

Research on Logistics and Regional Economic Synergy ——Taking Yangtze River Delta and Pearl River Delta as Examples

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ABSTRACT

The development of the contemporary economy is inseparable from the development of logistics, and the sustainable development of the economy is inseparable from the healthy logistics industry. The regional coordinated development of economy and logistics is one of the important standards for measuring the healthy development of logistics. On the basis of extensive literature research and data collection, this article uses the software Eviews8.0 to the two major regions with high logistics development level——the Yangtze River Delta Carry out Granger causality analysis with the freight volume and GDP of the Pearl River Delta, and give reasonable suggestions based on the analysis results.

Keywords: *Regional Economic, Yangtze River Delta, Pearl River Delta, Freight volume, GDP, Synergy.*

1. INTRODUCTION

With the rapid development of the economy and the extreme expansion of the population, the contradiction between man and nature has gradually emerged. The traditional economy of high mining, high investment, low utilization and high emissions has gradually depleted some non-bioresources and caused serious environmental pollution. As a medium and carrier, logistics is an important link in social operation. The logistics center is an important node in society. Logistics is a collection of three major systems: society, economy, and ecology.

The Yangtze River Delta and the Pearl River Delta, as areas with relatively advanced domestic economic development, have also received support from the central government. Among them, they also mentioned the need to upgrade the economic industry and the development of logistics. To improve the sustainable development of the economy, we must develop efficient, green, and low-carbon logistics, and promote the implementation and development of economic circular economy. Therefore, exploring the degree of synergy between logistics and economy is an important basis for its interactive integration and development.

2. LITERATURE REVIEW

The development of contemporary economy is inseparable from the development of logistics, and the

sustainable development of the economy is inseparable from the healthy logistics industry. Foreign scholar Yevhen Mishenin combined the "environmental" vision of the regional system logistics with the "economy" content of industrial ecosystem characteristics, studied the economy and logistics, and put forward some suggestions for formulating regional economic sustainable development goals [1]. Dong Huili studied the development of the logistics industry in the five major urban agglomerations, including the Yangtze River Delta and the Pearl River Delta, from four aspects: human capital, government intervention, industrial structure, and industrial development level [2]. Li Hong used the coordinated development measurement model to analyze the coordinated development level of regional logistics-economic growth-ecological environment, and explored from the four levels of economic development level, logistics scale, environmental regulation, and technological progress [3]. Factors affecting the coordinated development of large systems. Finally, an empirical analysis of the Yangtze River Delta and the Pearl River Delta shows that the level of coordinated development in the Yangtze River Delta region is relatively high, and the Pearl River Delta region is low.

There is an inseparable relationship between modern logistics and manufacturing. Ren Dandan used the Eviews software to perform Granger causality tests and believed that the growth of the manufacturing industry in the Pearl River Delta has a significant role in promoting the development of the logistics industry. The driving

force for the manufacturing industry is insufficient [4]. The development of the manufacturing industry and the logistics industry in the Yangtze River Delta region is not coordinated. There is no Granger causality between the development of the logistics industry and the manufacturing industry. The joint development of the logistics and manufacturing industries lacks an effective market operation mechanism. Jiang Ying believes that high-end should have the characteristics of "high added value, high industrial relevance, high technology-intensive, and high-knowledge-intensive", which is a dynamic that continues to climb from the low-end to the high-end [5]. Process, which not only includes the improvement of industrial functions and the extension of the industrial chain, but also the integrated development of the logistics industry and high-end industries (such as the financial industry). According to this idea, a set of systemic, targeted, objective, and quantifiable Comprehensive evaluation index system.

In terms of sustainable development of regional economy and reverse logistics, He Linghui conducted research on sustainable development of regional economy for reverse logistics, analysed the deep relationship between reverse logistics and sustainable development, and combined with the regional economy of Zhejiang and enterprises[6]. The characteristics of Zhejiang, put forward unique insights on the establishment of a reverse logistics system in Zhejiang. Yang Zhibelieves that circular economy is an inevitable choice for achieving sustainable development in the context of an era in which resources are overdrawn, the environment is destroyed, and the contradictions between man and nature are prominent; the development of circular economy requires circular logistics that matches it [7]. The development of reverse logistics came into being at the historic moment; reverse logistics is a core link of circular economy, and its development can effectively promote the development of circular economy.

