Research on the Impact of Trade System on Open Innovation Mode of Manufacturing Industry under the COVID-19 Epidemic Situation

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Abstract. Under the background of the COVID-19 epidemic situation, great changes have taken place in the field of international trade, and the investment activities of manufacturing industry have been greatly affected. Different countries have different modes of innovation in their trade systems. This paper analyzes the impact of the new epidemic situation, points out the impact of trade system on the open innovation mode of manufacturing industry, and finally makes a summary and analysis, hoping to promote the healthy development of Chinese manufacturing industry by optimizing the institutional environment.

1. Introduction

COVID-19 epidemic has a significant impact on economic development. This huge external event has a strong impact on all walks of life, especially on the manufacturing industry. The carrier of the manufacturing industry is goods. In the short term, the reserve inventory can maintain development. However, due to the shutdown of production during the epidemic period, which leads to a period of time out of stock, which will lead to the migration of customers and suppliers. Therefore, the medium-term impact is relatively large. Wuhan and Hubei are the important transportation hubs in China. With strict control measures, Hubei is still an important industrial province. Wuhan is an important supplier of parts and components in the upstream of many industries, such as optical communication, electronic information, automobile parts, etc., which makes Wuhan's economic activities experience a period of stagnation, and the impact on the industry is self-evident. Judging from the current situation, it is difficult to fully recover in the short term. In the long run, the development trend is better. The most direct impact of the epidemic on the manufacturing industry is the export of goods. Through the analysis of the export data of goods trade in 2019, we find that the export volume of goods trade in China is 17.23 trillion yuan. Among them, the export of mechanical and electrical products was 10.06 trillion yuan, accounting for 58.4%; the export of seven labor-intensive products such as textile and clothing was 3.31 trillion yuan, accounting for 19.2%. Among the electromechanical products, the export of electrical and electronic products was 4.63 trillion yuan, and that of mechanical equipment was 2.87 trillion yuan. From the perspective of export entities, the export of private enterprises accounts for 51.9%, which has become the largest export subject. The market of these industries may be affected in the short term. In addition to exports, there are also global supply chains that may be affected. After the closure of Wuhan, the chip industry began to focus on the operation of Yangtze storage, Wuhan new chip and Wuhan Hongxin. If the three companies stop production, it will seriously affect the supply of the three most short supply chips in the world. If the epidemic continues to spread, similar concerns will spread to more areas. Some countries have taken measures such as closing borders, refusing Chinese entry, cancelling flights and so on, which will also affect some industries that rely on imported equipment and accessories in the industrial chain. Even in the domestic market, the supply chain of many enterprises will be challenged because of the restrictions on the flow of logistics and people due to epidemic prevention and control. Therefore, the new epidemic situation has a great impact on the development of manufacturing industry.
2. Literature Review

Under the influence of the epidemic situation, the national trade system and policies have an important impact on the development of manufacturing industry. There are many studies on the trade system and the investment field of manufacturing industry in foreign countries. In terms of the influence of trade system on the economic performance of manufacturing industry and industry, the innovation of foreign trade system is also a kind of productivity. Effective trade system can reduce the transaction cost of manufacturing technology progress and technology achievement transformation, so as to promote the development of productivity\(^1\). The quantification of institutional performance can be done through case analysis, and the performance of a certain institutional change or institutional innovation can be quantitatively analyzed by excluding other factors, and the economic performance of institutional variables can also be analyzed by using modern economic analysis model\(^2\). Dunning (2018) pointed out that when choosing the target country for investment, multinational companies tend to enter countries with relatively perfect national legal system, and those countries that can effectively protect intellectual property rights and have rich labor resources and high quality, which play an important role in promoting the development of local manufacturing industry. There are also studies on the innovation mode of manufacturing industry in foreign countries. The theory of open innovation is not put forward in a hurry, but conforms to the development of economy and the progress of technology\(^3\). The concept of open innovation has a certain theoretical basis. Open innovation is the trend of enterprise technological innovation in the era of knowledge economy, and the concept of "open innovation" was proposed by Henry w. Chesbrough, Professor of Harvard Business School Proposed in May 2003, liehtenthaler (2015) adopted a questionnaire survey, the main objects of which were 154 large and medium-sized European enterprises to analyze the situation of enterprise open innovation from a systematic perspective (2016) and others take Korean SMEs as research objects, and find that enterprise network can effectively promote the open innovation of small and medium-sized enterprises. Compared with large-scale enterprises, open innovation focuses on promoting R & D, and SMEs pay more attention to the commercialization of open innovation& Ernst (2017) believes that manufacturing enterprises of different sizes have an important impact on the application of open innovation. In order to facilitate the search for innovation, they should choose the mode of open innovation.

