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WORLD MARITIME UNIVERSITY

Malmö, Sweden

**Study On Amalgamation Of The Logistics Industry And
Manufacturing Industry
—Shanghai's Case Study**

By

Haole Zheng

China

A dissertation submitted to the World Maritime University in partial Fulfillment of
the requirements for the award of the degree of

MASTER OF SCIENCE

In

MARITIME AFFAIRS

INTERNATIONAL TRANSPORT AND LOGISTICS

2021

DECLARATION

I certify that all the material in this research paper that is not my own work has been identified, and that no material is included for which a degree has previously been conferred on me.

The contents of this research paper reflect my own personal views, and are not necessarily endorsed by the University.

A handwritten signature in black ink, consisting of three Chinese characters: 郑 (Zheng), 日 (Ri), and 乐 (Le), written in a cursive style.

June 22nd,2021

Supervised by:Professor Liu Wei

Supervisor's affiliation:Shanghai Maritime University

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ABSTRACT

Title of Dissertation:Study on Amalgamation of the Logistics Industry and
Manufacturing Industry
—Shanghai's case study

Degree: Master of Science

With the accelerating process of economic globalization and the deepening of regional industrial division of labor, all industries and industries with industrial connections have formed an interactive association body. Manufacturing industry is a pillar of China's economic development, and the logistics industry as a service industry can provide important transportation service support for manufacturing and other industries.

In this paper, the data of manufacturing and logistics industry in Shanghai from 2015 to 2018 are processed in a uniform and dimensionless way, and the symbiosis degree measurement algorithm is used to measure the amalgamation of Logistic industry and Manufacturing industry in Shanghai. The results show that the degree of interaction and amalgamation between manufacturing and logistics industry in different municipal district of Shanghai is different. The contribution of manufacturing to logistics industry is generally higher than that of logistics industry to manufacturing industry, and the difference between manufacturing and logistics industry tends to narrow in recent years. After that, through the analysis of the case, this paper expounds some problems that may appear in the process of the amalgamation of the two industries. Finally, based on the above data and the factors influencing the amalgamation obtained through the case, the author provides opinions and suggestions on the amalgamation of the two industries in combination with the national policy on the amalgamation of the two industries, which provides a new idea for the amalgamation of the manufacturing and logistics industries in Shanghai.

Keywords:Logistics Industry; Manufacturing Industry; Amalgamation; symbiosis; Case analysis;

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1 Introduction

1.1 Background of the dissertation

With the accelerating process of economic globalization and the deepening of regional industrial division of labor, all industries and industries with industrial connections have formed an interactive association body. The X industry will directly or indirectly affect the development of other industries, and will also be greatly affected by the related industries. The logistics industry, known as the "third source of profit", has become a new point of profit growth, while the manufacturing industry, as the pillar industry of the economy, is facing a dilemma of sluggish demand and supply due to the adjustment of national policies and constraints of resources and environment. In order to promote the upgrading of the manufacturing industry and make China a manufacturing power, the government has vigorously laid out the "Made in China 2025" strategy, accelerated the development of producer services, strengthened the second-party logistics, and improved the supporting capacity for the transformation and upgrading of the manufacturing industry.

In 2007, the National Development and Reform Commission, the Ministry of Industry and Information Technology and the China Federation of Logistics and Purchasing organized the first National Conference on the Linkage Development of Manufacturing and Logistics(He,2020).In 2009, the State Council launched the first

national plan for the development of China's logistics industry, "Logistics Industry Adjustment and Revitalization Plan", which lists "the joint development project of manufacturing and logistics industry" as one of the "nine major projects". At present, the National Development and Reform Commission and other departments closely adhere to the new pattern of "double cycle" development, giving new connotation to the linkage development of manufacturing and logistics industry, from linkage development to deep amalgamation. And my understanding is that "interconnection between the two industries" is a synergistic and interactive relationship between the two entities, while "deep integration" is to integrate the two industries into a community of shared interests and a community of shared future. This is what we need to deepen supply-side structural reform and promote high-quality economic development. It is the inevitable choice to further improve the quality and efficiency of logistics development and promote logistics cost reduction and efficiency increase. It is also an internal requirement to adapt to the service-oriented, intelligent and green development trend of the manufacturing industry and accelerate the innovation of the logistics business mode. At the same time, it is of great practical significance for the logistics industry and manufacturing industry to realize the "integrated" operation, adapt to the new pattern of "double cycle" development, and construct the modern industrial chain and supply chain system.

Shanghai is one of the most modern and international city in China, and it is known as the shipping center of China.

As a high-end manufacturing center in China, Shanghai is not just well-known for finance and trade because the core of high-end manufacturing is not ordinary daily necessities. As the largest industrial city in modern China, Shanghai concentrated about 50% of national capital enterprises, 40% of capital and 50% of annual output value. Jiangnan Shipyard, which accounts for 90% of China's shipbuilding tons, ranks first in the world in terms of overall scale and unit

shipbuilding capacity. So Shanghai is a developed manufacturing city, not just a Finance Center.

There is little research on the amalgamation of the Logistics industry and Manufacturing industry because for China it is just the beginning to amalgamate the Logistics industry and Manufacturing Industry. So it is necessary to analyze the concept of 'amalgamation' and do research on the amalgamation of Logistics industry and Manufacturing industry.

1.2 Literature Review

On the amalgamation of manufacturing industry and logistics industry, He Dengcai(2020) made a systematic and in-depth interpretation of the newly launched "implementation plan for promoting the deep amalgamation and innovative development of logistics manufacturing industry". Through his understanding of the plan, he elaborated it from several aspects. First of all, Mr. He(2020) believes that "China's logistics industry and manufacturing industry should move from linkage development to deep amalgamation"(p. 1). "Two industry linkage" refers to the interactive and coordinated development between the two industries, while "deep amalgamation" refers to the amalgamation of the two industries into a community of interests and destiny(He,2020,p. 1). Secondly, it is necessary to explore and establish an amalgamated development mode of manufacturing logistics industry in line with China's national conditions, and five important links should be mentioned:

1. Promoting the amalgamated development of enterprises;
2. Promoting the amalgamation and linkage of facilities and equipment, laying a good foundation for the amalgamated development;
3. Promoting the coordination and amalgamation of business processes;
4. Promoting the amalgamation and convergence of standards and specifications, and establishing a communication mechanism among various departments;
5. Promote the amalgamation and sharing of information resources and get a free ride in the digital era.

Finally, he(2020) thinks that "the deep amalgamation of the two industries is also inseparable from the support of the corresponding policies"(p. 2). And gives a corresponding introduction to the business environment, policy support, financial support and other aspects in the plan.

Based on the input-output table in 2012, 2015 and 2017, Ma penfei(2020) analyzes the status quo of industrial association between China's logistics industry

and manufacturing industry by calculating the indicators of intermediate demand rate, intermediate input rate and influence coefficient, and thinks that “China's logistics industry is in the rising trend, but it needs to be further improved”(p. 1). Secondly, the government should support the outsourcing demand of manufacturing enterprises to promote the development of logistics industry. We should reduce the service cost of logistics industry and improve the service efficiency of logistics industry. Finally, we should build the information sharing platform of logistics and manufacturing industry, strengthen the information sharing between the two industries, and then promote the common development.

Chu yanchang,Lian wenhao and Yan zichun(2021)used DEA-Malmquist index model to calculate the total factor productivity of manufacturing and logistics industry in China from 2009 to 2018, and then used grey relation model to measure the linkage efficiency of the two. Finally, they concluded that “the linkage efficiency of logistics and manufacturing industry in most regions of China is not high, and there are still some areas showing a decline”(Chu et al., 2020,p. 4).

Taking Yangzhou as an example, Zhu Meng(2020) explained that “the coordinated development of manufacturing industry and logistics industry promoted the overall economic development of Yangzhou”(p. 2).

Taking Inner Mongolia as an example, Wang Xinyu(2020) makes a qualitative analysis of the linkage development of logistics and manufacturing in Inner Mongolia. The development suggestions are given from “five aspects: Expanding opening up, Improving the quantity and quality of import and export, Outsourcing of manufacturing enterprises logistics, Training of professional talents and Improvement of infrastructure”(p. 2).

Based on the above literature, the existing research focuses on the perspective, path and method of the interaction and amalgamation of the two industries at the theoretical level, and the quantitative analysis of the degree of correlation between the two industries. But in a large number of studies, there is a lack of research on the amalgamation of logistics industry and manufacturing industry in Shanghai. This paper will use the method of symbiosis degree measurement to analyze the development situation and trend of the amalgamation of the two industries within and between the municipal districts in Shanghai, and finally provide some suggestions for the amalgamation of the two industries in Shanghai.

This paper will be based on theory of the core competitiveness and theory of value chain. The core competitiveness refers to the most basic competitiveness that can make the whole enterprise maintain long-term stable competitive advantage and obtain stable excess profits. “It is the organizational ability of the enterprise that organically integrates assets and operation mechanism. It is also the result of the implementation of internal management strategy and transaction strategy”(Huo,2017,p. 2). For manufacturing enterprises,they can use more resources

to improve their core competitiveness from logistics outsourcing . At the same time, the third-party logistics enterprises can continue to undertake the logistics business of manufacturing enterprises, increasing their own enterprise scale and profits, and also enhance the status of enterprises in the logistics industry. Value chain theory refers to a series of activities to increase the practicability or value of an enterprise's products or services, mainly including three parts: internal value chain, competitor value chain and industry value chain. In the process of amalgamation of manufacturing industry and logistics industry, it can be considered that both sides peel off part of their value chain and amalgamate it into each other. Manufacturing industry will peel off logistics business and outsource it to logistics enterprise. Similarly, part of the value chain of the logistics industry will be stripped out and restructured. Huo(2017) believed that "Under the market selection mechanism, the logistics industry and the manufacturing industry, which are separated from part of its own value chain, will amalgamate in a new way and promote the formation of the emerging value chain"(p. 2).