Through reading, summarizing, and analysing the above-mentioned domestic and foreign literatures, we can find that forward logistics is generally studied at the subdivision level of logistics, and research on reverse logistics is rare and early; from the perspective of research, GDP and material flow (Freight volume) Not much research is done separately.

Therefore, this article will focus on the research on the relationship between GDP and material flow (cargo volume), and discuss the relationship between the Yangtze River Delta and the Pearl River Delta in terms of logistics and regional economic synergy.

3. REGIONAL ECONOMY AND REGIONAL LOGISTICS

3.1. Connotation of regional economy and regional logistics

Regional economy is a production complex produced by the interaction of internal factors and external conditions of economic development in a certain region. In 1987, the World Commission on Environment and Development published a report, "Our Common Future," which defined sustainable development as "development that meets the needs of contemporary people without compromising the ability of future generations to meet their needs."

Regional logistics refers to logistics activities in a specific area, and is composed of a regional logistics network system, a regional logistics information support system, and a regional logistics organization and operation system [8].

3.2 Include area

According to the <Outline of the Yangtze River Delta Regional Integration Development Plan> released in December 2019, the planning scope covers the entire territory of Shanghai, Jiangsu Province, Zhejiang Province, and Anhui Province (area of 358,000 square kilometres). Taking Shanghai, Jiangsu, Nanjing, Wuxi, Changzhou, Suzhou, Nantong, Yangzhou, Zhenjiang, Yancheng, Taizhou, Hangzhou, Zhejiang, Ningbo, Wenzhou, Huzhou, Jiaxing, Shaoxing, Jinhua, Zhoushan, Taizhou, Hefei, Wuhu, Anhui, Ma'anshan, Tongling, Anqing, Luzhou, Chizhou, and Xuancheng are the central areas (225,000 square kilometers). The Yangtze River Delta described in this article includes Shanghai, Jiangsu, Zhejiang, and Anhui provinces. The Pearl River Delta includes nine cities, including Guangzhou, Foshan, Zhaoqing, Shenzhen, Dongguan, Huizhou, Zhuhai, Zhongshan, and Jiangmen, with a total area of 56,000 square kilometers, but the Pearl River Delta in a broad sense includes the entire Guangdong Province. For comparison, the Pearl River Delta described in this article is the whole province of Guangdong.

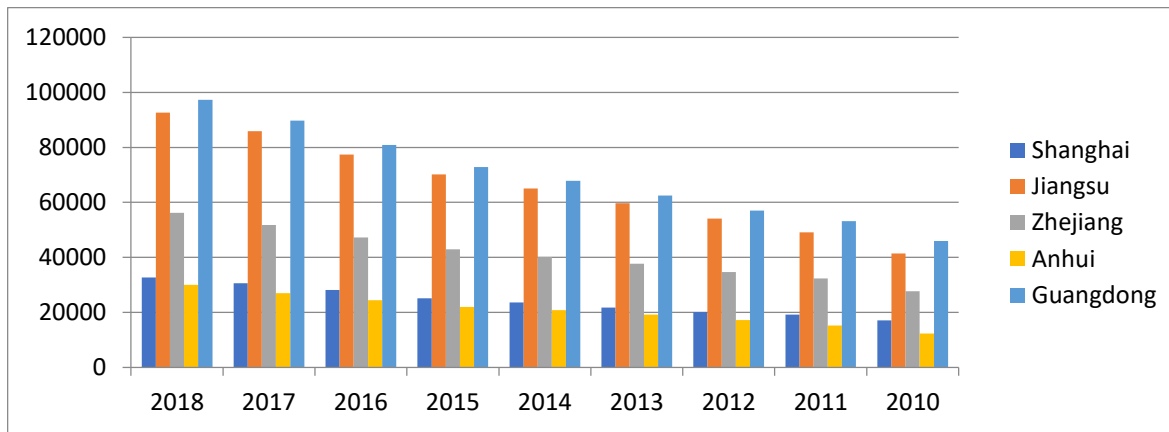
3.3 Data analysis

Gross Domestic Product (GDP) refers to the final result of the production activities of all resident units of a country (or region) calculated at market prices in a certain period of time, and is often recognized as a better measure of the economic situation of the country (or region) index. This article selects the GDP of Shanghai, Jiangsu, Zhejiang, Anhui, and Guangdong as indicators to measure their economic development level.