In the field of research on the impact of trade system on the open innovation mode of manufacturing industry, many scholars have also conducted research in China. Jin Yuguo (2015) used three indicators to measure the regional macro institutional environment: property rights system, degree of marketization and degree of opening to the outside world. Correspondingly, he introduced three institutional variables: the rate of non-nationalization, the degree of marketization and the degree of openness the regression analysis of institutional variables and GDP shows that the four aspects of the selected institutional variables have a very significant positive correlation with economic growth. Relevant scholars have also carried out certain research on open innovation and innovation mode of manufacturing industry. Chen Yufen and Wang Ju (2015) believe that in the process of open innovation, the possession of intellectual property in manufacturing industry is particularly important. In the process of open innovation, enterprises break the original independent mode of intellectual property rights and seek the combination of intellectual property rights in innovation; Chen Yantai et al. (2015) According to the analysis of the relationship between organizational open innovation culture support, market orientation and different innovation degree and innovation performance; you Daming, Sun Jie (2016) open integrated innovation is a practical way to improve the innovation ability of Chinese enterprises at this stage, and uses ANP Method to construct the evaluation system of enterprise open integrated innovation ability; sun Hai et al. (2017) also believe that open innovation is a practical way to improve the innovation ability of Chinese enterprises Innovation and independent innovation are closely related, and open innovation can transform external technology into enterprise's own capabilities through independent innovation; Yang Yanhong and Lu Xianxiang (2018) studied the changes of China's opening up and foreign
trade system, and believed that from selective institutional opening to comprehensive institutional opening, the foreign trade system will also follow the practice of opening up; According to Tao Feng, Yang Yuqing, Qiu Yangdong, etc. (2019), the formal system is a factor affecting the uncertainty of international market and trade costs\(^4\). Based on the complexity of products introduced by transnational immigrants, this paper studies the mechanism of the quality of bilateral institutions affecting international trade. The institutional quality of bilateral countries has a significant role in promoting the export expansion of their home countries\(^5\). Li Honglin, Chen Wenhui, etc. (2020) proposed a new model Under the background of the great impact of the epidemic situation on the manufacturing industry, we should seize the important opportunity of restructuring and reforming the global manufacturing supply chain, further deepen international cooperation, realize key technology innovation and independent control as soon as possible, and accelerate the cultivation and internationalization process of advanced manufacturing industry clusters\(^6\). We should deepen the reform of market factor allocation, optimize the business environment, absorb advanced links in the global manufacturing supply chain, and enhance the competitiveness and discourse power of China's manufacturing industry in the global supply chain.