1.3 Research methodology of the dissertation

In order to fully reflect the current situation of the amalgamation of manufacturing industry and logistics industry in Shanghai, aiming at the more important municipal districts, taking 2015 as the base year, the time series data from 2015 to 2018 are used for analysis. The data sources are China Statistical Yearbook, Shanghai Statistical Yearbook, etc., which include the added value of manufacturing and logistics industry in Shanghai from 2015 to 2018.

After selecting the data, in order to fully eliminate the influence of units, orders of magnitude and positive and negative changes between the statistical data, this paper will first use the ideal value method to make the original collected data consistent and dimensionless; Then, based on the data processed above, the fusion degree between symbiotic units is described by means of symbiosis degree measurement method.

The specific steps of the research method will be introduced in 4.1.1 of this paper.

1.4 The purpose of the dissertation

Based on the above dissertation background, it is of great significance for the research in the amalgamation of manufacturing industry and logistics industry, and the research will take Shanghai from 2015 to 2018 as an example. Therefore, the research will focus on the following points:

1. The present characteristics of logistics industry and manufacturing industry in Shanghai respectively
2. The trend and the necessity in the Amalgamation of logistics industry and manufacturing industry in Shanghai
3. How to reflect the Amalgamation degree of logistics industry and manufacturing industry of various of municipal districts in Shanghai

1.5 Structure of the dissertation

The dissertation starts with background and introduction to the amalgamation of manufacturing industry and logistics industry in Chapter 1, and it also contains literature review, purpose and the research methodology of the dissertation.

In the next chapter, the characteristics and development of Logistics industry and Manufacturing industry is analyzed in two sub-chapters.

Chapter 3 focuses on the research on the relationship between manufacturing industry and logistics industry. Firstly, the chapter starts with the discussion about the dependence of manufacturing industry and logistics industry and the following part discusses about the trend of amalgamation.

Chapter 4 focuses on the analysis of the benefit of the amalgamation of manufacturing industry and logistics industry from different aspects, which includes sharing of information, unification of standards, Facility coordination and

synchronization, driving the market and technical communication.

The next chapter is about using methodology to measure the amalgamation of manufacturing industry and logistics industry. Firstly, author introduce the methodology and data. Then, the trend chart of amalgamation degree will be obtained through data and methodology. Finally, author analyzes the obtained trend charts and explained why such situation happens.

Chapter 6 is used to analyze the elements that affect the amalgamation of manufacturing industry and logistics industry. The author use some case examples to support these elements.

2 The analysis of Logistics industry and Manufacturing industry in Shanghai

2.1 Analysis of the characteristics and development of Logistics industry in Shanghai

First of all, what is the concept of logistics?

Logistics refers to the physical flow process of goods from the place of supply to the place of reception. According to the actual needs, the basic functions of transportation, storage, handling, packaging, circulation processing, distribution, information processing and so on are organically combined. Taking an example, when someone buys a football on an e-commerce platform, the merchant will deliver it to the user from the warehouse through a logistics company. The process of transporting the goods from the warehouse to the designated address is logistics. According to the definition of logistics defined by the American Association

of Logistics Management, "Logistics is the process of planning, implementing and controlling the effective flow and storage of raw materials, intermediate inventory, end products and related information from the origin to the consumer to meet the needs of consumers " (The relation and, 2019). The definition specifically highlights four key components of logistics: physical flow, physical storage, information flow and management coordination.

According to the function, the logistics could be divided into supply logistics, sales logistics, production logistics, recovery logistics and waste logistics. According to the system nature, it could be divided into social logistics, industry logistics and enterprise logistics. According to the activity space, it could be divided into regional logistics and international logistics.

The following part is the analysis of the development and characteristics of China's modern logistics industry.

China's logistics industry started late, but with the rapid development of the national economy, China's logistics industry maintains a relatively rapid growth, and constantly improve China's logistics system, the operation of the industry is becoming more mature and standardized. After more than 30 years of development, logistics industry has become the pillar industry of China's national economy and an important modern service industry." In 2013, the scale of China's logistics market surpassed that of the United States for the first time, becoming the number one in the world. In 2019, the total amount of social logistics in China reached 298.0 trillion yuan. In 2017, China's railway freight volume was 3.689 billion tons, road freight volume was 36.869 billion tons, waterway freight volume was 6.678 billion tons, and civil aviation freight and postal transport volume was 7.058 million tons. The national railway freight turnover was 2696.22 billion ton kilometers, highway freight turnover was 6677.15 billion ton kilometers, waterway freight turnover was 9861.13 billion ton kilometers, and civil aviation freight turnover was 24.35 billion ton kilometers. The cargo throughput of ports above designated size was 12.672 billion tons, and the container throughput of ports above Designated Size in China was 238 million TEUs. The business volume of express service enterprises above Designated Size in China has reached 40.06 billion pieces, and the daily express business volume has exceeded 109.74 million pieces. Railway freight volume, railway freight turnover, road freight volume, port throughput, container throughput and express delivery volume all rank first in the world, while civil aviation freight volume ranks second in the world ("Eight problems", 2019). These data show that the scale of China's logistics industry is growing and deepening development, and has achieved remarkable results in railway, road, waterway, air transportation and other aspects.

However, for China's logistics, we can not ignore some problems under the development trend of increasing volume. On the one hand, the fate of China's international logistics is almost in the hands of others. In China's international

express business, the market share of the three international express companies exceeds 70%.McKinsey's research shows that "the United States and Germany are the countries with the strongest globalization connectivity, while China's globalization capability is only half of them."(Wang jixiang,2020,para. 5).China does not have an international logistics system to match in its export business, and the foreign trade is highly dependent on foreign freight companies.

For example,with the emergence of COVID-19's emergency in 2020, the risk of supply chain disruption in various industries is increasing dramatically.For example, a large number of international cargo flights have been cancelled due to COVID-19, and the global cargo aviation capacity and supply-demand relationship have been tightened.According to incomplete statistics, "in February and March when the epidemic just happened, the transportation capacity of all international aviation sales markets decreased by at least 60% compared with the normal situation" (Wang Jiang, 2020, para. 7).However, when international logistics is not under the control of the country itself, there will be a lot of problems. The most typical one is that more and more export goods in China will be unable to be exported due to the shortage of logistics supply, and the aviation cost will become difficult to control because of the imbalance between supply and demand.Shao Zhonglin, former deputy secretary general of China Express Association, said, "It is a must for every big manufacturing country to have a logistics enterprise with global service capability" (Wang Jixiang,2020, Para.12).In this regard, before the rise of some manufacturing powers in the last century, such as Germany, Japan and the United States, this is a necessary path. In the process of development, logistics enterprises with international fame and influence, such as DHL and FedEx, have been formed. These enterprises have played a huge role in the deployment of global logistics services, Provide liquidity for the development of manufacturing industry and supply chain.

Then, as an important municipality directly under the central government of China, Shanghai is adjacent to the East China Sea in the East, and is located at the estuary of the Yangtze River. It has Yangshan deep-water port, which opened in 2005. At the end of 2017, phase IV of Shanghai Yangshan deep water port was put into trial operation, and now it is the largest fully automatic terminal. The development of Shanghai's logistics industry also has several stages of development, from the traditional logistics to the modern logistics.

Development of Shanghai logistics industry:

During the 11th Five Year Plan period, with the vigorous promotion of the China Federation of logistics and purchasing, the development of modern logistics industry

has started in China, and the logistics industry in Shanghai has also transformed from traditional logistics to modern logistics. After entering the "12th Five Year Plan", Shanghai logistics industry began to make research on industrial transformation and upgrading, changes in consumer demand and new logistics development direction. Under the background of the construction of the Shanghai free trade experimentation area, Shanghai authorities are looking forward to the new pattern of global investment and trade development and exploring the future of Shanghai's logistics industry. Since the 21st century, the development of modern logistics industry in Shanghai has begun to accelerate, the function of urban logistics has been significantly strengthened, and the level of logistics has also been continuously improved, mainly including the following points

(1) The scale of Shanghai's logistics industry continues to improve

Around 2013, in the development process of Shanghai logistics industry, it has been facing the problem of opening to the world."In 2013, the added value of Shanghai's logistics industry was 261.4 billion yuan, accounting for 12.1% of the city's GDP and 19.5% of the city's tertiary industry. In 2013, Shanghai's total commodity sales exceeded 6 trillion yuan, maintaining a double-digit growth for many years. The total retail sales of the whole society exceeded 800 billion yuan, and the import and export trade of goods reached more than 440 billion US dollars. The added value of Commerce in the city was 384.7 billion yuan, accounting for 28.6% of the tertiary industry. Last year, e-commerce exceeded 1 trillion yuan, and there were more than 100000 kinds of cross-border e-commodities, with a total of 120 billion yuan "(Liu, 2014, para. 3).In such a state of economic operation, "Shanghai's port cargo throughput remained the first in the world last year, and the total cost of social logistics accounted for 15% of GDP. There are 132 A-level logistics enterprises in Shanghai, and more than 55% of them are 4A level logistics enterprises" (Liu, 2014, Para. 3).These data show that under the stimulation of the early development of e-commerce economy in 2013, Shanghai's logistics industry is constantly expanding its output value in the process of providing services for the development of e-commerce, which promotes its proportion in the city's GDP to rise, which obviously shows that its industrial location is rising, and further confirms the promoting role of logistics service industry in the process of economic development.