Table 1. Comparison of GDP in recent ten years (Unit: 100 million yuan)

Area/Year	Shanghai	Jiangsu	Zhejiang	Anhui	Guangdong	Yangtze River Delta
2018	32679.87	92595.4	56197.15	30006.82	97277.77	211479.24
2017	30632.99	85869.76	51768.26	27018	89705.23	195289.01
2016	28178.65	77388.28	47251.36	24407.62	80854.91	177225.91
2015	25123.45	70116.38	42886.49	22005.63	72812.55	160131.95
2014	23567.7	65088.32	40173.03	20848.75	67809.85	149677.8
2013	21818.15	59753.37	37756.59	19229.34	62474.79	138557.45
2012	20181.72	54058.22	34665.33	17212.05	57067.92	126117.32
2011	19195.69	49110.27	32318.85	15300.65	53210.28	115925.46
2010	17165.98	41425.48	27722.31	12359.33	46013.06	98673.1

Note: Data source-the official website of the National Bureau of Statistics

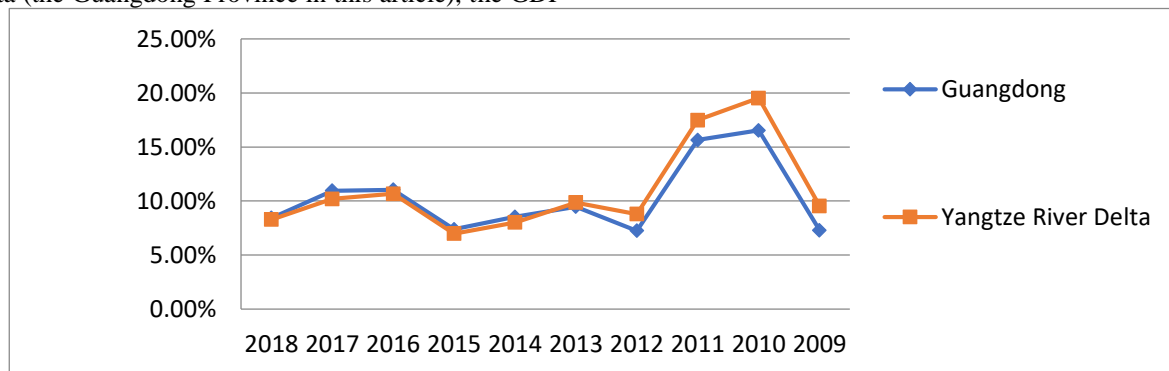


Note: Data source-the official website of the National Bureau of Statistics

Figure 1 Comparison of GDP in recent ten years (Unit: 100 million yuan)

It can be seen from Table 1 and Figure 1 that the current GDP gap between Guangdong Province and Jiangsu Province is not large, but in terms of comparison between the Yangtze River Delta and the Pearl River Delta (the Guangdong Province in this article), the GDP

gap is large. As far as the GDP growth rate shown in Figure 2 is concerned, in recent years, the GDP growth rate of the Yangtze River Delta and the Pearl River Delta is basically the same as the development growth rate.



Note: Data source-the official website of the National Bureau of Statistics

Figure 2 GDP growth rate of the Yangtze River Delta and Pearl River Delta over the past decade (Unit: 100 million yuan)

As an important index of logistics, freight volume is a window to measure the development of regional logistics. As shown in Table 2 below, from the perspective of total freight volume (see Figure 3 below),

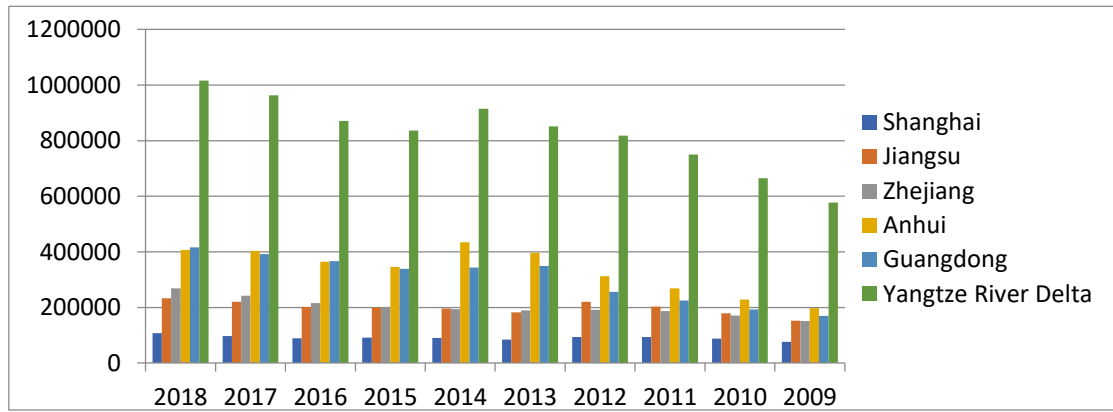
the total freight volume of Anhui Province in 2009-2015 and 2017 is located in the first place in Jiangsu, Zhejiang, Shanghai, Anhui, and Guangdong.

