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The Dynamic Mechanism of Logistics Networking Industry in Jing-Jin-Ji Region of China in the Context of"Internet +"

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Abstract

With the development of cloud computing, big data, Internet of things, the traditional logistics industry integration of the Internet. It gave birth to a variety of business models and Shared prosperity. It has discovered the dynamic factors of logistics industry in Jing-Jin-Ji region (Beijing, Tianjin and Hebei region) were related to the regional network, industry integration and business innovation, etc. This article, based on the investigation of "the networked logistics industry" in Beijing, Tianjin, Hebei, influence elements of logistics industry,established the model of combination of the dynamics.The model reflected the network in the process of logistics industry,which including four dimensions :the logistics industry benefit, scale of logistics, the logistics demand and logistics network resources, to simulate the trend of the logistics industry network. In addition, It observed the dynamic effect of the four-dimensional one completely changed. It has been found that the influence of scale of logistics efficiency and logistics more network logistics industry in Jing-Jin-Ji. But it is not obvious, the influence of the network resources, the logistics demand of network logistics industry in Jing-Jin-Ji area.

Keywords*: logistics industry, dynamic mechanism of networking,“ Internet + ” , Jing-Jin-Ji region*

1. Introduction

China's economy evolution has tend to a form of more advanced in pattern ,more complex in division of labor, more reasonable in structure, the development of regional logistics industry presented new normal pattern, It was the main objective to realize economic growth healthily in the new development environment. The logistics circle of Jing-Jin-Ji, a trade gathering area of growing fast, was one of the most dynamic regions of China's economic circles, besides Pearl River Delta, Yangtze River Delta. Logistics industry in Jing-Jin-Ji faced an opportunity of regional economic integration, also assumed a responsibility for promoting economic "second growth", Intensive management and grid management of the logistics industry, as the main path, promoted the healthy development of the logistics. At the macro environment of the logistics industry coordinated development in Jing-Jin-Ji, on one hand, aggregating existing types of logistics information capital, constituting a system of interoperable and share platform ;on the other hand, improving the mechanism of data docking, and reinforcing the interoperability of cross-category information, which provided robust propulsion to

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logistics system and economic development of Jing-Jin-Ji, has become the focus of research in economic integration development.

Researches on the logistics network mainly in two directions: Logistics physical network and logistics information network. H. Gleissner, J.C. Femerling（2015）pointed out logistics information network and logistics network were the key of logistics system designing. The study of logistics network mainly focused on the distribution of traffic network study [1-2]; Sundar (2002)researched on Ghana and Nigeria , provided a evolution model about transportation network [3]; Tomoya. Moriy (2001)developed a business model to describe the development of transport routes and a five-stage hierarchy of urban growth in North America [4]; Ezzeddine Fatnassi（2015）investigated how they could share a rapid transit network and used the available transportation capacity within a city more efficiently in an interconnected way [5];Adil Baykasoˇ glu, Kemal Subulan（ 2015）presented fuzzy efficient solutions and analysis for a fully fuzzy reverse logistics network designing problem with fuzzy decision variables. The computational results had shown that more reliable and necessarily precise solutions can be generated by the proposed method for a risk-averse decisionmaker[6];Feng (2012)proposed a regional logistics network based on hub-and-spoke network model to strengthen the promotion of the regional logistics towards the regional economic development [7]; Bruzzone(2011) etal focused on the development of a new simulator of micro activities in a logistics node, which could extend the capabilities of a logistics node over its current capabilities effectively[8];Tang *et. al.,* (2004) discussed the integrated decisions for logistics network in a global manufacturing system based on heuristic algorithms[9]; Schönsleben(2000)proposed partnership strategies towards logistics networks, and revealed that the duration and intensity of cooperation within a logistics network would cause different Consequences[10];Wang and Feng (2011)established a regional logistics node layout optimization model, based on weighted Voronoi diagram and the discrete generation algorithm. They provided a new research idea to the logistics node relationship study [11];A logistics network nodes planning and development strategy was described by Cao, and a logistics network in Henan province was taken as an example. In the work, a four-layer logistics network was designed[12].Wei Deng Moulay Hicham Hakam, Solvang (2012) cited the case studies in a sparsely populated area in northern Norway and analyzed that economic and environmental sustainability of the logistics network can be achieved through a combination of reverse logistics network and advanced logistics management [13] ; Maria *et. al.*,(2002)used Latin America as a study case, studied the relationship between transport networks and regional planning basis for social-economic development, pointed out that the integration of Latin America's transportation network was conducive to regional economic development [14]; TageSkjot-Larsen *et. al.*,(2003) from Denmark and Sweden, used Oresund Bridge as a case study to analyze the impact of the bridge on the efficiency of transport corridors and regional networks, indicated action of regional economic joint development can improve transport infrastructure to facilitate logistics and operational efficiency [15]; Tuzkaya(2011)studied the Northeast Ohio logistics network, as well as organizational network carriers, shippers and the public sector were the experience of the overall development of regional logistics industry [16];PerryA, Trunic(2003) analyzed the Atlanta was responsible for the construction of urban logistics planning by founding Logistics Task Force who paid attention to urban transportation, logistics nodes and highway construction so as to promote regional logistics development [17]; DeMarco (2007)exploited the northwest region of Italy as the research object, built the system dynamics model to optimize logistics and transportation network[18];Zou Chenguang based on the internet of things, designed the framework of the regional logistics intelligence information platform, and analyzed the positive influence of the platform on regional logistics and regional economic development[19];Gulcin Buyukozkan, Orhan Feyzioglu, Erdal Nebol (2007) intended to provide decision support for the company by assessing of electronic logistics partner

