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Overall Development of Logistics in Wuhan Urban Agglomeration and Its Influence to Regional Economy*

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Abstract: The regional economy and the regional logistics are interdependent unity, the coordinated development of the two aspects have important significance on the ascension of regional overall competitiveness. With the development of the central region strategy step by step, Wuhan urban agglomeration has good economic environment for the developing of regional logistics. Since the 11th Five-year Development Program implemented, the regional economy of Wuhan urban agglomeration will also have been leading local logistics to higher level. By analyzing the economic relationship between the latest 10 years' GDP and the amounts of goods turnover in Wuhan urban agglomeration, the result shows that the development of regional logistics has an influence on regional economy. At last the have put forward suggestions for the development of regional logistics in Wuhan urban agglomeration.

Keywords: Regional Economy, Urban agglomeration, Development of Logistics Industry

1 INTRODUCTION

Because of economic globalization, every enterprise, region in the international market closely connect and interdepend each other. The competitions between regions which are for resources and developing space never ceases. Modern logistics affect the production of region, sales organization mode and management technology directly, and the circulation of commodities cost and benefit are decided by it, the core competitive power of the region is involved too.^[1] Therefore, the development of regional logistics in an area has great significance on overall economic development. The regional governments also pay more attention to the regional logistics, they try to make the development of this area to be historical, environmental, economic, geographical and realize regional characterized economy with greatest degree, organize the region internal logistics reasonable and guarantee the effectiveness of the regional logistics activities coordination, in order to make the regional logistics in regional economic development to give full play in an important role.

In 1957, the French geographer Gete firstly put forward the concept of metropolitan area, and summarized that some of the countries have big urban agglomeration. The big urban agglomeration often has the following characteristics: high and dense urban areas, large scale of population, clear division of labor between cities, their own characteristics, advantages, it is the most active and important area of a national and regional economy.^[2] Logistics network in Wuhan urban agglomeration regarding 100 km radius of the city communities, including Wuhan and Huangshi, Ezhou, Xiaogan, Huanggang, Xianning, Xiantao, Qianjiang, Tianmen, the eight cities around as the economic hinterland, to form the service of the regional economic development and logistics network service of industrial labor division. As the connection node of Pearl River Delta, Yangtze River Delta, Bohai Rim Economic Zone and western Economic Zone, Wuhan cluster is the largest, most intensive city agglomeration, it is not only the most intensive and vigorous area in Hubei province but also the most potential region in the mid-west of China.

The essence of modern logistics industry is the third industry, so it directly relates to the development of tertiary industry, to play a positive role in promoting and modern logistics industry covering almost all areas of production and economic sector. And it not only accelerates business flow, capital flow, information flow, technology flow concentration within regions but also changes the industry's asset structure, technological

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structure, labor structure relying on the advanced modern regional information logistics network to coordinate and manage economy, promotes and optimizes the industrial structure up to high-class, and has a “one change makes all change” role in developing regional economy.

According to the Growth Pole theory^[3], there is no doubt that the regional central city should become a strong regional economic growth pole of regional economic, the development of regional economic depends on the development of the regional central city, an efficient regional logistics system can promote the formation of a central city to drive regional economic development. Specifically, the important role of construction of regional logistics on regional economy which reflects in the modern logistics regionalization can promote the form of regional economic in the city as the center. It can be helpful to regional economy of internal division of labor, the industrial structure adjustment, the change of economic development model. Logistics development will centralize business flow, capital flow, information flow, it may play a leading role in the development of central cities^[4]. To accelerate economic development of Wuhan urban agglomeration pace and narrow the gap between the developed metropolitan area depend, to some extent, if we can take right industrial policy or speed up the adjustment of industrial structure, the conversion process, the advantages with regional characteristics to establish industries and pillar industries or not.