Table 2. Comparison of various types of freight volume in recent ten years (unit: 10,000 tons)

Freight volume (10,000 tons)	Shanghai	Jiangsu	Zhejiang	Anhui	Guangdong	Yangtze River Delta
2018	106983	233157	269083	406761	416389	1015984
2017	96850	220532	242504	403426	392381	963312
2016	88324	202070	215558	364567	366839	870519
2015	90893	198998	201231	345756	339225	836878
2014	89980	196153	194250	434298	343491	914681
2013	84305	181775	188679	396391	349011	851150
2012	94038	220007	191817	312437	256077	818299
2011	92962	202528	186376	268413	224394	750279
2010	87256	179014	171038	228104	192343	665412
2009	76669	152581	151566	196654	169653	577470
Railway freight volume (10,000 tons)	Shanghai	Jiangsu	Zhejiang	Anhui	Guangdong	Yangtze River Delta
2018	482	6171	4330	8066	9293	19049
2017	488	5949	4071	8940	8606	19448
2016	482	5590	3913	9265	8380	19250
2015	496	5304	3887	10158	8117	19845
2014	549	6376	4343	10488	9136	21756
2013	702	7157	4831	11566	9711	24256
2012	825	7670	4607	12260	9306	25362
2011	888	7713	4850	12507	8971	25958
2010	959	6812	4386	12091	8562	24248
2009	941	6563	3762	11308	7597	22574
Road freight volume (10,000 tons)	Shanghai	Jiangsu	Zhejiang	Anhui	Guangdong	Yangtze River Delta
2018	39595	139251	166533	283817	304743	629196
2017	39743	128915	151920	280471	288904	601049
2016	39055	117166	133999	244526	272826	534746
2015	40627	113351	122547	230649	255995	507174
2014	42848	114449	117070	315223	257136	589590
2013	43877	103709	107186	284534	261273	539306
2012	42911	153698	113393	259461	189034	569463
2011	42685	140803	108654	219467	166567	511609
2010	40890	123500	103394	183658	140689	451442
2009	37745	104002	95802	157991	125433	395540

Water freight volume (10,000 tons)	Shanghai	Jiangsu	Zhejiang	Anhui	Guangdong	Yangtze River Delta
2018	66906	87735	98219	114877	102353	367737
2017	56619	85668	86513	114015	94871	342815
2016	48787	79314	77646	110776	85633	316523
2015	49770	80343	74797	104949	75113	309859
2014	46583	75328	72837	108587	77219	303335
2013	39726	70909	76662	100291	78027	287588
2012	50302	58639	73817	40716	57737	223474
2011	49389	54012	72872	36439	48856	212712
2010	45407	48702	63258	32355	43092	189722
2009	37983	42016	52002	27355	36623	159356

Note: Data source-the official website of the National Bureau of Statistics

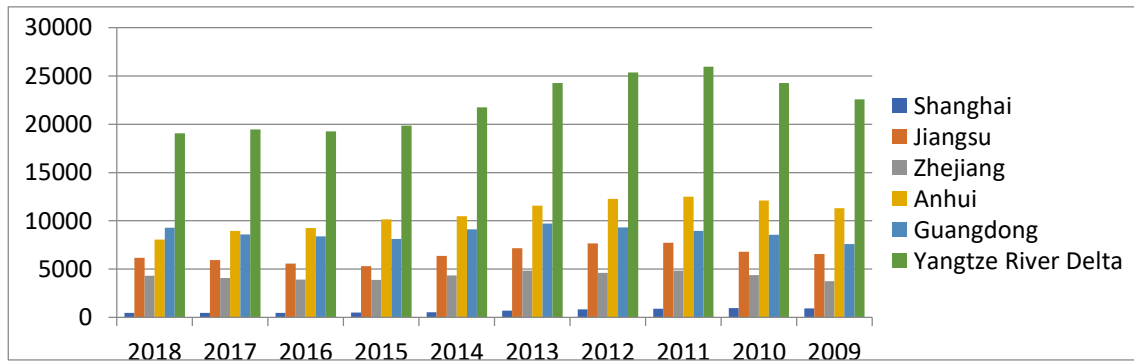


Note: Data source-the official website of the National Bureau of Statistics

Figure 3 Freight volume in the last ten years (10,000 tons)