carefully, made a " multi-criteria decision making (MCDM)" approach to assess effectively the electronic logistics network based on strategic alliances[20]; Alexander Smirnov (2008) proposed Internet technology was a method ontology and environmental management information sharing [21]; Xiaopeng Li (2013) studied the integrated logistics networks, determined the optimal location of the supplier and in an uncertain environment, inventory management strategy, proposed a mathematical model to determine the optimal minimize the expected total cost of the system network design [22]; YiPeng, HongChen (2013) proposed a system dynamics model, simulated and analyzed the association between prediction of road network and latency information by disrupting the behavior of Supply chain relationships [23]; GuiPing Du *et. al.*, (2003) proposed a system dynamics modeling of regional logistics network system structures by analyzing the rule of the formation and evolution process. The relationship between the constituent elements were analyzed [24]; From the perspective of industrial cluster theory, Haifeng *et. al.*,(2010) studied the mechanism of elements interaction between logistical activities in the theory of Industry Cluster [25]; From the perspective of the theory of dissipative structure system, ZhaoLei Li *et. al.*,(2010) studied the evolution of the regional logistics system and built a dissipative structure evolution mode,Explored the driving factors of system coordinated development, It found that the construction of regional logistics network were related to the regional economy,regional transportation and regional level of consumption, etc[26].

In recent years, the most well-known Internet, as digital network technology, provided logistics services in the manner of computer interconnection network transparently [27]. With the mature of business model of cloud computing, big data, things networking and other internet technologies, the traditional manufacturing integrated logistics industry, giving birth to a variety of commercial paradigm, presenting prosperity of shared economy. The new environment of "Internet+", fostered new consumer groups and generated significant economic and social values [28-29].Networking of Logistics industry was a firm support on cross-border e-commerce of Internet-based logistics [30-32].

2.The Definition of Regional Logistics Industry Networking

Rochdi Sarraj, Eric Ballot, Shenle Pan, who believed that the logistics networks which currently being developed are intertwined but heterogeneous with supply chain networks, proposed a concept: new logistics network is physical logistics network designed to provide interconnection services. And gave an inherent potential logistics network interconnection instructions [33].The logistics networks, from the perspective of supply chain system to understand, were entangled flows which conveyed the complex friendships and trees in geographical between the suppliers and customers[34]. However, new logistics networks were inseparable with information, business and financial flows which delivered over the internet. Networking of logistics industry, which depends on "Internet+" environment, was a process being formed to new business model connected with the logistics networked.

In this paper, the definition of regional logistics industry networks was: a platform of sharing networks, which were built by logistics enterprises through Internet access about e-commerce, provided interactive services along with the flows of cross-border business. Obviously, networking of logistics industry was established at the collaborative development of regional logistics industry and the concept of "Internet +". It was a dynamic process the logistics industry setting up Internet platform and distribution network business, driven by the parameters which were the power of logistics industry evolved. Among the variables, which affected and controlled the networking were driving elements, which were affected by others

called the result elements, which between control variables and result variables were mediating elements. The driving elements played an important role in networking of logistics industry. So understanding the dynamical mechanism was not only the key to find driving factors to control the direction of regional logistics industry development, but also was the main way to regulate the balance of the development of regional logistics industry .

3.Networking of Logistics Industry in Jing-Jin-Ji

This paper collected the indicators about the development of logistics companies in Beijing, Tianjin and Hebei, surveyed 300 companies in Beijing, Tianjin, and Hebei as samples (each 100) on the internet construction of logistics companies through the way of web-based survey. Those Established a mature self-business network were regarded as companies had been networked. Those had no their own network of enterprises were deemed as companies not interconnected, some of companies had added the websites of Ganji and 58 Tong Cheng were not within the scope of the networked companies, but those added third-party network and published their e-commerce products through the platform, for example: logistics China logistics network, China supplies net, the division business network *etc*., were deemed to the enterprises had networked. Table 1 showed the result of the survey on Beijing, Tianjin and Hebei, which displayed the networked rates of logistics industry from 2005 to 2014.

Table 1. Networked Rates of Logistics Industry in Jing-Jin-Ji Region

Year	Networked Rate
2005	0.140
2006	0.200
2007	0.220
2008	0.250
2009	0.300
2010	0.327
2011	0.360
2012	0.403
2013	0.450
2014	0.533

4. The Dynamic Model of Logistics Industry Networking in Jing-Jin-Ji Region

4.1. Analysis of the Causal Relationship on Regional Logistics Industry Networking

Regional logistics network was a complex connective tissue which had close relationship with regional economy and regional transport. The construction of regional logistics industry not only connected with regional logistics network, but also closely linked with the regional economy, regional transport and levels of regional consumption. Evidently, the indexes of networking of regional logistics industry were complex and diverse. Among the research on regional logistics development, there were many representatives which established index system, such as: Li Zhao (2012) selected the indexes of cargo quantity, passenger traffic quantity, the total transportation distance, employment quantity on transportation and warehousing industries to reflect the level of