(2) The total volume of freight transport increased significantly

According to the statistical data:

"In the whole year, the total amount of goods transported by various means

reached 1 billion 96 million 85 thousand and 100 tons, which was 2.1% more than that of last year.

The completion and share of all kinds of transportation:

In 2019, the traffic flow of Shanghai road transport was 38 million 750 thousand tons, 2.1% lower than that of last year. The traffic volume of road goods was 35.4% of that of Shanghai City, 1.4% lower than that of last year.

In 2019, the total amount of goods transported by water in Shanghai city was 69980.95 tons, 4.6% more than that of last year. The total amount of goods transported by water was 63.8% of that of Shanghai City, and 1.6% more than that of last year.

As an international transportation center in China, its competitive ability was mainly reflected in the port capacity and function. In 2019, the handling capacity of the Shanghai harbor reached 720 million 313 thousand and 200 tons, which was 1.4% lower than that of the last year. It was the biggest harbor in the world. The international container transportation capacity was also at the top level in the world. In 2019, the container handling capacity of Shanghai port was 43 million 302 thousand and 600 tons, 3.1% more than that of last year. It had been ranked number one in the world for about 10 consecutive years.

In 2019, the total amount of Shanghai railway goods transported was 4 million 717 thousand and 900 tons, 0.7% more than that of last year. The total amount of railway goods transported was 0.43% of that of Shanghai City, which was almost the same as that of last year.

In 2019, the air traffic of Shanghai city was 4 million 57 thousand and 800 tons, 2.8% lower than that of last year. The air traffic of Shanghai city was 0.37%, almost the same as that of last year.

In 2019, the business volume of the express company in Shanghai City amounted to 3 billion 130 million pieces, which was 10.1% lower than that of last year. The total revenue reached 128 billion 880 million, up 26.3% from last year. Among them, the total revenue of business in the same city reached 7 billion 180 million, which was 21.3% lower than that of last year. The revenue of business in different places reached 20 billion 100 million, which was 14.3% lower than that of last year. The total revenue of international business, Hong Kong business and Hong Kong business reached 8 billion 170 million, which was 11.3% higher than that of the previous year. "Overview of the company, 2019. From the data on the tree, it could be seen that the scale of the logistics industry in Shanghai city in 2019 was still the same as before, but it was no longer growing fast, which also meant that it would appear in the period of existing economy. The logistics industry would need to carry out the internal adjustment and other measures.

(3) Technology helped the logistics industry to be digital, intelligent and platform oriented.

In 2019, the application of next-generation information technologies, such as the Internet of Things, big data and cloud computing, will accelerate in the logistics sector. UAVs, unmanned vehicles, unmanned warehouses, unmanned docks, unmanned driving and other emerging intelligent equipment usage scenarios have increased significantly. The Yangshan Deep Water Port in Shanghai has used unmanned facilities on a large scale, becoming the world's largest smart dock. The application of these modern information technologies proves that the industry is aware of the importance of improving efficiency for industrial development.

(4) Modern supply chain has become a new highlight of logistics innovation.

Supply chain innovation will enter a new stage in 2019. With the promotion of supply chain innovation and application pilot projects, logistics enterprises are actively adapting to the new situation and new requirements, accommodating each other, opening and sharing supply chain thinking is forming. Gradually eliminate the old competition environment of speed, scale and price, and work with upstream and

downstream to build a win-win ecological environment for supply chain collaboration, which will reduce supply chain costs and improve supply chain efficiency.

2.2 Analysis of the characteristics and development of Manufacturing industry in Shanghai

As a pillar industry of the national economy, manufacturing industry once brought prosperity to countries such as the United States, Germany and Japan. Similarly, manufacturing industry in China is also the core content of the national economy and the driving force of modern industrialization. Since the 1990s, China's economy has mainly focused on the development of manufacturing industry, and has made remarkable achievements in economic development. According to statistics, the proportion of global manufacturing industry ranged from 3% to 13.2% in 2007, which in turn became the second largest manufacturing country in the world after the United States, known as the World Factory. Then by 2019, China's manufacturing sector accounted for 28.1% of the global manufacturing industry, steadily surpassing the United States and becoming the world's largest manufacturing power.

The development of China's manufacturing industry can be divided into the following stages:

1. From 1978 to the early 1990s, China's manufacturing industry gradually improved. Since the beginning of reform and opening-up, China has begun to

establish a relatively complete manufacturing system, starting from heavy industry and state-owned enterprises, to rapidly develop light industry manufacturing, which mainly produces consumer goods.

2.From the early 1990s to the end of the 20th century, Foreign investment into China drives the development of China's manufacturing industry.In this stage, private enterprises have further flourished and formed a group of representative leading enterprises.Manufacturing in coastal areas has developed rapidly, and Made in China has become world-famous.These enterprises have fully played the advantage of low cost, gradually formed international competitiveness, and obtained a large number of contract orders. China has gradually become the production outsourcing base of international manufacturing industry.The deep reason is that the modernization of manufacturing equipment, resulting in a significant increase in production efficiency, and the formation of a scale economy, ultimately enabling China to achieve cost advantages.

3.At the beginning of the 21st century, China's manufacturing industry has entered a new round of rapid development. Innovations in automotive, engineering machinery, electronic communications and other industries are especially rapid. This is also due to the improvement of the education system, the substantial increase in the demand for raw materials such as moulds and steel, which further expands and develops the industrial value chain of the entire manufacturing industry.The benefits of large state-owned enterprises have been significantly improved. The steel, power, tobacco and other industries began to accelerate the integration. At that time, large and medium-sized manufacturing enterprises in China could obtain sufficient funds from the capital market to seek development. At that time, it was also the beginning of the information age. ERP (Enterprise Resource Management System), PLM (Product Life Cycle Management System), etc.The application of manufacturing information technology such as CRM (Customer Relationship Management System)

has also started to become an important means to promote the development of industry.

Since China joined the World Trade Organization in 2001, China's manufacturing industry has gradually integrated into the global economy. China's international trade volume has started to rise rapidly, its export surplus has continued to increase, and its foreign exchange savings have also continued to grow. China's excellent manufacturing enterprises such as Huawei, ZTE and Lenovo have started their globalization process, while large manufacturing enterprises such as automobiles are gradually developing their internationalization process.

For Shanghai, since the reform and opening up, the most important experience of industrial structure transformation and industrial upgrading is to follow the rules of industrial structure evolution, keep pace with the times, dynamically adjust the focus of industrial development, and better match with the continuous evolution of urban functions in Shanghai. In the early period of reform and opening up, Shanghai focused on developing shortage products such as light industry and consumer goods industry, increasing supply capacity, improving product quality and filling market demand gaps. From the planned supply to the adjustment of industrial structure to actively adapt to market demand, Shanghai has been at the forefront of national reform, creating the very fashionable "old three" consumer goods at that time, namely watches, bicycles and sewing machines. The Shanghai brand became the synonym of high-end consumer goods at that time in China.

Another important manifestation of dynamic adjustment is that Shanghai industry follows Hoffman's law from light industry to heavy industry. By taking advantage of the opportunities of opening up to the outside world and the development and opening up of Pudong, Shanghai timely readjusts its industrial structure and focuses on the development of the six pillar industries characterized by heavy chemical industry, from the initial "automotive, communications equipment,

petrochemical and fine chemicals, household electronics and appliances, iron and steel industry, complete set of equipment for power stations" to the new century "electronic information products, automotive manufacturing, Petrochemical and fine chemical manufacturing, fine steel manufacturing, complete equipment manufacturing, biomedical manufacturing". During this period, the biomedical manufacturing industry replaced the home appliances manufacturing industry, and the steel manufacturing industry was adjusted to eliminate the low-end links and replace them with fine steel.

In fact, these adjustments reflect the trend of Shanghai in the adjustment of industrial structure and industrial upgrade, and the understanding and grasp of the law of industrial development in the industrial development strategy. It also shows that the development of Shanghai can not be separated from the strong support of manufacturing industry. In fact, the development of tertiary industry, such as service industry and financial industry, depends on the material technical support of manufacturing industry.

The development of manufacturing industry in Shanghai has unique advantages: first, a large number of high-quality, well-structured human resources supply, scientists and engineering technicians required for high-quality development, and these high-quality talents are concentrated in large-scale research and development institutions and high-end manufacturing industry, which is an important basis for the development of manufacturing industry in Shanghai; Second, Shanghai has a high quality living environment, medical conditions and educational resources, which can attract talents matching the development of high-end industries. Third, Shanghai has a high degree of openness and internationalization, which is the commanding point of industrial development and the hub of industrial exchange and cooperation at home and abroad. However, it is undeniable that the higher land cost and real estate price, as well as the higher business cost in Shanghai, are also the major factors that restrict

the development of manufacturing industry.

Shanghai's strengths and weaknesses determine that when choosing manufacturing industry, Shanghai needs to promote its strengths and avoid its weaknesses. The selected manufacturing industry should have some unique technical and economic characteristics. "Made in Shanghai" chooses manufacturing with high complexity, high integration, high income elasticity and high correlation, import substitution manufacturing and high barriers to entry, and has a certain scale of manufacturing ecology. The manufacturing industry with the above characteristics not only conforms to the trend of industrial upgrade, but also is the core that "Made in Shanghai" differs from other manufacturing industries. Of course, the above technological and economic characteristics are not isolated, but have many intersections. Specifically speaking:

Firstly, the high complexity and integration of manufacturing means that a high-quality and well-structured talent team and a strong system control ability are needed, which can manage complex technology chains and supply chains at a faster speed to achieve high-precision production. The advantages of human capital and industrial matching in Shanghai make the above-mentioned production possible. This competitive advantage enhances the entry threshold, restricts competitors and becomes the core advantage which is difficult to imitate. With this ability, we can stand at the commanding point of industrial chain innovation. Integrated circuits, commercial airplanes, aeroengines, microelectronics and other industries have such characteristics.