With the development of the central region strategy step by step, Wuhan urban agglomeration has good economic environment for the developing of regional logistics. This paper attempts to do the research from Wuhan urban agglomeration with regional logistics economic development on how to form a benign interaction, coordination development, based on the analysis of the logistics of the regional economic city cluster of the development of the influence and function based on the qualitative and quantitative method. The Wuhan urban agglomeration with logistics of the regional economic development relations are discussed. In this paper, we select GDP of Wuhan urban agglomeration in recent 10 years and the economic relationship of freight turnover amount to explain that the development of the logistics of Wuhan urban agglomeration has an influence on Wuhan regional economic development and put forward some countermeasures and suggestions on the regional economic environment of Wuhan urban agglomeration of the regional logistics development

2 WUHAN URBAN AGGLOMERATION ECONOMY OF MATERIAL FLOW RATE AND THE CORRELATION ANALYSIS.

2.1 The generation of original data.

Through consulting 8+1 city cluster, that is, Wuhan, Huangshi, Eshoo, Xiaogan, Huanggang, Xianning, Xiantao, Qianjiang, the nine former city of urban statistical yearbooks and government work report, We extract GDP and cargo turnover out of the nine cities in the last 10 years, and respectively sum the GDP of these nine cities and cargo turnover to get Wuhan urban agglomeration of GDP and cargo turnover.

Nine of the metropolitan cities (Wuhan, Huangshi, Ezhou, Xiaogan, Huanggang, Xianning, Xiantao, Qianjiang, Tianmen) in turn are numbered from 1 to 9.

The city cluster cargo turnover is W , each city cluster goods turnover is w_i ; City cluster GDP is G , each city GDP is g_i .

$$W = \sum_{i=1}^9 w_i (i=1, 2L, 9) \quad G = \sum_{i=1}^9 g_i (i=1, 2L, 9) \quad (1)$$

The first formula in principle cannot be summed directly to GDP, but our aim is just the correlation of regional macro-economic analysis. According to (1) formula summation, the analysis does not affect this study.

In the data collection process, because each city's statistical yearbook and government work report are not completed, and some areas have not given the measurement of cargo or Cargo turnover, thus it is difficult to collect the data, and part of the some data losses. Because the revolving quantity of the goods and GDP belong

to the time series data, and time basic in a linear relationship, so we adopt the Regression substitution (Regression Imputation) ^[5] to replace missing value. The turnover of freight traffic (W) and GDP (G) respectively with the time, a linear relationship is as follows:

$$\begin{cases} W = a t + b \\ G = t + \end{cases} \quad (a, b, , , \text{are constant}) (2)$$

According to the above linear relationship, with Views statistical software regression, it's easy to fill the missing value.

Raw data as follows;

Table 1. The GDP and freight turnover raw data of Wuhan urban agglomeration

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Wuhan	G	1336	1450	1662	1979	2238	2591	3209	3960	4561	5516
	W	6971000	7377300	7640300	8351800	12776500	13127300	14180100	14451000	23848000	24018500
Huangshi	G	223	248	274	317	362	401	467	557	598	687
	W					672300	695800	743800	803700	772658	
Ezhou	G	101	113	126	142	147	168	209	270	314	395
	W	30939	22806	23724	138817	146000	62400	95000	156056	231920	241331
Xianning	G	145	157	174	205	204	235	287	359	405	520
	W				84898	86747	104157	117300	282700	299800	342700
Xiangyang	G	101	110	123	138	144	163	190	234	262	
	W			104292		116800	128350	150308	162333	191553	
Qianjiang	G	80	107	94	106	109	125	157	212	234	
	W						96359	93483	99427	190806	
Huanggang	G	343	364	388	433	349	391	474	601	700	862
	W	193418	126330	162069	163961	215745	234161	63100	402300	465700	734900
Xiagan	G	288	314	344	381	360	404	481	593	681	801
	W				200000	230000		19000			
Tianmen	G	94	100	110	127	137	122	151	187	187	219
	W						27713	29987	30000	73619	105700

According to the data of table 1 and processing the data base on (1) and (2) formula, the processed data will be shown in table 2. For the data in table 2, we visited many logistics enterprises of Wuhan urban agglomerations to make sampling survey. According to the results of the survey, the data we predicted basically conforms to the city cluster freight turnover actual levels.