development of logistics[35]; Poncet S (2003) pointed out that the promotion of the level of regional economic development would bring further growth in demands for logistics, which would promote infrastructure construction of the level of logistics-related industries, such as: transportation, warehousing, distribution, postal and telecommunications industries [36]; Rodrigo Rezende Amaral (2015) confirmed the urban logistic development, traffic flows and investments in urban infrastructure construction had a great correlation [37]; Xiaowei Lin, Jianjun Li(2013) divided the logistics development system into five subsystems: the regional logistics functions system, the regional logistics network system, regional logistics demand system, regional economic system, auxiliary system. The subsystem of regional logistics functions mainly covered the indicators of logistics industry output. The construction volume of traffic and information were included in regional logistics network subsystem, The regional economic system included regional economic level indicator, while the regional auxiliary subsystem included funds, personnel, technology, policy and other indicators [38]; Liu He, Wang Jian (2014) chose the indexes of socio-economic development, logistics and market demand conditions, infrastructure status to research the logistics network system [39]. Ahmed Alshamsi, Ali Diabat (2015) designed the logistics network, involving the transportation, the initial investment of factors, from the aspects of logistics sector entities and government policy to illustrate[40]; Panos Kouvelis (2002) studied the factors impacted the regional logistics network included infrastructure financing, transportation planning, government subsidies in corporate tax law and other global utility production and distribution network [41].

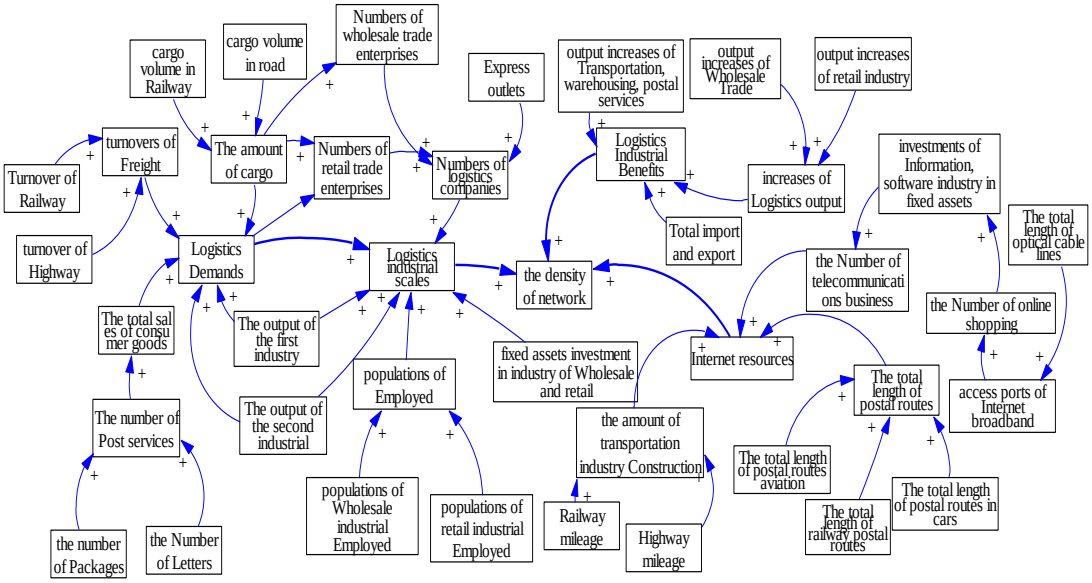
Based on the above index system, the power systems of regional logistics industry networking involved four subsystems: the logistics industrial benefits subsystem, logistics industrial scale subsystem, logistics demands subsystem and logistics network resources subsystem. The indicators were shown in Table 2.

Table 2. Indicators on Regional Logistics Industry Networking

Level indicators	Secondary indicators
Logistics Industrial Scales (X1)	Quantity of Wholesale corporate Enterprises C1
	Quantity of Retailing EnterprisesC2
	Quantity of Express Outlets C3
	The Number of Employment wholesale tradeC4
	The number of retail employeesC5
	The number of loading , unloading and other transport services employmentC6
Logistics Industrial Benefits(X2)	Total import and export(One thousand US dollars)C7
	Added value in Transportation, Storage and Postal industries ($ billion)C8
	The total sales of retail goods (million)C9
	Total sales of Wholesale trade (million)C10
Logistics Demands(X3)	Sales index on RetailC11
	CPI C12
	Growth Index on Postal Business Volume C13
Logistics Network Resources (X4)	Highway Mileage (ten thousand kilometers)C14
	Railway Mileage (ten thousand kilometers)C15
	The total Length of railway postal routes (kilometers)C16
	The total length of postal routes (kilometers)C17

	Total fixed asset investments in Information transmission, computer services and software industry($ billion)C18
	Total fixed asset investments in Transportation, storage and postal services industry ($ billion)C19

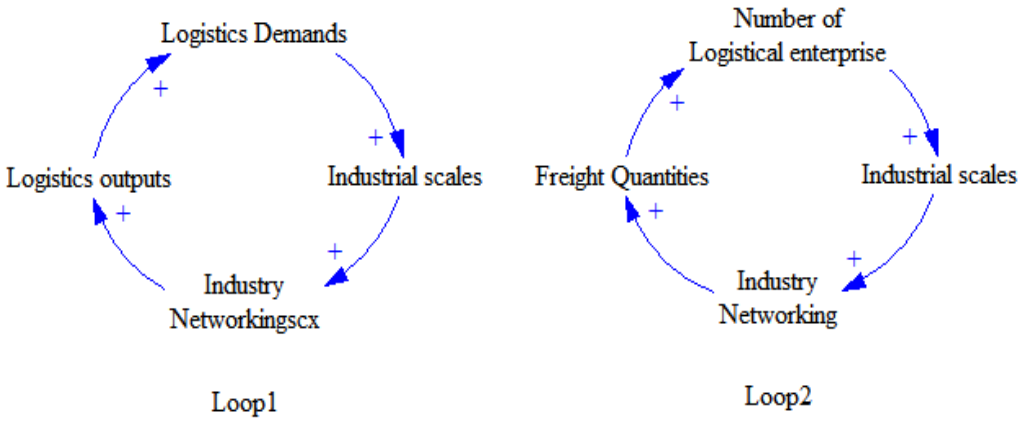
Analyzed of the indicators of four subsystems of networking impact mechanism,