Secondly, import substitution manufacturing means that Shanghai needs to strengthen the main force of China's economic transformation strategy, aiming at the focus of China's industrial transformation in the future. In the future, China's transition from "export-oriented" to "import substitution" is not only driven by the new international trade situation, but also the internal demand of China's economic

transformation and industrial upgrading. From the scale of imported goods in China, chips rank first, followed by automobiles and airplanes. Chips imported by China in one year cost more than trillion yuan, far more than large commodities such as oil. Chips, automobiles and airplanes are China's major import substitution industries in the future. Such industries have a large volume and a huge demand in China. Shanghai has the foundation and the ability to take the lead in this area. In 2019, the high-end equipment manufacturing industry in Shanghai achieved a total industrial output value of 261.303 billion yuan, an increase of 2.8% over the previous year (China Business Industry Research Institute, 2020). From this data, it can be concluded that in 2019, the high-end manufacturing industry as the core of manufacturing industry in Shanghai achieved positive growth.

Third, high income elasticity and high correlation of manufacturing means that in the future, such industries will have strong penetration, can obtain higher added value, and can drive the development of surrounding industries. The economic development level of many cities in Shanghai and the Yangtze River Delta has started to enter the ranks of high income, which has certain "prophet" basis and demand basis for the development of future industries. Shanghai is also the hub of the integration of the manufacturing zone of the Yangtze River Delta and the world, and has a broad manufacturing and service hinterland. Intelligent manufacturing, big data, artificial intelligence, high-end chips and other fields are high-income resilience and high correlation industries. For example, in the area of artificial intelligence, "currently one-third of the national artificial intelligence technical personnel gather in Shanghai, 12% of the total national data is in Shanghai, 50% of the national average daily data transactions occur in the Shanghai Big Data Exchange Center (Made in Shanghai, 2017), and Shanghai has formed a mature artificial intelligence industry technology and business model. Shanghai clearly has a unique advantage in this area.

To sum up, for the manufacturing industry in Shanghai, since the reform and opening up, a correct way for the evolution of industrial structure has been chosen to follow the trend of the times and the needs of the market to formulate the structure. In this process, Shanghai has also achieved the development from light industry to heavy industry, and has made efficient use of its advantages of opening to the outside world, constantly adjusting and optimizing its industrial structure. After that, with its good resources, Shanghai has attracted many high-quality scientific researchers and technicians to develop in Shanghai, forming a manufacturing ecology with high complexity, high integration, high income flexibility and high correlation, import substitution manufacturing, high barriers to entry and a certain scale. More layouts will be made in high-end manufacturing and emerging industries, such as artificial intelligence, semiconductors and so on.

2.3 The dependence of manufacturing industry&logistics industry and the trend of amalgamation

Manufacturing industry and logistics industry are closely related in economic development. Manufacturing industry is a pillar industry of national economic development and a lifeline of national economy. Logistics industry belongs to a service-oriented industry. The reason for the emergence of logistics industry is that most enterprises do not have the ability to control the cost of long-distance transportation of goods, which leads to the appearance of logistics industry. The development and quality of manufacturing industry directly affect the development

of logistics industry. Logistics industry is an important producer service industry, and its development level greatly affects the efficiency and benefit of manufacturing industry.

Zhang tong (2016) said:

“Michael Porter divides enterprise value creation activities into basic activities and supportive activities. Among them, the basic activities are to directly create value by realizing the function of the product, including logistics of feeding, production, delivery, sales, after-sales service and other activities; Supportive activities are those that indirectly create value through professional management to improve the efficiency of basic activities, including procurement, research and development, human resource management, and enterprise infrastructure activities. These activities are not only different but also interrelated in the process of enterprise Value creation, which constitutes the Value Chain of the enterprise.” (p. 19) .

Manufacturing industry belongs to the basic activities in the value chain theory, while logistics industry belongs to the supportive activities in the value chain theory. It is a kind of professional management, and its essence is to improve the efficiency of production activities. These two kinds of activities are not only different but also interrelated in the process of creating value of an enterprise, which constitutes the value chain of an enterprise, which indicates the mutually promoting relationship between manufacturing industry and logistics industry.

Zhang (2016) also mentioned the theory of Embeddedness,

”In the industrial chain, logistics enterprises and manufacturing enterprises establish a cooperative relationship based on supply and demand and

complementarity. This embeddedness is reflected in the embeddedness of logistics services in the value chain network of manufacturing industry. Logistics enterprises and manufacturing enterprises interact and promote each other in the value chain”(p. 19)。

Based on theory of embeddedness, there is an interactive and mutually promoting relationship between manufacturing industry and logistics industry.

Nowadays, the most common way for manufacturing industry is to outsource the logistics business required by enterprises and peel off the non core logistics business. Taking the logistics outsourcing of many companies as an example, the author will introduce the benefits of logistics outsourcing.

When manufacturing enterprises outsource logistics to logistics enterprises, they can not only directly share the achievements brought by the improvement of logistics efficiency, but also indirectly obtain many other benefits.

First of all, it is conducive to focus on the development of core competitiveness. In the case of limited resources, enterprises must adopt the strategy of "doing something and not doing something" in order to obtain and maintain the dominant position in the competition. Through the introduction of logistics, enterprises can concentrate their limited human, material and financial resources on their core business, carry out key research and develop core technology and new products, so as to make their core competitiveness stronger and stronger, and their core business become bigger and bigger, so that competitors can not surpass and replace them. The cooperation between Unilever and Shanghai Friendship logistics can well reflect this. Unilever is a manufacturer of food and washing products. After leaving the production line, the logistics business of its products will be outsourced to Shanghai Friendship Logistics Group Co., Ltd., including storage and transportation, inventory, goods circulation and processing (such as disinfection,

cleaning, gift and promotional packaging, labeling, thermoplastic sealing, etc.). Under the cooperation mode of outsourcing, Unilever can focus on the development of new products, and will not spend unnecessary manpower and financial resources because of the demand for logistics business.

Secondly, it is conducive to improve the level of enterprise logistics management. For many enterprises, logistics is a kind of auxiliary business, which is often inefficient and out of control. Logistics enterprises can give full play to their professional advantages, optimize the existing logistics network of production and circulation enterprises, create a customized and integrated logistics system for them, and send special personnel to timely guide and even directly manage the warehouse site and distribution operations, so as to greatly improve the logistics management level of production and circulation enterprises. The general idea is to let professional people do professional things.

Finally, it is conducive to improve the efficiency of logistics operations and reduce logistics costs. Because of its huge and reasonable distribution network, rich knowledge and experience in logistics management, advanced logistics management information system can provide timely logistics information for production and circulation enterprises, and greatly improve the efficiency of ordering, delivery and distribution. The production and circulation enterprises can share the economic advantages of scale brought by the operation amalgamation of logistics enterprises, and greatly reduce the logistics cost of enterprises.

All these show that the logistics industry and the manufacturing industry have established a mode of dependence and interconnection. This mode enables manufacturing enterprises and logistics enterprises to put limited human resources and resources into the main business of enterprises to achieve the highest efficiency.

The formation and development of logistics industry is the result of industrialization, which is separated from the value chain of manufacturing industry,

and is constantly socialized, specialized and large-scale. As the supplier of manufacturing logistics service, logistics services are embedded in the manufacturing value chain, and form mutual dependence and mutual promotion relationship with manufacturing industry, and realize industrial upgrading in the interaction, and then go to deep amalgamation.

With the transformation and upgrading of manufacturing industry to intelligent manufacturing, higher and newer requirements are put forward for logistics service, which requires the establishment of logistics system matching with intelligent manufacturing. Among them, the logistics service network should match the manufacturing supply chain network, the logistics facilities and equipment should meet the standardization and automation requirements of manufacturing production, the logistics information system should be connected with the manufacturing enterprise production management system, and so on. Under the background of upgrading manufacturing industry, logistics enterprises need to optimize the existing logistics system according to the requirements of intelligent manufacturing industry, innovate logistics services, comprehensively improve the networking of logistics services, the standardization of logistics links and logistics equipment, and the intellectualization of logistics system, so as to promote the transformation and upgrading of logistics industry to intelligent logistics. In the process of upgrading and integration to intelligence, the original logistics service for production in manufacturing industry will be decomposed from the value chain of manufacturing industry. Similarly, the value chain of logistics industry will be decomposed and broken because of the extension to manufacturing industry. In this case, the decomposed value chain will be integrated and reconstructed according to the principle of the best core competitiveness of enterprises through the choice of the market, and form a new value chain. In the process of decomposition and integration of the value chain, the integration of manufacturing industry and logistics industry is

deepened, and greater value is released, which makes the integration of manufacturing industry and logistics industry inevitable.

3 Analysis of benefits of the Amalgamation of Logistics industry and Manufacturing industry

Through the analysis of the above cases in chapter 2, we can see that the deep amalgamation of the two industries is bound to bring new changes to both industries. The author will put forward the benefits brought by the amalgamation of manufacturing and logistics industry in five aspects according to the author.

1.Promoting information sharing

The author holds that the sharing of information resources is the basic core and key link in the amalgamation and development of manufacturing and logistics industries, which can eliminate the information asymmetry between the industrial chain and supply chain, and lay a good foundation for creating an information environment conducive to the amalgamation of the two industries' factors and resources. First, the sharing of information resources will help the manufacturing and logistics industries to implement more efficient decision-making, planning and operations.