2.2 The correlation analysis.

Using the data of GDP and freight turnover of Wuhan urban agglomeration latest ten years as regional economy and logistics development level measures for analysis.

Table 2. The data of freight turnover and GDP of Wuhan urban agglomeration

Years	t	Urban agglomeration GDP(Billion Yuan)	Freight turnover(Million ton km)
2001	1	2408.36	7932981.42
2002	2	2627.28	8306672.57
2003	3	2951.32	8748318.46
2004	4	3468.30	9660983.01
2005	5	3723.07	14175745.06
2006	6	4196.01	14476240.00
2007	7	5143.92	15473078.00
2008	8	6379.00	16387516.00
2009	9	7260.24	26074056.00
2010	10	8748.58	26622209.58

In Table 2, it gives the GDP and freight turnover data of Wuhan cluster in 2000-2009, the data shows that the economy of Wuhan urban agglomeration and freight turnover have tendency of rising. In 2000-2009, these 10 years' GDP has grown at an average rate of 14.36%. Freight volume has growth rate of 8.72% as average. We can see this changing more intuitive from the figure of Wuhan urban agglomeration changes in GDP and cargo turnover.

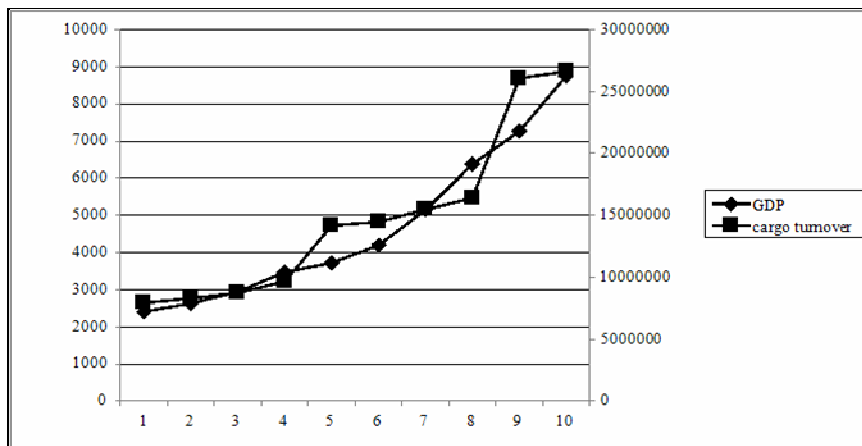
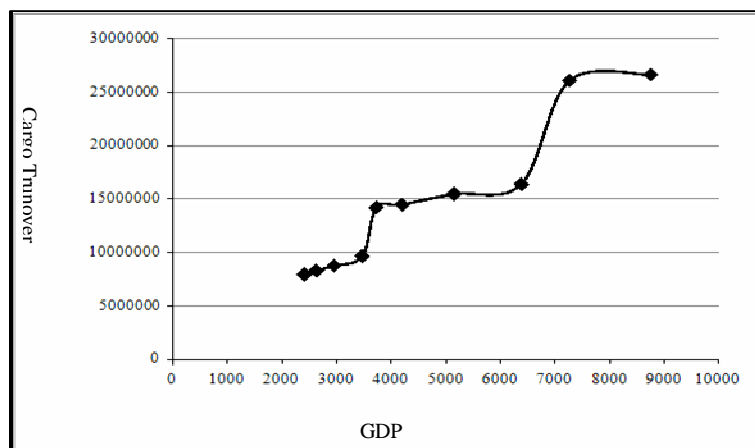


Figure 1 Time coordinate of the Wuhan urban agglomeration changes in GDP and cargo turnover figure.