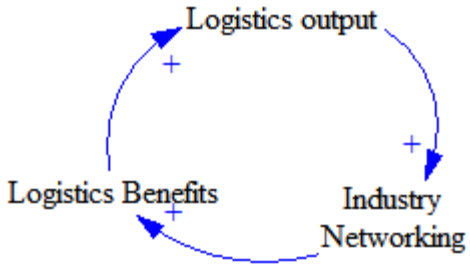


established the networking system of causality in Figure 1.

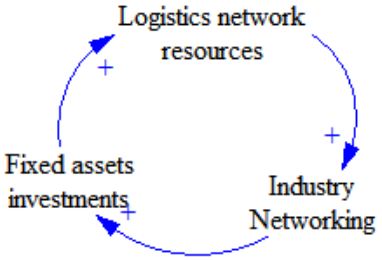
Figure 1. Figure of Causality of Networking System

There were four main feedback loops. Loop 1 showed elements of the logistics needs of logistics industry collaboration traction; Loop 2 represented Logistics industry itself spontaneously generate economies of scale and industrial expansion in the form of industrial integration; Loop 3 represented industrial efficiency driving the network of logistics industries construction; Loop 4 represented network resources in regional logistics infrastructure driving industry networking.





Loop 3



Loop 4

4.2. The Dynamics Model of Networking of Logistics Industry in Region of Jing-Jin-Ji

(1)The description of dynamics Model on logistics industry networking in Jing-Jin-Ji
Based on the system of causal feedback diagram, established the flow diagram which reflected the dynamics relationship of regional logistics system, covering the four subsystems in Figure 2.From four dimensions of logistics system, established the system flow chart. Evoluting in four processes: factors of logistics demand driving the logistics industry collaboration, the growth of the regional people's consumption ability inevitably reflects the purchasing power in an area, and consumer goods logistics is required to transmit, leading to the market actual freight volume increasing which results in logistics industry continues increasing; Logistics industry scale and spontaneously produce industrial expansion in the form of industrial convergence, the number of logistics enterprises, the competition in the industry enhanced, inevitably induce effective fusion to form the industry advantage, cash as polymerization industry scale, industry efficiency is increased, the regional economic output increase too.In turn, the development of economic level will cause the ascent of the logistics freight volume; Industry benefits driven industry network integration, the logistics industry and subnetted development makes unit logistics flow than traditional industry benefits to ascend, enterprise benefit maximization of the guide will spontaneously to melt net direction; Regional logistics network infrastructure and drive the industry integration, the state of transportation, information industry increase in the number of fixed investment, regional infrastructure level, provides a solid platform for the logistics industry networking, and promotes the logistics network deepen and deepen in a certain period of time,.

(2) Dynamic equations on logistics industry networking in Jing-Jin-Ji

The level of networking in the logistics industry was affected by complicated indicators according to the dynamics system model, in which the industrial scales, industrial efficiency, logistics demands, regional logistics network resources subsystems were comntained. Table 3, represented indexes which influenced the level of networking in the logistics industry.