Through the use of some information technology, such as block chain technology, to build a credit system between the two industries, to create a platform belonging to the manufacturing industry and the logistics industry to understand each other, so

that every member of the platform can become the platform builder and maintainer. Blockchain technology makes every parameter on the platform more real, because Blockchain technology does not allow any individual to modify any parameter arbitrarily, so everything on the platform is the consensus of everyone. Therefore, Blockchain technology can enhance the credibility of the platform.

Finally, in the procurement, production, sales and other links in the supply chain information sharing, can thoroughly solve the supply chain cooperation not comprehensive in-depth, unable to each link of manufacturing enterprise logistics business system optimization problem, has both industry can promptly of any change in a link to make a timely response, and maximize reduce cost in money and time.

2.Unification of standard

The author believes that in the industrial chain, the consistent standards of supply chain convergence are the operational basis for achieving integrated development and breaking the gap between manufacturing industry and logistics industry. First of all, the standards and specifications of the two industries are unified, so that each operation link of the manufacturing industry and the logistics industry can be smoothly connected, effectively reduce the repeated input and waste of unnecessary human resources, material resources and other factor resources, improve the utilization efficiency of factors, and reduce the overall and respective operating costs of the manufacturing industry and the logistics industry. Secondly, the consistency of the standards and norms of the two industries is an internal requirement to adapt to the service-oriented, intelligent and green development trend of the manufacturing industry and accelerate the development of the logistics industry model. Thirdly, the accelerated construction of the logistics service standardization system will extend to the manufacturing industry on the basis of

some important national standards, such as Commodity Barcode, Storage and Transportation Unit Barcode, Logistics Unit Barcode, etc., and lay a standard foundation for the efficient development of the industrial chain and supply chain. In addition, the packaging and other aspects can be unified to further improve efficiency and save time.

3. Facility coordination and synchronization

The author thinks that on the basis of information resource sharing and industry standard unification of the two industries, the amalgamation and collaboration of hardware facilities and equipment will provide a carrier for the amalgamated development of manufacturing industry and logistics industry, and can produce new benefits.

First of all, in order to serve the rapid and flexible transportation needs of manufacturing enterprises for raw materials, parts, semi-finished products and finished products, the logistics industry will carry out spatial layout of logistics facilities, and such layout will also realize the logistics industry's own economies of scale in loading, unloading and transportation. Secondly, it can effectively solve the problem of poor connection between logistics facilities and manufacturing layout. Finally, through the organic combination of logistics facilities, the two industries will greatly improve the utilization efficiency of loading, unloading, transportation and other equipment in the process of logistics, so that the utilization of equipment can reach the maximum efficiency.

4. Driving the market

The author thinks that manufacturing industry and logistics industry both serve

the market and the amalgamation of the two industries is an innovative development process for enterprises to realize value and improve efficiency and benefit. Manufacturing industry itself is the pillar industry of the national economy. In the process of the amalgamation of logistics industry and manufacturing industry, it will gather a certain market to excellent logistics enterprises. According to the principle of "survival of the fittest", it will form some leading enterprises of logistics industry, so as to amalgamate the relatively scattered logistics resources of the market, give full play to the resource efficiency, and stimulate the vitality of the logistics market. After the formation of leading enterprises in the logistics industry, they can provide logistics outsourcing for manufacturing enterprises, improve the supply chain capacity of the manufacturing industry, reduce logistics costs, and have a higher ability to resist risks.

5. Technical communication

The amalgamation of the two industries is not a simple business cooperation relationship, but the amalgamation of the two business processes based on modern information technology and supply chain technology. It is the fulcrum to realize the linkage development of the two industries and will form a large industrial operation cycle from production to terminal consumption. First, improve the coordination capacity of the supply chain between the manufacturing industry and the logistics industry, and promote the resource integration, process docking and organizational coordination capacity of the two industries. The second is to optimize the design of the whole supply chain process from production, procurement, sales and distribution, speed up the process reengineering, realize the integrated operation of all links of the industrial chain and supply chain, and provide specific amalgamation implementation for the linkage of the two industries. Third, the manufacturing industry produces the demand for third-party logistics service, which will produce

the development path of scale economy and the innovation of amalgamated management mode, and form the professional supply chain service cycle.

4 Measurement of the Amalgamation of Logistics industry and Manufacturing industry in Shanghai

4.1 Reflect the Amalgamation Degree of Logistics industry and Manufacturing industry in Shanghai with methodology

In the process of amalgamation of manufacturing industry and logistics industry, we need to have an index to quantify the degree of amalgamation, to reflect the process of amalgamation, and to better provide a reference standard for decision makers and those who care about the amalgamation of manufacturing industry and logistics industry.

4.1.1 Introduction of the methodology and data

(1) Selection of data

In order to fully reflect the current situation of the amalgamation of manufacturing industry and logistics industry in Shanghai, aiming at the representative districts of Shanghai, taking 2015 as the base year, the time series data from 2014 to 2018 are used for analysis. The data comes from Shanghai Statistical Yearbook, including the growth of manufacturing and logistics industries in typical districts of Shanghai. Because the added value of manufacturing industry in each municipal area is incomplete, and the added value of manufacturing industry accounts for the vast majority of the industrial added value, the industrial added value is selected to replace the added value of manufacturing industry. The second is logistics index. The definition of logistics industry in China is not completely clear, so it is very difficult to find a complete index of logistics development scale. After selection, it is decided to take container throughput as the index of Shanghai logistics level or current logistics scale. As we all know, logistics includes transportation, storage, handling, packaging, circulation and processing, distribution, information processing and other links, and container throughput can represent its scale in shipping logistics. Shanghai is a shipping center built by our country. The change of the total amount of shipping logistics can reflect the change of the total scale of social logistics. Some municipal districts in Shanghai do not have statistics on container throughput. Through a series of selection, the logistics level of these areas will be reflected by the total import and export volume of foreign trade, because import and export trade is a very important part of Shanghai's total economic volume, and the import and export trade logistics serving import and export trade is also the core part of Shanghai's social logistics. And in the subsequent data processing, the data will be first processed in a uniform and dimensionless way, focusing on its changes. Therefore, the changes of this indicator can reflect the changes of logistics serving the import and export trade, because it can also represent the level of

logistics industry in Shanghai. Finally, the degree of amalgamation of manufacturing industry and logistics industry in Shanghai and its representative districts will be presented by symbiosis degree, and the trend will be presented by chart.

In order to eliminate the influence of units, orders of magnitude and positive and negative changes of statistical data, the ideal value method is used to make the original data consistent and dimensionless; Then, for the processed data, the degree of amalgamation between symbiotic units is described by means of symbiosis degree measurement method.

Before elaborating two data processing methods above, some variable markers are introduced. Firstly, we use x to represent the industrial added value of manufacturing industry and y to represent the added value of logistics industry. Secondly, Shanghai and its municipal districts are ranked as 1, 2, 3, 4 as follows: Shanghai, Pudong New District, Xuhui District and Yangpu District. Similarly, the manufacturing value-added of region I in year t is $x_{i,t}$, and the logistics value-added is $y_{i,t}$.

For the study of the amalgamation degree of manufacturing and logistics industry in various regions, take Shanghai as an example. First of all, the value-added of manufacturing industry in Shanghai is $\{x_{1,0}, x_{1,1}, x_{1,2}, x_{1,3}, x_{1,4}\}$ and that of logistics industry is $\{y_{1,0}, y_{1,1}, y_{1,2}, y_{1,3}, y_{1,4}\}$.

$$\text{Let } M1 = \max_{0 \leq t \leq T} x_{1,t}, m1 = \min_{0 \leq t \leq T} x_{1,t}.$$

For positive growth, let $\bar{x}_{1,t} = x_{1,t} / M1$; For negative growth, let $\bar{x}_{1,t} = m1 / x_{1,t}$; The standardized index is $x^*_{1,t} = \bar{x}_{1,t} / \sum_{t=1}^T \bar{x}_{1,t}$.

In the same way, we can get $\{y_{1,0}^*, y_{1,1}^*, y_{1,2}^*, y_{1,3}^*, y_{1,4}^*\}$ from the same treatment of added value of logistics industry. Secondly, define the symbiosis degree of manufacturing industry to logistics industry in the t -th year $\theta_{1,t}^{ML}$, and the symbiosis

degree of logistics industry to manufacturing industry in the t-th year $\theta_{1,t}^{LM}$ as followed:

$$\theta_{1,t}^{ML} = \frac{(x_{1,t}^* - x_{1,t-1}^*)/x_{1,t}^*}{(y_{1,t}^* - y_{1,t-1}^*)/y_{1,t}^*}, 1 \leq t \leq T \quad (1)$$

$$\theta_{1,t}^{ML} = \frac{(y_{1,t}^* - y_{1,t-1}^*)/y_{1,t}^*}{(x_{1,t}^* - x_{1,t-1}^*)/x_{1,t}^*}, 1 \leq t \leq T \quad (2)$$

Similarly, for typical districts in Shanghai, Pudong New District, Xuhui District and Yangpu District can get the symbiosis degree of manufacturing industry and logistics industry.

In the whole process of calculation and analysis, the data consistency and dimensionless processing and symbiosis degree calculation in Shanghai and some typical districts in Shanghai are carried out on EXCEL platform.

4.1.2 Use Methodology to measure the Amalgamation Degree of Logistics industry and Manufacturing industry in Shanghai

According to the symbiosis degree of amalgamation between manufacturing industry and logistics industry, this paper makes the symbiosis degree trend chart, analyzes the situation of amalgamation in China, explains the current situation according to the actual situation, and forecasts the development trend in the next step.