In terms of railway freight volume (see Figure 4 below), Shanghai's freight volume has been the least. From 2009 to 2016, the railway freight volume in Anhui Province has been ranked first in Jiangsu,

Zhejiang, Shanghai, Anhui, and four provinces and one city, but in 2018 in Anhui Railway freight volume has declined and has been largely surpassed by Guangdong.

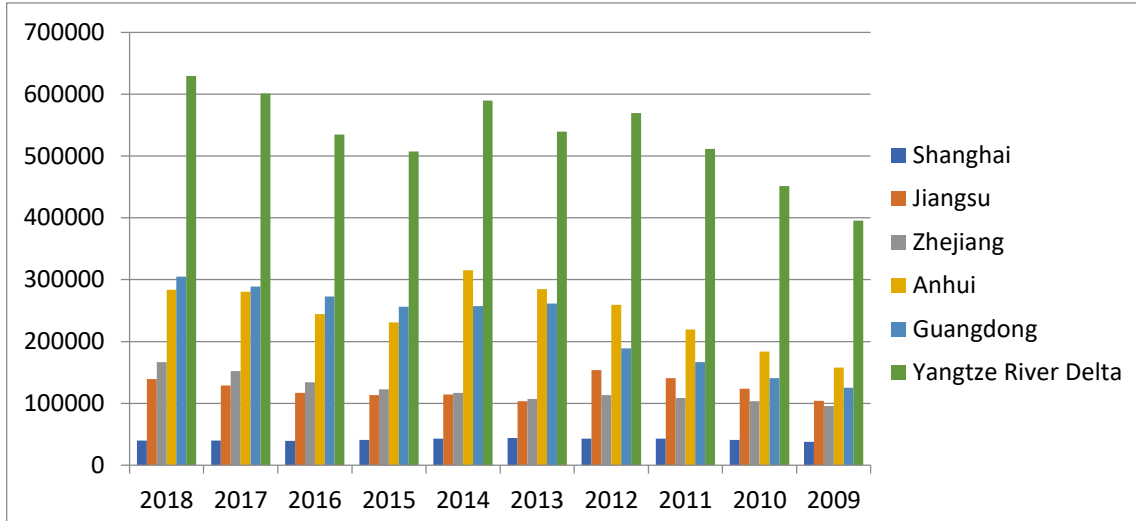


Note: Data source-the official website of the National Bureau of Statistics

Figure 4 Railway freight volume in the last ten years (10,000 tons)

In terms of road freight volume (see Figure 5 below), from 2009 to 2014, Anhui Province's road freight volume ranked first among the four provinces

and one city in Jiangsu, Zhejiang, Shanghai, Anhui, and Guangdong, and reached its peak in 2014. Guangdong is beyond.