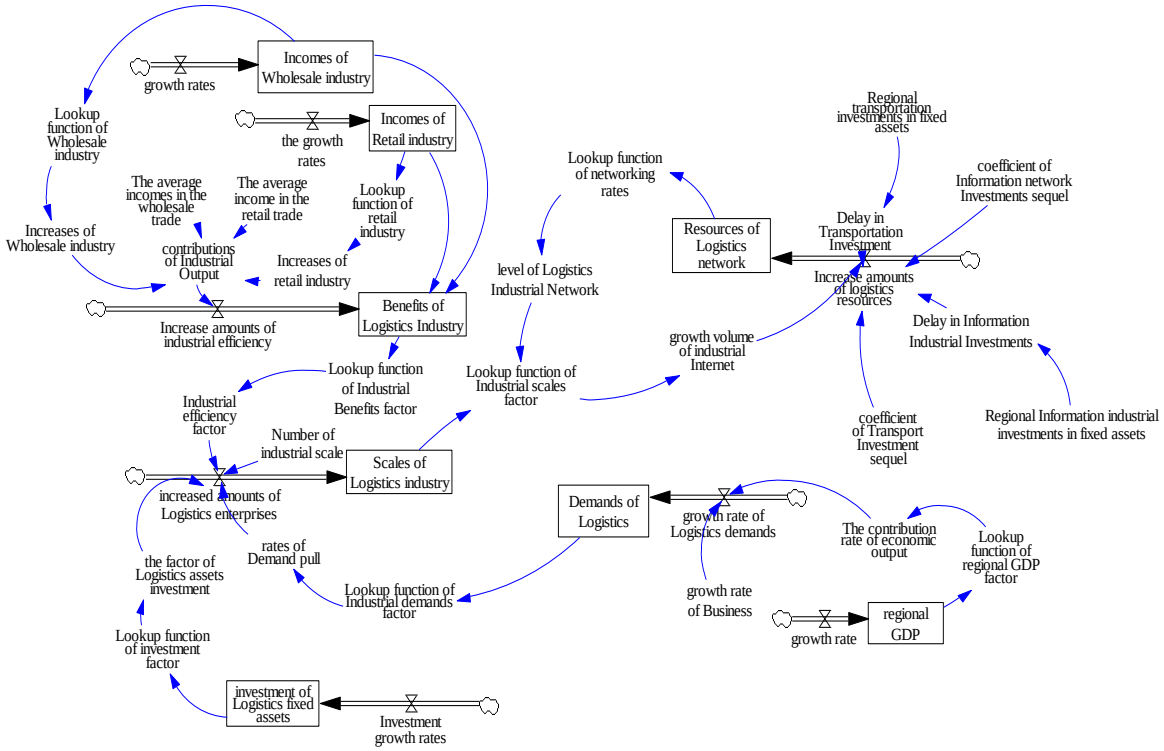


Figure 2.The Flow Diagram of Dynamics Model on Logistics Industry Networking in Jing-Jin-Ji

Table 3. Indexes of System Dynamics Model on Logistics Industry Networking

Variable	Type	Definition	Unit
Industrial efficiency	L	Regional logistics industrial outputs (replaced by transportation, post and telecommunications industrial output)	One hundred million yuan
Industrial scales	L	The number of regional logistics industry enterprises (replaced by numbers of transportation, post and telecommunications industry)	
Logistics Demands	L	total cargo transport demands in regional Logistics System	One hundred million yuan
Regional networks resources	L	total length of networks in Regional transport and information Posts	Kilometer
Sales of Wholesale industry	L	Output of the Wholesale trade industry	One hundred million yuan
growth rate of Wholesale trade	R	average growth rates of Wholesale industrial output value	
Growth of Wholesale trade sales	R	Logistics industry growth rates calculated by the table function	
Sales of Wholesale industry	C	Mean output on Wholesale trade industry	One hundred million yuan
Sales of Retail industry	L	Output of Retail industry	One hundred million yuan
growth rate of retail industry	R	The average growth rate of the retail industry	

Growth rate of Retail trade	A	Logistics industry Growth rate calculated by Table function	
Sales of Retail industry	C	The mean value of the retail industry	One hundred million yuan
Increase amount of industrial efficiency	A	annual growth on Logistics and industrial efficiency	One hundred million yuan
Fixed asset investments in Logistics industry	L	Total investments in regional logistics industry(replaced by wholesale and retail trade)	One hundred million yuan
Growth rates on fixed asset investment	R	Growth rate on Regional Logistics investment	
Contribution Rate on Logistics Industry Investment	A	Contribution rate the Logistics industry investments to the increase logistics enterprises calculated by using table functions	
Increased amounts Logistics enterprises	R	The amount of annual growth of logistics enterprises	
Industrial basic scale	C	The initial number of Logistics Enterprises	
Rates pulled by Demands	A	Logistics enterprises growth rate influenced by Logistics demands	
Regional economic output	L	Regional GDP	One hundred million yuan
Regional output growth	C	Growth rate of Regional national economic output	
Demands pulled by Economic Growth	A	Growth rate of Logistics demands pulled by Regional national economic output,	
Growth rate of Logistics business	C	Growth rate of transport ,postal and telecommunication services	
Growth rate of Internet Industrial volume	A	Internet volume of logistics industry	
Effect coefficient of Transportation network investment	C	Effect coefficient of transportation, warehousing investment growth to Regional networks	
Investments of Regional transportation, transportation in fixed assets	C	The average investments of Regional transportation, transportation in fixed assets	One hundred million yuan
Effect coefficient of Information network investment	C	Effect coefficient of information transmission, computer services and software industry investment growth to Regional networks	
Investments of Information transmission, computer services and software industry in fixed asset	C	The average investments of Regional information transmission, computer services and software industry in fixed asset	One hundred million yuan
Delay on Transportation Investments	A	Investment Delay on regional traffic, transport	
Delay of Information Investment	A	Investment Delay on regional information transmission, computer services and software industry	
Function on Logistics industry networking	A	Relations function between Regional logistics industry networking and network resources	
Degree of logistics industry Networking	A	Degree of logistics industry Networking	

Where in, L represented the state variable, R means rate variable, A was an auxiliary variables, C was a constant variable. A total of 33 variables are in the model, in which eight state variables, eight rate variables, nine auxiliary variables (including 8 table functions), eight constant variables.

The model simulated the time of 2005 to 2024 according to the National Bureau of Statistics data in Beijing, Tianjin and Hebei. Table 4, showed the initial values for the simulation.

Table 4. Initial Values of Level Variables of the System Model

Index	Initial value	Unit
Industrial efficiency	1470.68	One hundred million yuan
Industrial scales	7992	piece
Logistics Demands	1867.8	One hundred million yuan
Logistics network resources	483117.43	Kilometer

①The values of wholesale trade sales and retail sales

The income of Wholesale trade and retail trade was the main revenue of logistics industry. The data of wholesale trade and retail sales were chosen as basic values in this simulation model. The mean of Regional wholesale trade and retail sales data were selected as fixed income in logistic industry.

②The growth rates of regional economic output and logistics business

Regional economic output was measured by regional gross domestic product. The growth rate of regional gross domestic product was constant variable. The value was 0.138331, which was calculated through collecting the data from 2005 to 2014 in Beijing, Tianjin and Hebei region. The result of calculating the average annual growth rate of Logistics services amount was 0.1807, which was designed as a value of constant variable.