(1) Amalgamation of manufacturing industry and logistics industry in representative district of Shanghai

In this paper, the author chooses Yangpu District, Xuhui District and Pudong

New Area as the object of analysis, and the rest of the municipal districts will not be described.

According to Formula (1) and (2), the symbiosis degree of manufacturing industry and logistics industry in Yangpu District, Xuhui District and Pudong New Area of Shanghai during 2015 to 2018 can be calculated. The results are shown in Table 1 and Table 2.

Table 1

The degree of symbiosis of manufacturing industry to logistics industry in the municipal district of Shanghai

Year	2015	2016	2017	2018
1	4911.495386	-3.750091838	-12.40523672	283.5044401
2	-307.7953049	-595.6396731	8.347803381	87.42231024
3	5376.622449	-3.608402588	-17.50464072	53.10632813

Table 2

The degree of symbiosis of logistics industry to manufacturing industry in the municipal district of Shanghai

Year	2015	2016	2017	2018
Yangpu District	8.25213551	-7.130921114	-0.694096879	6.208841775
Pudong New District	-80.15074795	-2659.95618	1.727345826	9.935328635
Xuhui District	-0.101286972	-19.6113204	7.240058307	-15.92408872

(2) Amalgamation of manufacturing industry and logistics industry in Shanghai

According to Formula (1) and (2), the symbiosis degree between the manufacturing industry and the logistics industry in Shanghai during 2015-2018 can be calculated. The calculated results are shown in Table 3.

Table 3

The degree of symbiosis of manufacturing industry to logistics industry in Shanghai

Year	2015	2016	2017	2018
θ^{ML}	3.723336128	32.5125375	0.681777797	-11.05877373
θ^{LM}	3.380215597	96.69628485	0.90709769	-23.54867682

In order to fully reflect the change of symbiosis degree between manufacturing industry and logistics industry in Shanghai and its typical districts, the results are drawn into symbiosis degree trend chart. Due to the obvious quantity difference between symbiosis degrees, the ordinate scale is changed into logarithmic scale with the help of Excel, which makes the trend effect easier to observe and compare. The results are as follows:

1. Yangpu District, Shanghai

As shown in Figure 1, from 2015 to 2018, the contribution of the manufacturing industry to the logistics industry in Yangpu District was greater than that of the logistics industry to the manufacturing industry. However, it can be seen that the logistics industry and manufacturing industry have begun to amalgamate the attempt. In 2016 and 2017, the contribution of manufacturing to the logistics industry was very similar to that of the logistics industry to the manufacturing industry. Yangpu district has always been the largest industrial zone in Shanghai, its manufacturing is also very rich, so the manufacturing industry has been in a

dominant position, but after Shanghai 12th five-year (2011-2015) for the development of logistics industry, logistics industry of yangpu district is working on a positive growth, and during the period of "much starker choices-and graver consequences-in" in an attempt to the development of modern logistics, and logistics platform for economic development, We will promote the amalgamation and innovation of the logistics industry and various industries. But in 2018, the industry's contribution to the logistics industry has surpassed the contribution of logistics industry in manufacturing, the appearance of the situation because the process of trying to logistics innovation, value chain have not done depth fusion, so unable to achieve a win-win result, so for the convergence of some to try needs to be improved and optimized.

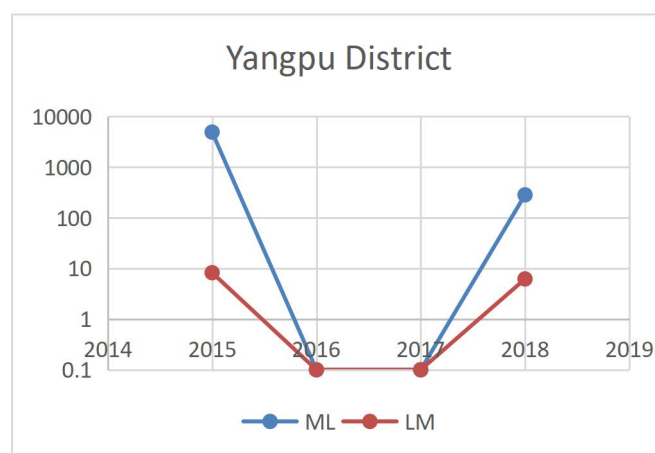


Figure 1. The trend of symbiosis degree in Yangpu district of Shanghai

2. Pudong New District, Shanghai

As shown in Figure 2, from 2015 to 2018, the contribution of the manufacturing industry to the logistics industry in Pudong New Area is greater than that of the logistics industry to the manufacturing industry and shows an expanding trend. It is understood that Pudong New District is developing high-end manufacturing industry. By 2018, the scale of integrated circuit has exceeded 100 billion yuan, accounting for

73% of Shanghai's total. The authority is actively planning space to build a Shanghai integrated circuit industrial park with thousands of enterprises and a large scale and a large number of talents ("Shanghai Pudong New", 2019) 。 Secondly, the scale of innovative pharmaceutical industry reached 67.2 billion yuan, accounting for 46% of Shanghai's total, and Zhangjiang Innovative Pharmaceutical Base and Zhangjiang Medical Device Industry Base will be built soon ("Shanghai Pudong New", 2019) 。 The Pudong New District will also build a pilot area for the innovative application of artificial intelligence in China to help realize the development from "manufacturing" to "intelligent manufacturing", as well as a supporting park for the final assembly industrial base of large aircraft. As for the auto industry, the scale of the auto industry in the Pudong New Area has exceeded 200 billion yuan. It is speeding up the development of new energy vehicles and intelligent connected cars, and has built the famous Tesla factory in Shanghai ("Shanghai Pudong New", 2019) 。 All these information show that Pudong New Area is undertaking the task of manufacturing upgrading and is trying to build a high-end manufacturing park to attract relevant talents. Therefore, the contribution of the manufacturing industry to the logistics industry is greater than that of the logistics industry to the manufacturing industry. Therefore, it is necessary to make the logistics industry high-end and refined to meet the demand of the high-end manufacturing industry for accurate and efficient services.

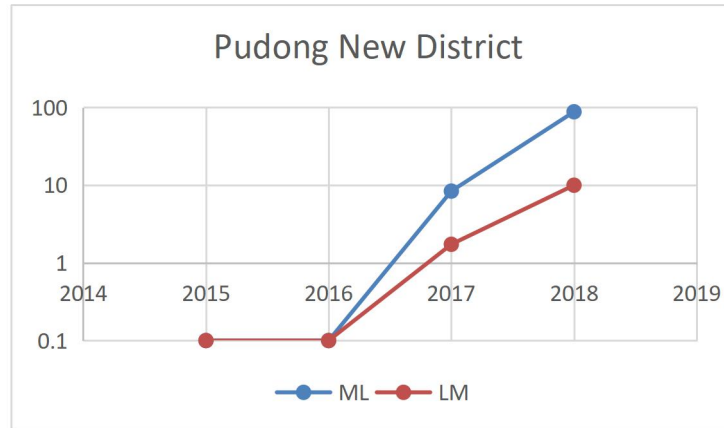


Figure 2. The trend of symbiosis degree in Pudong New district of Shanghai

3. Xuhui District, Shanghai

Figure 3 shows that from 2015 to 2018, Xuhui District is in the trend of staggered development of the contribution of manufacturing industry to the logistics industry and the contribution of logistics industry to the manufacturing industry. As far as the amalgamation of Xuhui District is concerned, the amalgamation between the manufacturing industry and the logistics industry is getting better and better, and the degree of symbiosis is getting smaller and smaller, which indicates that the amalgamation between the two industries is getting closer and closer under the catalysis of some conditions. During the period from 2017 to 2018, the contribution of the logistics industry to the manufacturing industry exceeded the contribution of the manufacturing industry to the logistics industry.

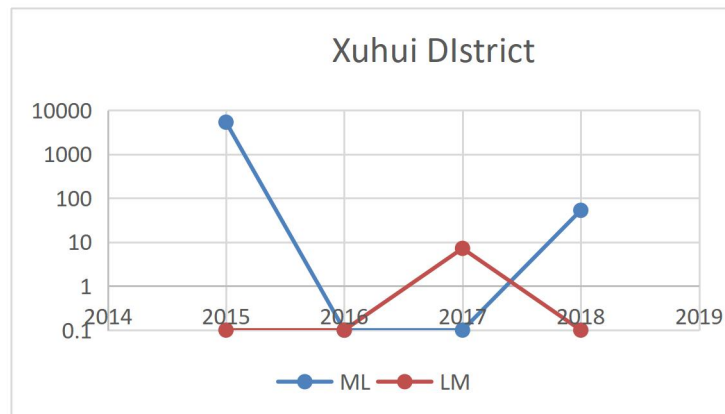


Figure 3. The trend of symbiosis degree in Xuhui district of Shanghai

4. Shanghai

As shown in Figure 4, the contribution of the manufacturing industry to the logistics industry has been slightly greater than that of the logistics industry to the manufacturing industry, but the gap between the two is getting smaller and smaller, which proves that the amalgamation of the manufacturing industry and the logistics industry is going in a good direction. As for the manufacturing industry and the logistics industry in Shanghai, the logistics industry is still in the overall leading position.