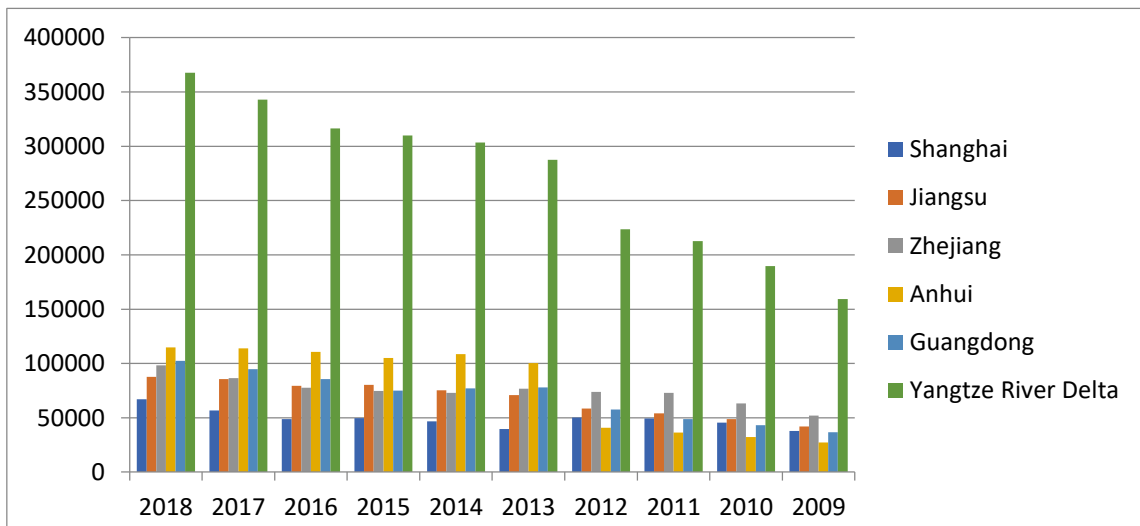


Note: Data source-the official website of the National Bureau of Statistics

Figure 5 Road freight volume in the past ten years (10,000 tons)

In terms of water freight volume (see Figure 6), from 2009 to 2012, Zhejiang Province's water freight volume was the first among the four provinces and one city in Jiangsu, Zhejiang, Shanghai, Anhui, and

Guangdong, and from 2013 to 2018 Anhui Province's water freight volume surged and was Jiangsu, Zhejiang, Shanghai, Anhui and Guangdong are the first in the four provinces and one city.



Note: Data source-the official website of the National Bureau of Statistics

Figure 6 Water and freight transport volume (ten thousand tons) in the last ten years

Anhui Province's ranking in various freight volumes shows a difference from its economic status in the Yangtze River Delta. This article believes that

although most of the freight volume is based on population and economic development, there are also some policy issues. In terms of transportation

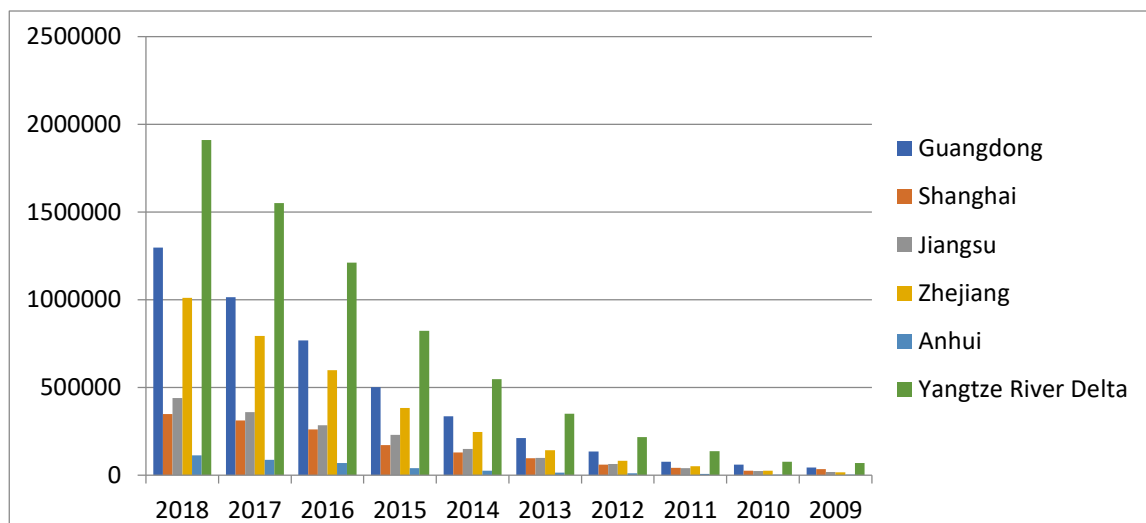
convenience, Anhui is not more convenient than Jiangsu Province, which is also in the Yangtze River Basin and Linhai. At present, many large cities or more developed regions put some logistics parks or logistics industries with low added value and large area in areas with low land prices or continue to introduce related industries. Based on this feature, Anhui Province has achieved greater development.

One of the closest indicators of the logistics industry to people's lives is the amount of express delivery. As shown in Table 3 and the graph, since Guangdong's population and economic scale have always ranked first, from 2009 to 2018, Guangdong has the largest amount of express delivery Province; Zhejiang Province ranks second, mainly due to its developed e-commerce economy and the world's small commodity market in Yiwu.