③The investments in regional traffic, transport industry and information transmission, computer services and software industry in fixed assets

The investment in regional traffic, transport industry and information transmission, computer services and software industry in fixed assets changed slightly, which was set to be constant variable when simulated the level of investment .The statistics data of 2005-2014 Regional traffic, transport investment in fixed assets, information transmission, computer services and software industry in fixed asset investment, showed the values were 813 million and 17.56 billion yuan.

④The coefficients of investment in transportation network and information network

The coefficient of investment in transportation network ,namely the amount of logistics networks increased per unit in investment ,was 2.4 km / million, which was the average ratio of the amount of investment each year and the length of next year transportation network obtained from "data of Statistics Bureau". Similarly, the coefficient of investment in information network was 3 km / million.

⑤The delay of investment in transport and investment in information

Due to the construction of transportation and information was time-consuming, the investment had time delayed. Particularly investing in roads building, railways longer, which cannot be ignored. The delay time of investment in transportation, warehousing industry was set to 2 years, investment in the information industry was set 1 year in this model.

4.3. The Check of Dynamics Model of Networking of Logistics Industry in Region of Beijing, Tianjin and Hebei

(1)Validation

The purpose of validation test on model was to guarantee the model appropriate and to monitor the parameters reasonable and the structure correct. The result of the validation text proved that the dynamics model of networking of logistics industry in region of Beijing, Tianjin and Hebei was valid and the system's internal mechanism was impartial, the definition of variable description was correct, the unit of parameters was correct and reasonable. So the test of validation had been fulfilled.

(2)Authenticity

To test whether the model run results abnormal and test the function of the model stable, compared the results simulated the degree of networking of logistics industry with the rate of networking of logistics industry. It has found that the results simulated in the model fluctuated in the reasonable range (10%-10%) . Consequently, authenticity was checked acceptably.

Table 5. Results of Comparing the Simulation & Historical Data

Year	Rate of Networking	Degree of Networking simulated	Deviation
2005	0.14	0.190259	5.026%
2006	0.2	0.191298	-0.870%
2007	0.22	0.192352	-2.765%
2008	0.25	0.25353	-0.353%
2009	0.29	0.295817	0.582%
2010	0.327	0.300896	-2.610%
2011	0.36	0.336946	-2.305%
2012	0.403	0.415952	1.295%
2013	0.45	0.427706	-2.229%
2014	0.533	0.490063	-2.294%

(3)Sensitivity

Changed the parameters and the structure in the model and compared the output results of model to observe its sensitivity. So there were two approaches to analyze the sensitivity: one of them was parameters analysis, the other was structural sensitivity analysis. Causality in the model of the system was so clear that the structure of the model undoubted. Parameter sensitivity analysis was to test whether the result of the runs sensitive when the parameters were converted within a reasonable range. The model parameters changed at an amount of -3% -3% to validate the level of networking in regional logistics industry, It has found that the degree of networking were within reasonable limits. Abnormal changes did not occur because of changes in parameters. Therefore, the model was sensitive.

5.Results of Simulating the Dynamic Model of Networking in Logistics Industry on Jing-Jin-Ji Region

5.1. Results of Simulation on Subsystem of Logistics Industry Benefits on of Jing-Jin-Ji Region

Figure 3, showed, logistics industry benefits tended to upward tendency overall from 2005 to 2024 on Beijing-Tianjin-Hebei region. However, the rate of increase would was expected to tend to zero after 2015. That was to say, logistics industry benefits would behave smoothing after 2015. Figure 3, depicted the trends of the logistics industry benefits between 2005 and 2024, which was produced by Vensim software.

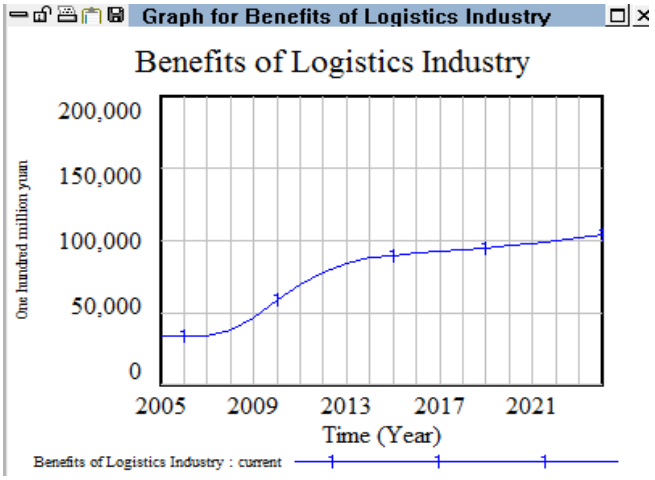


Figure 3. Figure of Logistics Industry Benefits Simulated

5.2. Results of Simulation on Subsystem of Logistics Industry Scales on Jing-Jin-Ji Region

Figure 4, showed the simulated results of logistics industry scales on Jing-Jin-Ji region. The curve represented the trends of the number of logistics enterprises, from which revealed the number of logistics wave firstly. After 2014 there would be no significant increase in the number of logistics enterprises.