Combining table 1 and figure 2 analysis, Wuhan urban agglomeration cargo turnover and GDP last 10 years show rapid growth, the two laws growth are basically the same, the growth rate and the trend is are very close. it shows a high degree of positive correlation between the two namely mutual restraint, mutual promotion. The development of modern logistics changes the regional economic growth mode, promotes the formation of new industry form, optimization of regional industrial structure, and the city as the center of the formation and development of the regional market. Logistics development in Wuhan urban agglomeration for the impact of regional economic development is essential to draw in Wuhan urban agglomeration cargo turnover and GDP scatter plot shown in Figure 2.



Picture 2: Cargo turnover and GDP scatter

From Figure 2, Initially, Wuhan city area material flow rate (freight turnover) and GDP has obvious and positive correlation, and for the non-linear growth, it basically conforms to the Logistic model of the economic growth trend. Through the establishment and using of Wuhan urban agglomeration area and GDP turnover of goods between the Logistic model, cargo turnover and GDP analysis of the correlation coefficient to determine the degree of correlation between the two and determine the development of regional logistics role in promoting regional economic growth.

GDP and the function between freight turnovers for:

$$y = \frac{1}{K + ab^x}$$

Type: y for GDP, x for freight turnover, K, 'a' and 'b' are unknown constants, $K > 0$, $a > 0$, $0 < b < 1$.
To make the following function equation transformation:

$$\frac{1}{y} = K + ab^x$$

$$\ln\left(\frac{1}{y} - K\right) = \ln a + x \ln b$$

$$\text{Set } \ln\left(\frac{1}{y} - k\right) = y', \ln a = a', \ln b = b'$$

The conversion for:

$$y' = a' + b'x \quad (2)$$

Using the least squares method can estimate the parameters in Equation 2. The value for $K = 1/y$, also is saturated value, but in real life, x as freight volume could not tend to infinity, as regional GDP, y does not exist saturated value. Considering the logistics industry in China it is just the rise of an industry, its development may show unstable growth trend. We can forecast the development of the logistics industry conditions to 2020, Therefore, the predictive value of GDP in 2020 as GDP, "saturation", thus to determine the parameters k, we firstly need to make time-series analysis of regional GDP. After the estimating of the value of "k", the expression 1 into expression 2, we can estimate parameter by least squares estimation.

By the time change model of GDP functional, we can predict 2020 GDP value as a saturated value of GDP
 $\text{gdp} = 655879627.7558 * 1.004520 = 88912170.2996866$

So $K = 1/y = 1.1247054217992977e-8$

Regression results can be seen in table 3:

Table 3. Regression results of the Logistic GDP and the material flow rate which is based on logistics model.

Variable	Coefficient	Standard error	t Statistics	t Statistical p- values
Freight turnover	3.0071	0.3155	9.5318	0.0000
C	235.4011	510.1359	0.4614	0.0008
R Square	0.9191	The dependent variable mean		4690.6080
Adjusted r square	0.9090	Standard deviation of the dependent variable		2141.9670
Return to standard deviation	646.3016	F Inspection		90.8548
The total difference of squares	3341646.0000	F Test p- value		0.0000

$Y' = -9.472476 - 0.000393x = -9.472476, a = 0.000008, b = 0.9961$

$$GDP = \frac{1}{k + 0.000008 * 0.9961^x}$$

After above econometric analysis we can see that, Wuhan urban agglomeration logistics development and regional economic development have close relationship, both restraining each other, promoting each other, the development of the logistics industry in Wuhan urban agglomeration has important strategic significance on the regional economic development. The development of Logistics industry is a key step. Then we will make forecasts of the cargo turnover and GDP growth in Wuhan urban agglomeration through regression model.