### 3. The Important Value of Research

Under the special background of the impact of the new epidemic, the impact on international trade is also very great. Whether the design of trade system is reasonable or not will have an important impact on the manufacturing industry. To be specific, whether a country's foreign trade system is perfect or not has an important and far-reaching impact on the open innovation mode of domestic manufacturing industry and the development of manufacturing industry. One belt, one road initiative, will be used to enhance the position of Chinese manufacturing in the global value chain. It will provide new market opportunities for China's machinery manufacturing, power generation equipment and transportation equipment, and also conducive to the structural adjustment and investment transfer of China's manufacturing industry. American economist Schumpeter's research on innovation theory from the perspective of technology is a branch of innovation centered on technological change. The research from the perspective of institution is a branch of institutional innovation centered on institutional change. Chesbrough puts forward the concept of open innovation, explains the connotation, mode and mechanism of independent innovation, and constructs the analysis framework of open independent innovation to further enrich the research on innovation. Through the reform and improvement of foreign trade system and mechanism, we should build an open innovation mode in the field of manufacturing industry in China, and provide theoretical support for the rapid development of manufacturing industry. This is the theoretical significance of this research in this field. In the future, how to seize the opportunity, calmly respond to the challenges, actively promote the opening up and implement the internationalization strategy of manufacturing industry, so as to achieve greater progress and development is an important topic that needs to be deeply studied.

Facing the impact of the epidemic, Chinese manufacturing enterprises will promote intelligent manufacturing more practically. Manufacturing enterprises will pay more attention to intelligent manufacturing, promote less human and flexible production, employ more highly skilled and multi skilled workers, so as to better cope with labor fluctuations. In addition, the production of medical masks, protective clothing, goggles and other protective products is not timely and cannot keep up with the demand. This will also make manufacturers of relevant medical materials and medical devices pay more attention to the application of flexible automatic production lines, build intelligent factories, reduce the dependence on labor, and strive to improve the intelligence and risk resistance of logistics supply chain Ability. Chinese manufacturing enterprises will embrace digital transformation more actively. As the explosive growth of mass services is difficult to respond to, there are some problems in the online collaboration platform of China's mainstream Internet companies, which also reflects the actual needs of enterprises for digital technology. It can be foreseen that manufacturing enterprises will put forward an urgent demand for remote collaboration software such as task
management, project management and workflow management. The deep application of digital technology can help enterprises improve the cooperation efficiency of employees, improve the transparency of production and operation, help enterprises respond to the fluctuation of market demand more efficiently, shorten the listing cycle of new products, innovate the business model, and change the service from selling products to selling products. The most fundamental value of digital transformation is that it can help leaders at all levels of manufacturing enterprises to have a real insight into the data and see the correct trend from the data. To be sure, after the outbreak, manufacturing enterprises will pay more attention to the practical application of Bi, big data analysis and AI technologies, and put forward urgent needs for data analysts. Manufacturing enterprises will actively promote remote intelligent services based on industrial Internet. When the virus epidemic, earthquake, typhoon and other accidents occur, the maintenance and service personnel of manufacturing enterprises often cannot arrive at the scene in time. Therefore, to promote remote intelligent services based on the industrial Internet, remote guidance through augmented reality technology, and fault warning based on the operation status monitoring of equipment, these intelligent services will gradually change from concept to reality. After the outbreak, there will be a clearer direction for manufacturing servitization and industrial Internet platform application.

Physical manufacturing enterprises are regarded as a dissipative system of exchanging energy and material with the outside world. Each enterprise is not closed, but needs to constantly exchange resources, energy and information with the outside world. As the basic industry of national economy and national defense construction, manufacturing industry is the main symbol of national strength and international competitiveness, and has extremely important strategic and practical significance. Revitalizing China's physical manufacturing industry is a strategic measure to improve the realization of comprehensive, coordinated and sustainable economic development. Manufacturing industry is the key to building a strong city with innovative economy. To enhance the ability of independent innovation, manufacturing industry should take the lead. Manufacturing enterprises need to use the mode of open innovation to improve their innovation ability. In order to obtain a large number of external innovation sources, manufacturing enterprises need to carry out open innovation and have the concept of open independent innovation. Therefore, under the background of the new epidemic situation, it is of great practical value to study the influence of trade system on the open innovation model of manufacturing industry and put forward corresponding policy suggestions.