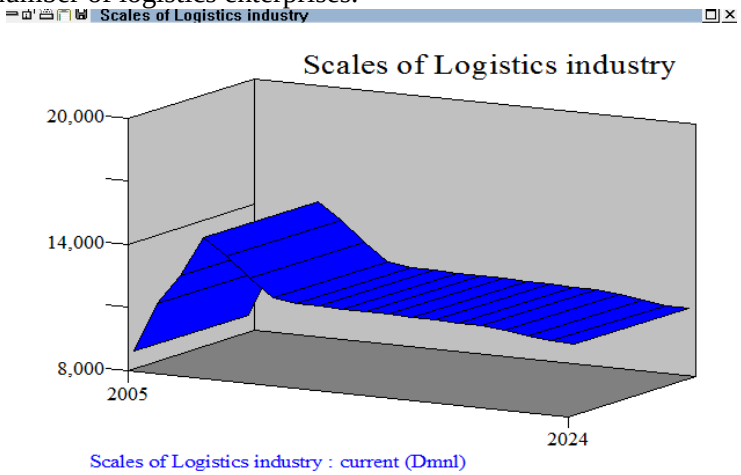


Figure 4. Figure of Logistics Industry Scales Simulated

5.3. Results of Simulation on Subsystem of Logistics Industry Demand on Jing-Jin-Ji Region

Figure 5, showed an upward trend in the logistics demand curve formula. Logistics demands continued proliferation with economic growth on Beijing, Tianjin and Hebei logistics system, especially the growing rate of logistics demand after 2015.

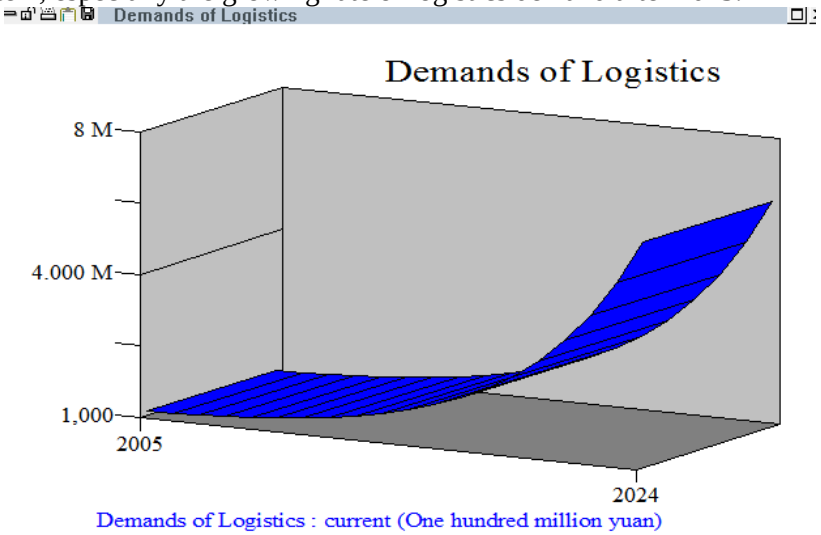


Figure 5. Figure of Logistics Industry Demands Simulated

5.4. Results of Simulation on Subsystem of Logistics Network Resources on Jing-Jin-Ji Region

Resources of logistics network included the transport network and information network resources, which were the result of investments in transportation, information industry from government on the basis of the existing network resources. Figure 6, showed the logistics network resources changing trend from 2005 to 2024, an overall linear growth simulated.

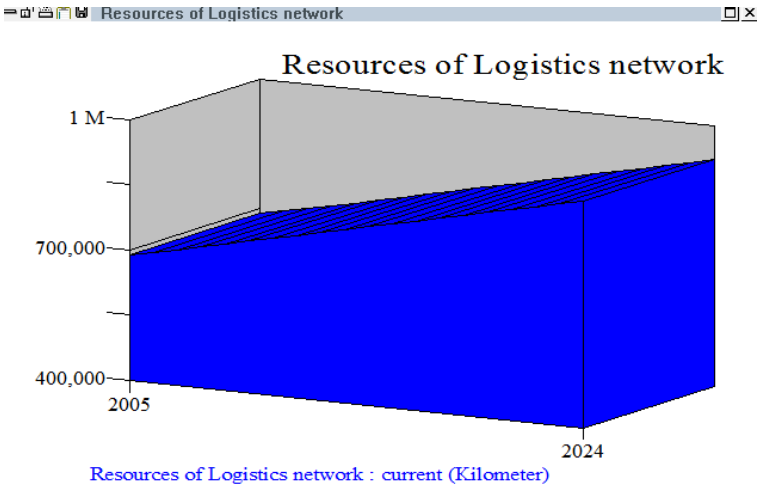


Figure 6. Figure of Logistics Network Resources Simulated

5.5. Results of Simulation on Level of Networking on Logistics Industry on Jing-Jin-Ji Region

The level of networking of logistics industry was the consequent of being integrated by the four subsystems above. Figure 7, clarified the level of networking of logistics industry in Beijing, Tianjin and Hebei region. Distinctly, it was the peak of networking of logistics industry from 2010 to 2017, after which there was steady state continuously. As we all know, the rapid development of e-commerce had brought opportunities to many industries, which had been confirmed in logistics industry through the trend of changing from 2010 to 2015.And there would be another increases from 2015 to 2017. After that, it would maintain this level continuously.