Table 3. Comparison of express delivery volume in recent ten years (unit: 10,000 pieces)

Year/Area	guangdong	shanghai	jiangsu	zhejiang	anhui	Yangtze River Delta
2018	1296195.66	348648.8	438935.42	1011050.65	112322.38	1910957.25
2017	1013468	311503.7	359627.79	793231.11	86332.31	1550694.91
2016	767241.56	260274.43	283823.24	598770.04	68878.26	1211745.97
2015	501335.16	170777.96	229047.65	383145.91	39935.56	822907.08
2014	335555.9	128366.11	148435.2	245744.79	23859.08	546405.18
2013	210670.28	95012.45	98415.47	141952.82	13755.5	349136.24
2012	133770.49	59905.25	63870.5	81986.75	9731.35	215493.85
2011	75689.66	40914.91	38508.96	49660.84	6628.32	135713.03
2010	59107.5	24318.9	23796.5	24898.2	3604.2	76617.8
2009	42206.51	34178.35	17498.18	14764.71	2362.41	68803.65

Note: Data source-the official website of the National Bureau of Statistics



Note: Data source-the official website of the National Bureau of Statistics

Figure 7 Comparison of express delivery volume in the last ten years (unit: 10,000 pieces)

3.4 Granger causality analysis

This article uses software Eviews8.0 to carry out Granger causality analysis on the freight volume and GDP of the Yangtze River Delta and Pearl River Delta.

Before performing Granger causality analysis, it is necessary to analyse the trend and smoothness of GDP and freight volume, and take the logarithm Ln of the original GDP and freight volume data to eliminate part of the heteroscedastic nature.