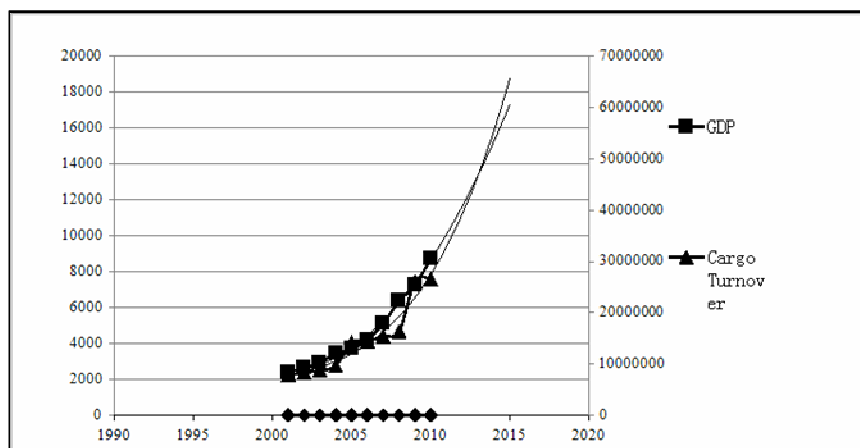


Figure 3 .On the basis of regression of the calculation of Wuhan urban agglomeration freight turnover and GDP growth forecast figure.

As you can see, till 2015 years, that is, 12th Five Year Plan period, city cluster freight turnover and GDP will rise smoothly. The stimulating influence on regional economic growth cannot be ignored, while the regional economic growth and development of the city agglomeration play an important role in promoting; metropolitan logistics development must meet the needs of economic growth, while the direction of economic development and trends and guide guide the healthy development of the city agglomeration logistics. To properly handle the relationship, we must fully understand the economic development of Wuhan urban agglomeration law, and of deeply analyse the logistics industry in Wuhan urban agglomeration situation.

3. THE ANALYSIS OF THE DEVELOPMENT IN WUHAN URBAN AGGLOMERATION

Since the development of Wuhan urban agglomeration in logistics for the role of regional economic growth is so important, we have to analyse clear overall development status of Wuhan urban agglomeration in regional logistics to make feasible and effective proposal against the status quo. Therefore, our regional logistics development of Wuhan urban agglomeration needs SWOT analysis.

3.1 Advantages and opportunities

(1) It is located at the middle and lower reaches of the Yangtze River in Wuhan City, broad hinterland, Jingguang railway passing across the Yangtze River, with an excellent inland waterway transport, railways, road transport system. Of the overall planning of Wuhan urban agglomeration, it describes the East economic spatial pattern as a bow and arrow, coastal areas are carat Melcher, urban agglomeration in the Pearl River Delta and Beijing-Tianjin-Hebei metropolitan area are the North and South ends of the bow, economic belt along the Beijing-Guangzhou Railway and Beijing-Zhuhai Express way are the string, the Yangtze River economic belt is a bow and arrow, andWuhan urban agglomeration, the string of Wuhan urban agglomeration interchange is arrow's point punches of this "China. Wuhan City is located " middle " of the economic hinterland, and it is in the front ranks of the urban agglomeration at the national level in China's city group structure system, it will become an important engine of China's regional economic growth.

(2) Hubei has basic advantages of technology and education, science and education, of which Wuhan is the second largest concentrated areas in China of intelligence, the third largest science and technology education resource center section and a wealth of talent, in his forties by institutions of higher learning, 10 "211" Universities, 48 academicians, 10 national key laboratories.

(3) Wuhan urban agglomeration of agriculture, industry,service industry is particularly rapidly develop in recent years. And it is one of the birthplaces of China's modern industry, it is also an important old industrial bases in China, solid industrial Foundation. In addition, Wuhan has generator equipment in petrochemical

manufacturing, photonics, tobacco and food industries are very competitive.

(4) Being approved by the State Council of Wuhan urban agglomeration the "new DC" has the largest urban agglomeration development opportunities. "The new Special Administrative Region" of the reform plan clearly states the development of modern service industry and highlights the development of modern logistics and the five emerging industries.