4. The Impact of Trade System on the Open Innovation Model of Manufacturing Industry under the New Epidemic Situation

With the continuous development of national economy and foreign trade, the importance of trade system is becoming more and more obvious. Institutional factors are the main factors of manufacturing industry development and selection of investment regions. Trade system is an important index for a country to attract foreign manufacturing investment. We analyze the trade system, not only from the political and economic level, but also from the national trade system and policy system, such as political system, education system, tax reform system, bilateral investment agreement, trade reform system and other institutional indicators, but also from the cognitive system, normative system and governance system three aspects, we can analyze the institutional factors on the open innovation of manufacturing industry The specific impact of the new model. Specifically, the education system enables people to better understand the open innovation mode of manufacturing industry and the importance of manufacturing to national economic construction. Only when the cognitive level of trade system is solved can the inflow of manufacturing industry become a reality. The governance level of trade system can make the system itself play an effective role, which is guaranteed and enforced by the state power. In order to protect the property of multinational enterprises, provide a fair business environment, and provide relevant preferential tax and trade policies for the operation of manufacturing industry, these measures can be conducive to the benign development of manufacturing industry.
Due to the complexity and uncertainty of the environment, it is difficult for people to make economic decisions and increase the transaction costs in economic activities. The establishment of trade system is to reduce uncertainty and reduce trade transaction costs. The main function of the system is to establish a stable structure to reduce uncertainty. In international trade, when negotiating whether to carry out manufacturing investment and trade activities, that is, when one country tries to win over and attract multinational companies from other countries to participate in its own investment activities, the supply and demand sides are far away from each other and the amount of investment transactions is large, so it is difficult to enjoy or perform the rights and obligations of each other at the same time, which makes it bear certain investment risks in the negotiation activities. If there is a trade agreement between the two countries, it can guarantee the smooth progress of manufacturing investment activities, and the interests between the two sides can be realized. In this way, the bilateral trade agreement system can not only ensure the host country can successfully attract foreign investment, but also help to protect the interests of foreign manufacturing investors, so as to maximize the protection of foreign investment, and promote the development and exchange of bilateral trade and investment activities.

Under the influence of the new epidemic situation, the trade system has a greater impact on the open mode of manufacturing industry, and also has a great impact on the transnational development of manufacturing industry. From a demand perspective, most trade takes place between relatively rich countries, which have similar demands for high-end manufactured goods. When the trade system of the two countries is well known, it will help to reduce the trade transaction cost; if the operation cost of the trade system is high, it will hinder the international trade and foreign investment activities. The integration of world regional economic cooperation is also to further integrate the systems of bilateral trade countries, so as to reduce transaction costs and promote the development of international trade. Many international organizations have established a platform for mutual cooperation, through institutional arrangements, to achieve mutual tariff concessions among Member States. What's more, they strive to transfer part of their sovereignty to promote the gradual assimilation of trade systems of different countries, so as to better promote trade exchanges between countries and promote the development of manufacturing investment activities.

5. Conclusion

Under the influence of the epidemic situation, important changes have taken place in the manufacturing industry. With the steady development of the manufacturing industry and the in-depth promotion of foreign trade, the trade system is constantly improving. The relatively good institutional environment and investment prospects attract foreign capital and manufacturing industry to enter China's industrial market, making the manufacturing industry and economic scale continue to grow rapidly and steadily. It has become a hot spot of international external capital investment, so it is more and more important to construct a new open innovation mode of manufacturing industry. In the environment of absorbing foreign investment and meeting the transfer of external manufacturing industry, the study of trade system and theory is conducive to attracting foreign investment and promoting the innovation of open mode of China's real manufacturing industry. The design and formulation of trade system have important practical significance for the revitalization and development of manufacturing industry. Creating a good trade system environment is conducive to further expanding foreign economic exchanges, guiding the rational flow and transfer of international manufacturing industry to China, and promoting the prosperity and healthy development of China's manufacturing industry.

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