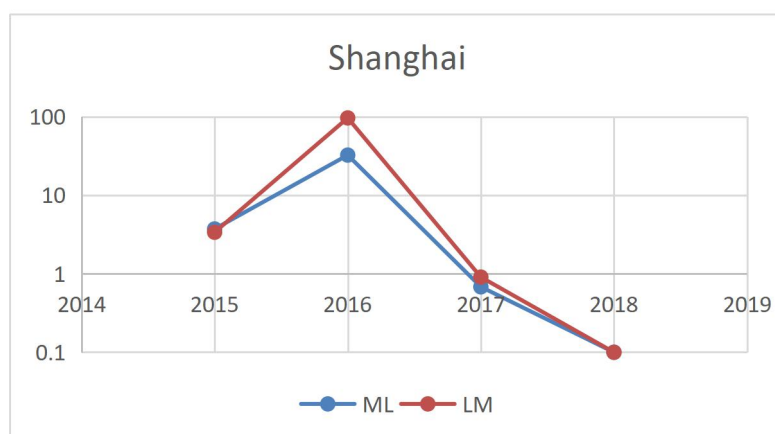


Figure 4. The trend of symbiosis degree in Shanghai

5 The elements affecting the amalgamation of manufacturing industry and logistics industry

According to the trend measurement of symbiosis degree in Chapter 4.1, we can see that there are still many problems in the amalgamation of manufacturing and logistics industry in Shanghai and several representative municipal districts. This chapter will analyze some problems that may exist in the amalgamation of manufacturing and logistics.

1. The supply chain management level of some manufacturing enterprises is not high enough

According to the statistics of 2014, the proportion of outsourcing logistics in China's manufacturing industry is only 61%, while more than 70% in developed countries. The number of manufacturing enterprises that actually implement supply chain management in China is less than 20%, while that in developed countries is more than 50% (“China's manufacturing outsourcing”, 2014). This indicates that the manufacturing enterprises' awareness of supply chain management is still relatively weak, and there is a big gap compared with foreign regions with developed logistics industry. In addition, the outsourcing awareness of manufacturing enterprises is also relatively weak, of course, the reason why some manufacturing enterprises with outsourcing awareness do not outsource is that they cannot find the corresponding logistics outsourcing services. For the manufacturing industry in the past, it was only outsourced in some links, such as renting a warehouse. Now, the trend of outsourcing in manufacturing industry is getting stronger and stronger, and it really enters the

procurement link. Logistics enterprises in the future need to integrate into the procurement and order links of manufacturing enterprises in the early stage of production. Logistics enterprises develop from the stage of picking up goods and delivering goods to the stage of cooperating with customers to the stage of production management, to the stage of production and even to directly participate in the production process of the production line. This is the form of the amalgamation of the two industries in management.

2.The professional service ability and level of some logistics enterprises are not high enough to effectively adapt to the development needs of the manufacturing industry

Manufacturing enterprises' demand for logistics services comes from manufacturing enterprises' demand for outsourcing of some non-core logistics. For manufacturing enterprises, logistics business usually includes supply logistics, production logistics, sales logistics, recovery logistics and waste logistics. However, the various mechanisms and systems of the logistics industry are not perfect enough, and the industrial norms also need to be continuously upgraded. Most logistics enterprises need to have their own logistics equipment and other facilities. For manufacturing enterprise, the materials procurement warehousing, product delivery should be an important link of the logistics distribution, but due to the inadequacy of equipment in the logistics enterprises as well as the mechanism system defects, which makes manufacturing enterprises concern about its safety, so most manufacturing enterprises still hold the logistics into his own hands, rather than the logistics enterprise cooperation, The outsourcing of its logistics business.

3.The amalgamation and opening degree of stock logistics resources in the manufacturing sector is insufficient, and the internal logistics cost of

manufacturing enterprises is relatively high.

At present, the growth of most economic indicators in China is slowing down, which indicate the emergence of stock economy. Inventory economy refers to the situation that structural optimization is needed in the industry after the momentum of rapid development in the industry fades based on the large population base and the advantages of the region.

According to the statistics of the China Federation of Logistics and Purchasing, from 2013 to 2015, the total cost of logistics accounted for 18%, 16.6% and 16% of GDP, respectively. In 2016, the total cost of logistics fell to less than 15%. In recent years, the level of logistics cost in China has declined. However, at present, the proportion of total logistics cost in GDP in China is not only about twice as high as that of developed countries such as the United States, Japan and Germany, but also higher than that of other BRICs countries such as India and Brazil, which is about 5 percentage points higher than the global average. This means that if the whole society creates the same scale of GDP and enterprises create the same scale of output, the cost of logistics in China is higher. This also confirms that the logistics cost of China's economic development is high, and the problem of low logistics efficiency still needs to be improved. "From the current point of view, if the ratio of China's total social logistics cost to GDP can reach the level of 8.3% in the United States in 2010, the annual economic benefit will increase by more than 50000 billion yuan" (Fang Yuanzhen, 2017, para. 6). This shows that the high logistics cost will virtually offset the value created by many manufacturing industries, reflecting the great significance of cost reduction and efficiency in the amalgamation of the two industries.

During the COVID-19 epidemic response and the resumption of work and production, problems such as insufficient elasticity of the supply chain, weak coordination of the industrial chain and insufficient integration of the logistics industry and manufacturing industry appeared, which directly affected the smooth

operation of the industry and normal production and living order. In the special report of DHL's resilience360 on January 29, 2020, it was pointed out that "the serious interruption of freight transportation along the Yangtze River in Wuhan, the overstock of port materials, the serious interruption of truck transportation and railway transportation services, as well as the United States, Singapore, South Korea, Thailand, France, Australia, Malaysia, Japan, Canada, etc. The interruption of air transportation between Wuhan and even China due to the epidemic in Vietnam and other countries has had a huge impact on the supply chain operation and material supply, especially in the automobile, technology and chemical industries. According to resilience360 survey, the main industrial supply in Wuhan and its surrounding areas include automobile (accounting for 48.39% of its total economy), technology and Engineering (25% and 8.06%), chemical industry (8.06%) (Song Hua, 2020). These data can show that accidents such as the epidemic will affect the raw material supply chain of the manufacturing industry, and make the logistics industry stagnate. In this case, there is a demand for emergency logistics.

6 Suggestion for Amalgamation of Logistics industry and Manufacturing industry

Through the above analysis of the amalgamation of manufacturing industry and logistics industry in Shanghai, it can be concluded that the amalgamation of manufacturing industry and logistics industry in Shanghai is still not very balanced. The contribution of manufacturing industry to logistics industry is generally greater

than that of logistics industry to manufacturing industry, but the gap has a tendency to narrow. In Yangpu district, manufacturing is still dominant. In the Pudong New District, manufacturing industry is in the leading position due to the construction of a series of high-end manufacturing factories. In Xuhui District, manufacturing industry and logistics industry are interlaced with each other.

Based on the theory of the core competitiveness and theory of value chain mentioned above, the author will put forward some suggestions on the amalgamation of manufacturing and logistics industry.

1.Manufacturing enterprises themselves should improve the level of production management

According to the value chain theory, the driving force of the mutual amalgamation of the two industries comes from the business intersecting part of the value chain, while the development of technology can promote the operation of the deep amalgamation to a greater extent. Therefore, manufacturing enterprises need to constantly innovate to achieve the high-end level of production management. According to the data and trend chart, Shanghai's own manufacturing industry is in the process of improvement and upgrading and moving towards comprehensive high-end manufacturing industry. First of all, the manufacturing industry should be bold in the management concept innovation, enhance the enterprise logistics service outsourcing awareness; Secondly, in the production, we should try to implement the block production, and subdivide the production into several processes, so as to realize the seamless connection between the manufacturing link and the logistics link. By outsourcing logistics services, which have little relationship with their core assets, manufacturing enterprises can focus more on product research and development. According to the theory of the core competitiveness, this is more conducive to the improvement of the core competitiveness of manufacturing enterprises. By accepting

more business, logistics enterprises can expand their operating scale and improve service quality, which is also conducive to the enhancement of their core competitiveness. For example, Bausch & Lomb Shanghai is a subsidiary of Bausch & Lomb USA established in Shanghai, which is engaged in the production and manufacture of ophthalmic surgical equipment and devices. The company's supply chain logistics model is initially self-operating. Most of the logistics business is done independently by the company's headquarters and subsidiaries. Only some special logistics business, such as emergency air transport of samples, loading and unloading of large operating equipment, and transportation of dangerous goods, are handed over to professional logistics companies. In this case, the company's unit logistics costs are high, and the efficiency of the company's logistics system can not meet expectations compared with the input of resources. After that, the company's decision-making level decided to outsource the entire logistics business to Shanghai Qilin Logistics Company. After the implementation of the logistics outsourcing strategy, the proportion of enterprise logistics costs has significantly decreased. The ratio of logistics costs before outsourcing to total cost of the enterprise reached 7.4%, which decreased to 6.65% in the first year after outsourcing and 10.14% year on year (pixyday, 2015).