3.2 Disadvantages and risk

(1) Growth rate is slow and economic outward is low. From section II of the analysis, we can see that the average growth rate of the national economy of Wuhan is 14.36%. Although the economic growth rate maintains high speed, it is slightly slower compared with the Pearl River Delta urban agglomeration and Beijing-Tianjin-Tangshan City ring and there is a wide developing gap compared with coastal cities.

(2) Logistics system is inadequate and logistics sector is seriously divided. Transportation, warehousing, domestic trade, fragmentation of warehouses, and foreign trade are self-contained, the wishes of resource integration is weak, the socialization of the supply chain has not yet been achieved, logistics of the whole society did not become a whole part. Under such a system, it is difficult to develop cross-sectorial integrated logistics services and achieve business flow, logistics, capital flow, information integration and efficient operation.

(3) After this period of economic crisis, opportunities exist, the risk cannot be ignored. Wuhan urban agglomeration of iron and steel, automobile, textile and other industries will fluctuate with changes of supply and demand for international market, supply exceeds demand, excess capacity in the domestic market in the future, as well as on the international trade friction intensified long-standing, regional competition is extremely fierce, this will enable the variables of its development to be fraught with uncertainty and unpredictable risks.

(4) Relative superiority of Wuhan urban agglomeration in natural conditions, environmental conditions are better; but at this stage in Wuhan City's construction, the city traffic jam for the development of logistics parks around is also a challenge. As the pace of industrialization, urbanization, resource and ecological environment increasingly highlight contradictions; partial depletion of resources, intensive use of cultivated land, soil erosion, water pollution and ecological environment increasingly highlight contradictions, if we do not pay more attention and take effective measures, it will affect the urban economic and social development.

4 .THE SUGGESTIONS FOR THE DEVELOPMENT OF THE LOGISTICS INDUSTRY WUHAN URBAN AGGLOMERATION.

4.1 Strengthen the infrastructure.

Infrastructure is particularly important for the development of regional logistics, logistics infrastructure cannot keep up the pace of development of the phenomenon in the world. Copenhagen University Tag Skjttlarse in the study Eel Hai Bridge logistics put forward the same question which is also lack of reasonable legislative and infrastructure ^[7]. To speed up the development of the logistics, and promote economic development, we should start from the foundation, speed up between the urban and rural areas, the construction of the iron, water, male, empty new comprehensive transportation system, and ensure the smooth transportation and logistics. On the one hand, the government should aim at highway, railway, airport waterways and port and the construction of the stations to do plan as a whole; On the other hand, the logistics distribution center logistics warehouse construction enterprise should invest in accordance with the government's cross design and designated areas within the construction.

4.2 Adjust the layout of industrial development.

To construct 10 Industrial Chains as follow : cars, electronic information, iron and steel, nonferrous metallurgy, petroleum chemical industry, salt chemical industry, textile, garments, paper and packaging, building materials and construction, agricultural products processing. By 2020, the Wuhan urban agglomeration

will develop 50 industrial clusters. Industrial development will be distributed as follows, Ezhou: to focus on the development of agriculture and aquaculture, green vegetables, food, continue to extend the steel industry, clothing, building materials, food chain, high-tech industry, focusing on bio-medicine, electronic information and new materials; Xiaogan: to focus on automotive, salt of phosphorus chemicals, food, building materials, the four major industries, to complete the changeover Sanjiang Renault expansion, salt of phosphorus chemical products to improve the quality and grade ; Huanggang: the first industry in high-tech agriculture, tourism agriculture, ecological agriculture as the main attack direction, high-tech key development network software, ecological medicine, mechanical and electrical integration, fine chemical industry and the new material, the third industry aim at the development of tourism industry, information industry and trade industry; Xianning: to focus on developing the first industry to sweet-scented Osman thus, bamboo forest featuring flowers, the industrial prominent light industry, textile, machinery, building materials, metallurgy five major industries. Tertiary industry in Hot Springs, Red Cliff, Jiugongshan three brands as the basis, accelerate the construction of the tourism industry; Xiantao: Efforts to cultivate high-quality aquatic products, vegetables, efficient agriculture to textiles and clothing, focusing on modern fine chemical industry, electronic information, modern business-focused emerging industries, focusing on cultivating brand worsted and fine chemicals; Qianjiang: to focus on the development of vegetables and edible, pharmaceutical industry, oil machinery, oil, salt and non-ferrous metals processing and chemical. Tianmen: Cotton-based multi-class implementation of the industrial management of agriculture, to accelerate the textile and clothing, medicine and chemical, food and beverage as the main industrial development.