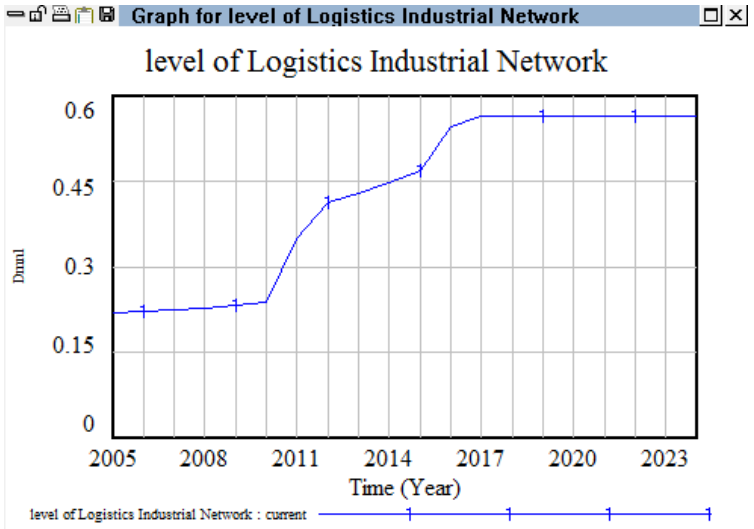


Figure 7. Figure of Level of Networking on Logistics Industry Simulated

6. Dynamics Effects of Networking of Logistics Industry on Jing-Jin-Ji Region

In the dynamics model of Networking of logistics industry on Jing-Jin-Ji region, there were two control variables, including wholesale trade sales and retail sales, affected the subsystem of logistics industry benefits. The factor which affected the subsystem of logistics industry scales was investment in logistics industry. what influenced the logistics demands were the variables of regional economic output growth rate and the growth rate of the logistics business. And the network resources were affected by the factors of investment in regional fixed assets of traffic, transport industry and investment in total fixed asset of information transmission, computer services and software industry. All of the variables above influenced the level of networking of logistics industry. But the extent of the influence was different. Observing the changes of the level of networking on logistics industry by the means of controlling variables of the four subsystems individually to determine the effect. When the variables increased 50%,there was a significant result to distinguish of the effects.Figure 8, showed the effect of the four subsystems.The logistics benefits and logistics scales impacted more on networking of logistics industry in Beijing,Tianjin and Hebei.But it was not obvious that the effect of network resources, logistics demands on networking of logistics industry in Beijing,Tianjin and Hebei region.

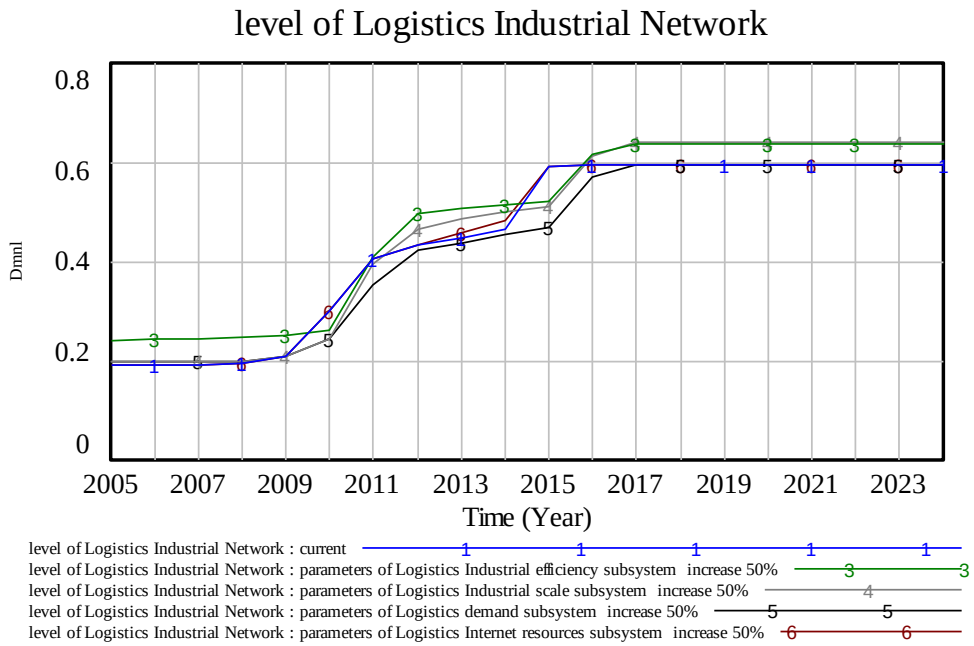


Figure 8. The Figure of the Effect of Networking on Logistics Industry

7.Conclusion

In this paper, based on the upshot of the research on logistics industry networking in the area of Jing-Jin-Ji, modeled and analyzed the system of logistics industry networked after reviewing literatures and refining the indexes about the logistics industry. A dynamics model was built to simulate the trend of logistics system development with the data of a decade from 2005 to 2014 in Jing-Jin-Ji region. The level of networking of the logistics industry was affected by four subsystems, whose trends had been simulated. Subsequently, observed the effect of the four subsystems by changing the parameters of each subsystem singly. The results showed that the efficiency of logistics benefit and logistics scales impacted obviously on the level of networking on logistics industry. While logistics demands and investments growth on the logistics network resources from government impacted slightly on the level of networking on logistics industry. It can be seen that the main drivers of networking of logistics industry on the region of Jing-Jin-Ji were logistics industry benefits and the logistics industry scales, which were the force prompted by enterprises who acted as the leader in the process of networking. However, the government's control to the networking of logistics industry was not perfect in Jing-Jin-Ji .There was a vast space to exert the function of government to speed up the process of networking further.At last,the model established in certain economic and market environment, only apply to the Jing-Jin-Ji, no broad applicability.

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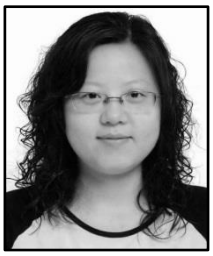

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