2. Logistics enterprises should try their best to improve the quality of their services

At present, the manufacturing enterprises in Shanghai are mainly high-end manufacturing industries, and the demand for logistics services is more accurate. At present, most of the logistics services of many manufacturing enterprises in Shanghai have been outsourced because the enterprise management concept has been progress, the more important reason is that the service items of logistics enterprises can better match the logistics needs of manufacturing enterprises, service quality is gradually

increased. Therefore, the logistics industry in Shanghai has been in constant efforts to expand the business scope of services, enhance the value of services provided, will no longer service is limited to the traditional warehousing, transportation of goods, to expand its business chain to the sorting of the goods, assembling, packing and so on high value-added links, to meet the requirements of diversified manufacturing enterprises. Secondly the logistics industry as producer services to constantly strive to improve their service quality, sets up the service for this consciousness, to start using some of the information technology to support the entire logistics system operation and improve efficiency, such as bar code and RFID technology, establish logistics information service platform, informationization and high-speeding of logistics services, to meet the requirements of the manufacturing enterprise timeliness. In addition, for the country, belongs to the Shanghai logistics industry more developed regions, logistics enterprises should have more international vision, to explore the innovation of logistics service mode, the initiative will itself and the economy in the supply chain business flow, information flow and cash flow elements such as organic combine to innovation, and combined closely with the international trade, international finance, international industry chain, Create a "logistics plus" service model. For example, the cooperation between Shanghai General Motors and COSCO reflects this very well. Because the automobile manufacturing industry is special, there are more parts and more complex varieties and specifications. It would take a lot of time for Shanghai General Company to do purchasing logistics by itself. Outsourcing achieved by Shanghai General Purpose and COSCO is an outsourcing system that delivers raw materials directly to production lines. In this process, COSCO will supply raw materials on time as required by Shanghai General Motors. In the logistics outsourcing cooperation with professional COSCO, Shanghai General Motors can experience the logistics system tailored by COSCO and put its energy into the core business of automobile manufacturing, truly "let professional

people do professional things", so as to achieve the highest efficiency.

3.The Shanghai government should be a facilitator to promote the amalgamation of the two industries

The government should relax the relevant control of industrial amalgamation, change its positioning, and gradually transition from the role of the manager of industrial amalgamation to the role of the service provider of industrial amalgamation, so as to create a relaxed institutional environment for the deep amalgamation of manufacturing and logistics industry. At the same time, the government should introduce relevant policies, which should focus on how to lower the transaction cost and the coordination difficulty between industries and how to strengthen the relevant personnel training, to optimize the innovation environment, and to build information platform and other aspects, so as to create conditions for industrial integration in an all-round way. At the same time, the government should support the local industrial policy, vigorously promote the development of local manufacturing industry, and create conditions for the in-depth amalgamation of two industries. For example, the Shanghai Government has given Tesla's factory in Shanghai a highly preferential loan of 18.5 billion RMB with an interest rate as low as 3.9%, far lower than the normal commercial loan rate. (Long Xi, 2020) This shows that the Shanghai Government intends to introduce a number of foreign enterprises in high-end manufacturing industry to bring impetus to the development of domestic high-end manufacturing industry.

In addition, the government should create some financial innovation policy, and develop some financial service mode related to logistics and supply chain management enterprise, and introduce international capital to use its leverage effect, aiming to solve the financing difficult problem of some logistics company. In this way, the improvement of the overall efficiency of the logistics industry can

reduce the transportation cost of manufacturing industry as a whole.

4.Support of information technology in amalgamation

The author believes that the amalgamation process of manufacturing industry and logistics industry needs the support of the advanced information technology, big data technology and blockchain technology. Big data is used to ensure the comprehensiveness of data, while blockchain is used to ensure the security of data.

The "big" of big data doesn't only mean the large amount of data, but also the comprehensiveness of data. The goal of big data is to have statistics of any data needed in the whole industry. Through the comprehensiveness of big data, the past data can be analyzed and the algorithm can be used to put forward the instructive risk control report for the future. The strategic significance of big data technology is not the collection of the large amount of data and information, but to do specialized processing on these meaningful data. In other words, if take big data as an industry, the key to profit in this industry is to improve the "processing capacity" of data and realize the value-added of data by processing (big bird, 2017). The ultimate goal of big data technology is to have enough data to predict future trends. Taking an automobile manufacturing enterprise as an example, the big data system stores the monthly output data of the automobile factory in different market conditions. According to these data, the logistics enterprise can predict the future output quantity under different market conditions and make plans to avoid unnecessary losses.

Blockchain technology is designed to ensure data security. First of all, the essence of blockchain technology is a more secure way of information storage. It is the underlying technology for the construction of a credit system in the future, and it has the characteristics of anonymity, openness and decentralization (Liu, 2019, p. 7). Blockchain technology can make the data in big data more secure and reliable, because once the data is entered into the block, it cannot be stolen or tampered with

by an unrelated person. For example, a logistics enterprise obtains the production data of a manufacturing enterprise based on the interactive platform between the manufacturing industry and the logistics industry, so that it can quickly match the corresponding logistics services. In this process, the accuracy and security of the data must be guaranteed, and it cannot be modified or deleted by criminals.

Nowadays, big data technology has been gradually forming, and block chain technology still in its infancy, so the manufacturing companies and logistics companies should continue to focus on big data technology and chain blocks the development of technology, the Shanghai government should also promote the information technology research personnel and more than two industry communication, using the power of the technology can make the two industry more safe and reliable, complete depth fusion process.

5.Construction of logistics information platform

With the influence of 'Internet +', the logistics information platform will play an increasingly important role." However, the current integration mode of the two industries is mainly a "one-to-one" single-point integration mode, with little platform involvement. The operation systems of logistics enterprises and manufacturing enterprises are both closed and independent, and the logistics information platform cannot directly participate in them "(Li Dandan & Wang Xiume,2018). This proves that the current cooperation between manufacturing industry and logistics industry in China is mostly a "point-to-point" mode, and the intervention of a platform is urgently needed. The system of manufacturing industry and logistics industry cannot be kept closed and independent. It is necessary to join the logistics information platform to achieve a new mode of the amalgamation of the two industries.At the 13th China Intelligent Transportation annual conference in 2018, Liu Jian (2018), who is the deputy director of China transportation and communication information

center, said:

“There are about 700 existing logistics information platforms in China, of which 500 are engaged in the match of cargo and vehicle. These 500 platforms all use the "Internet +" method to realize real-time sharing and intelligent matching of freight supply and demand information, so as to reduce roundabout, empty transport and idle logistics resources. From the perspective of market choice, the logistics market is to improve the quality and efficiency, and the application of information technology is the main means to improve the efficiency of logistics resource allocation and reduce the cost of logistics transportation. Of course, we can also see that in the development of logistics informatization, there are still many problems, such as the low level of information resources opening and utilization, the poor information exchange between different modes of transportation, the difficulty of information sharing between transportation subjects, and the imperfection of the relevant standard system.”

The above speech of Mr. Liu Jian comprehensively demonstrates the necessity and important role of the construction of logistics information platform in promoting the cost reduction and efficiency increase of national logistics, and provides the direction for the integration of manufacturing industry and logistics industry.

This shows that there are a certain number of logistics information platforms in China, but the utilization rate of information resources in these platforms is still low. It is still a data point-to-point logistics cooperation mode, and there is still a long way to go with the requirements of deep amalgamation of the two industries.

The author thinks that a mature logistics platform should meet the following requirements:

Logistics platform should face transportation departments, provide decision-making data and industry-related information based on large data of

logistics, and use large data to strengthen the overall service of the logistics market.

Logistics platforms should be oriented to logistics network trading platforms, vehicle-free carriers and various logistics parks, and provide basic data validation, information sharing and other services to support the operation of "Internet+", an efficient logistics ecology.

The logistics platform should face the supply chain system, provide queries on policies, regulations and credit systems for small and medium-sized manufacturing enterprises, provide dynamic communication services across regional transportation modes and various means of transport, and provide international logistics information sharing query services such as ship dynamics, port container status and so on.

7 Summary and outlook

7.1 Conclusion

This paper takes Shanghai as the research object, analyzes the amalgamation of logistics industry and manufacturing industry, selects the methodology of symbiosis degree measurement, and quantifies the amalgamation degree of manufacturing industry and logistics industry in Shanghai and its representative districts. As a result, generally speaking, the amalgamation of logistics industry and manufacturing industry in Shanghai is still in the running-in stage, and a good trust relationship has not been formed. Therefore, a strong sense of cooperation and outsourcing has not been formed between them. The amalgamation of logistics industry and

manufacturing industry is a new attempt for both industries, and it needs a period of time to adjust, and it takes time and is necessary for them to find partners that match themselves. For manufacturing enterprises, they used to have their own logistics system, so they have many worries about reducing costs and improving efficiency during transformation. This has a lot to do with the low level of logistics in the past. However, with the government's attention and the introduction of advanced logistics concepts in recent years, the logistics industry is also developing rapidly, they also need time to adapt. The logistics industry needs to find the matching manufacturing enterprises and understand the value chain of their enterprises, and provide reliable services for every logistics link in the value chain. Moreover, a more comprehensive logistics platform is needed to integrate logistics resources, which should be targeted at the transportation sector, manufacturing enterprises and supply chain, and use modern information technology such as large data and block chain technology to help the two industries cooperate in a comprehensive way. In this way, the amalgamation of manufacturing industry and logistics industry can reach a new level, achieving the effect of reducing cost and increasing efficiency and making contributions to the efficient growth of the country's overall economy.

7.2 outlook of the dissertation

Due to factors such as research time, research perspective and personal ability, this study still has certain deficiencies. The biggest shortcoming is that data taken in the quantitative analysis is not enough. The added value of the total import and export

volume of foreign trade and container throughput are used to reflect the development level of logistics industry. And due to the added value of manufacturing industry in each municipal area is incomplete, so it is replaced by the added value of industrial. In fact, this has great limitations, and there are many factors reflecting the development level of the manufacturing industry and logistics industry in a region. It is not comprehensive enough to use data above to reflect the accurate development level of the industry. The data adoption period is from 2015 to 2018, so the sample capacity is only 4, which is a certain defect. In addition, there is no unified concept for the amalgamation of manufacturing industry and logistics industry.

Therefore, for the convenience of calculation and the convenience of data acquisition, the data of Shanghai is taken as model data, and there is not enough quantitative analysis of the other municipal districts in Shanghai which is not comprehensive enough.

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