4.3 Accelerate the integration of urban and rural construction.

Further developing and polarization of the radiation driven features, integration of the city pillar and agglomeration key industries and to build good East lake New Technology Industry Zone, Wujiashan Zhuankou and advanced manufacturing area, WangJia Dun Central Business District, Tianhe Airport and the WIT Port Export Processing Zone. Making Wuhan as the financial, logistics, commerce and trade, tourism mainly of modern service industry center, high technology industries and advanced manufacturing center and science and education innovation center Hubei in the central region, to strengthen the Wuhan urban agglomeration in the core status and formation and city cluster other city dislocation development pattern, to realize the industry, capital, the prop, to spread gradually the management to the surrounding areas.

4.4 Environmental protection and ecological construction

In the pursuit of logistics and economic development, at the same time, the spreading of logistics^[8] can bring serious environmental problems, this is what the government must pay attention. Regional logistics and the coordinated development of the regional should be guided by the Scientific Outlook on development, adopting the strategy of sustainable development. With the industrialization and urbanization accelerated pace, Wuhan urban agglomeration will face ecological and environmental protection issues. We should accelerate the transformation of economic growth, adjust and optimize industrial structure, increase investment in environmental protection, speed up the environmental protection infrastructure construction, and improve environmental management. We have to do these things: to strengthen the system construction and protection of water features, to focus on remediation of water pollution, construction of water eco-system lakes connected. The construction to build ecological demonstration zones, to build an ecological city metropolitan area, around the zone to create eco-industrial Park to create eco-industrial Park around the zone, to creat clean, beautiful, comfortable living environment.

5. CONCLUSIONS

Based on the analysis of the logistics level and the overall economic development of the relevant

quantitative in Wuhan urban agglomeration we demonstrate regional logistics development and the relationship of regional economic development, interpretation of the regional logistics development for the regional economy. Because of Wuhan urban agglomeration economy and the development of logistics measure in an s-shaped type, it is the nonlinear relationship and both basic they all basically conform to the logic of economic growth. So in this paper we use the logistics growth model. In a series of complete measurement analysis, according to the results of analysis for Wuhan urban agglomeration of logistics development level of SWOT analysis, through the analysis this article shows that the Wuhan urban agglomeration has problems and opportunities in the development of logistics, and has some corresponding suggestions. This study also has some shortage because it is difficult to collect data of the city cluster of nine cities, this article with the freight turnover logistics development level measure related is a little univocal, but it is enough to meet study needs in this paper. In addition, the SWOT analysis to the actual condition of Wuhan urban agglomeration of logistics enterprises is not adequate, we need further study.

In the process of the construction of the regional logistics, we have to notice common properties of the regional logistics economic, which is the region within the space of logistics system of organic synthesis^[9] and needs city cluster between cities of the coordinated development and resource integration. Around the region economic development of Hubei province, the macroscopic follows complementary, mutual reciprocity and mutual benefit, joint development and common prosperity of the target, according to market economic principles configuration resources factor, the microscopic step is to realize the rising of the central region of the strategy by the regional support, promoting each other, and coordinated logistics network,

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