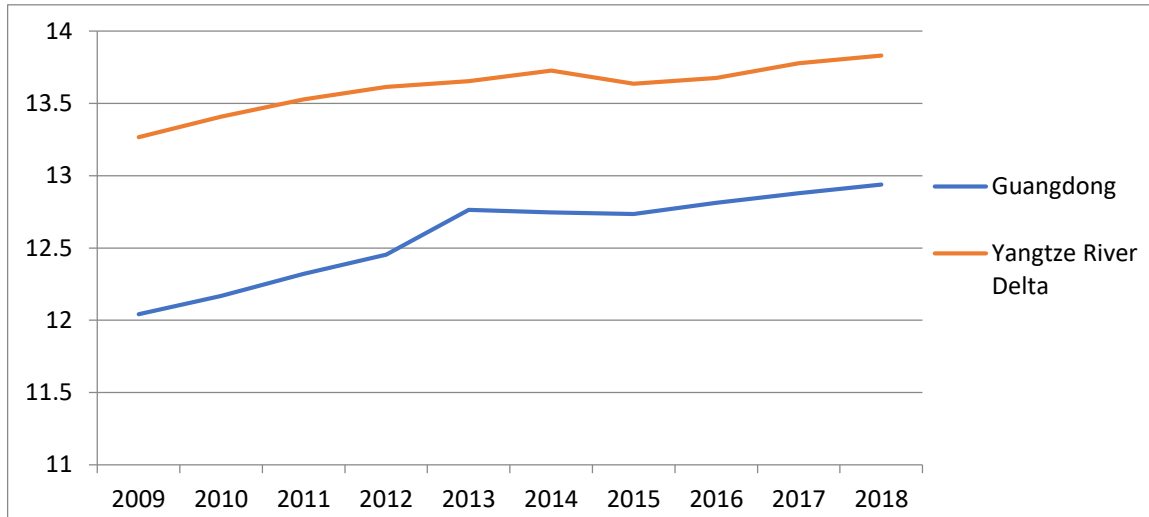


Figure 8 Smoothing graph of the Yangtze River Delta and Guangdong's GDP

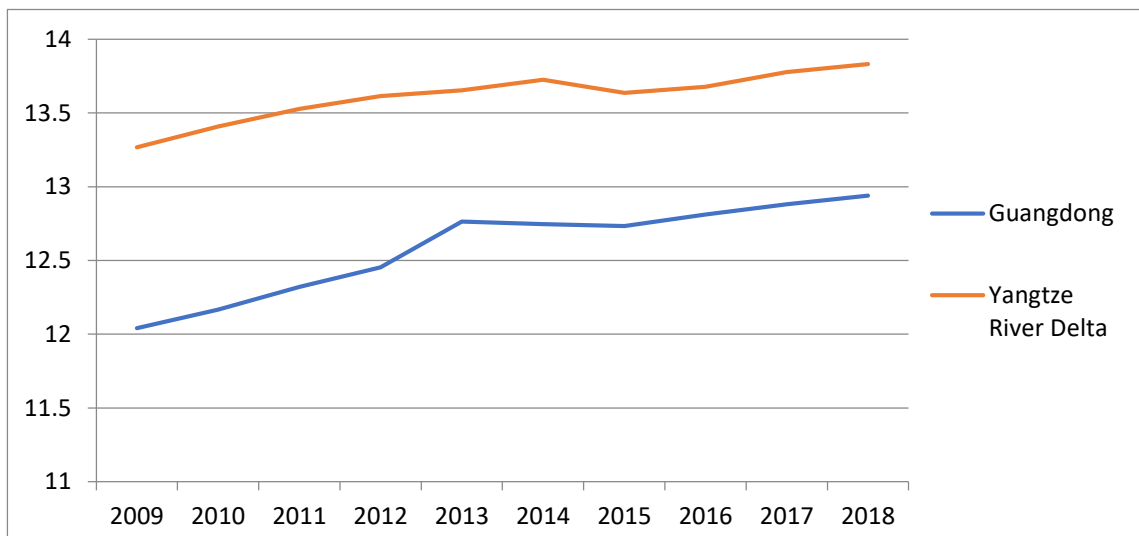


Figure 9 Smoothing of freight volume in the Yangtze River Delta and Guangdong Province

Figures 8 and 9 show that GDP and freight volume follow a smooth trend, so Granger causality test can be performed.

This article sets the confidence level to 5%, and Prob. In Table 4 rejects the null hypothesis if it is less than 0.05. The Prob. Value in the first column is 0.0198, and the Prob. Value in the second column is

0.2843, indicating that the freight volume is the Granger cause of GDP, and the GDP is not the Granger cause of the freight volume. It shows that the freight volume in the Yangtze River Delta will certainly promote the development of GDP, but GDP has not promoted the development of freight transport, and the logistics industry and the economy have not been well

integrated. Especially for the former Anhui Province, logistics has a greater role in promoting the economy.

This article sets the confidence level to 5%, and Prob. In Table 5 rejects the null hypothesis if it is less than 0.05. The Prob. Value in the first column is 0.6572, and the Prob. Value in the second column is

0.1640, indicating that the freight volume is not the Granger cause of GDP, and the GDP is not the Granger cause of the freight volume. It shows that the freight volume in the Pearl River Delta has not promoted the development of GDP, GDP has not driven the development of freight, and the logistics industry and the economy are not well integrated.

Table 4. Granger Causality Analysis of GDP and Freight Volume in the Yangtze River Delta

Null Hypothesis:	Obs	F-Statistic	Prob.
FREIGHT does not Granger Cause GDP	8	18.9927	0.0198
GDP does not Granger Cause FREIGHT		1.96968	0.2843

Table 5. Granger Causality Analysis of GDP and Freight Volume of Guangdong Province

Null Hypothesis:	Obs	F-Statistic	Prob.
GDP does not Granger Cause FREIGHT	8	0.48435	0.6572
FREIGHT does not Granger Cause GDP		3.50670	0.1640

4. CONCLUSION

This paper studies the logistics and Regional Economic Synergy by taking Yangtze River Delta and Pearl River Delta as examples. Case study research method is used in this study and a few conclusions and suggestions are made based on the research.

The Yangtze River Delta should promote better economic development with the development of animal logistics industry, and better integrate the logistics industry into the economic development trend. As the development basis of the tertiary industry service industry, logistics is the first industry and the second industry. In addition to the adjustment and integration of the economic and industrial structure, the integrated layout should also take logistics as an important starting point for the high integration and development.

The Pearl River Delta should promote the upgrading of the logistics industry's supporting economic industries, combine with the international trade of Hong Kong and Macao, take the small and refined route, strengthen the cornerstone of the logistics industry and economic development, or take a development path with precise positioning.

In the future, I hope that the measurement of logistics development can be more accurate, and the relationship between logistics and GDP can be more scientifically put in place. Although the Granger causality analysis of GDP and freight volume is carried out in this article, the

research on reverse logistics has not been carried out; the current analysis is only an analysis of past data, and no research on future development trends and sustainable development is involved. This is also the future research direction.

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