the postal industry relative to the production activities of other industrial sectors in China is lower than the average level of society, which fails to play a better role in promoting and radiating, and therefore has a weaker role in Promote China's economic development role is weak. At the same time, it can also be inferred that China's postal industry, so the development of related industrial sectors is relatively backward, and has greater development potential and room for improvement in the future.

The inductivity coefficient is ranked in the order from largest to smallest, among which the inductivity coefficients of the top ten industrial sectors, such as electricity and heat production and supply

ISSN: 2414-1895 DOI: 10.6919/ICJE.202307_9(7).0045

industry sector, electronic components industry sector, agricultural products industry sector, money and finance industry sector and other financial services industry are all greater than 4, which is higher than the demand of other industrial sectors. At the same time, the inductance coefficient of China's postal industry is 0.7655, ranking 57th among 149 industrial sectors, which shows that China's postal industry is relatively weak compared with other industries, driven by the economy.

4. Research Conclusions and Recommendations

4.1 Conclusion

The following conclusions are drawn from the data analysis using input-output tables: the postal industry in China is weakly associated with the majority of industrial sectors of the national economy in the forward as well as the backward correlation, the relative pulling effect on the business services sector and road cargo transportation and transport support activities is significant, and the supply pushing effect on the air cargo transportation and transport support activities sector, other transport equipment industry sector, printing and The supply pushing effect on the sector of air cargo transportation and transportation auxiliary activities, other transportation equipment industry sector, printing and recording media reproduction industry sector, multimodal transportation and transportation agency industry sector and loading and unloading and storage sector is relatively significant; air cargo transportation and transportation auxiliary activities, road cargo transportation and transportation auxiliary activities and the postal industry have strong forward and backward correlation effects, and belong to the postal industry's circular correlation industry. The induction and influence of China's postal industry are lower than the average level, the radiation and pulling force of the economy is not high, there is great room for development.

4.2 Policy Recommendations

Based on the analysis of the previous study, combined with the actual situation of China's current economic development, the following thoughts and suggestions for promoting the development of China's postal industry.

4.2.1 Scientific Planning of Postal Industry Development

Postal industry is an important industrial sector of China's national economy, providing convenience for the life of our people. The inductivity coefficient and influence level of the postal industry are both less than the average value, thus inferring that China's postal industry has a low degree of influence on other sectors of the national economy, and cannot better drive the development of the economy. Therefore, China's postal enterprises need to carry out scientific and reasonable planning for the future postal business to promote the development of the industry, and can formulate a more detailed development strategy in advance.

4.2.2 Increase the Postal Industry and Related Industries Dynamic Synergistic Operation

Nowadays, the boundaries of various industries are gradually blurred, and the integration of multi-industry operations has become a trend [11]. Therefore, the postal industry needs to be strengthened in terms of joint development with other industries again. For example, it can increase the synergistic operation with the Internet industry, continue to deepen the transformation and upgrading of the postal physical network to ensure invincibility in the e-commerce shipping market, improve the overall physical and network operation capacity, and thus enhance the radiation of the postal industry to the Internet economy; in addition, the postal industry can continue to increase the synergistic development with the logistics and transportation industries, and promote the development of these industries at the same time, driving the postal industry rapid, sustainable and healthy development of the postal industry itself.

4.2.3 Improve the Service Quality of the Postal Industry

The backward correlation between traditional industrial sectors such as road cargo transportation and transportation auxiliary activities, business services and postal industry is higher than that of other industrial sectors, which means that China's postal industry is still at a relatively primary stage, and

ISSN: 2414-1895 DOI: 10.6919/ICJE.202307_9(7).0045

more attention should be paid to the improvement of service quality and efficiency in the development of postal industry, especially in the intelligent and digital economy era of today's Internet explosion, new technical means should be used to speed up the development of new services that adapt to the information and digital era. new business, new products and new services in the era of information and digitalization to improve the service quality of the postal industry industry and bring customers a superior quality service experience ahead of time [11].

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