

# Analysis of the Impact of Technological Innovation on Export Trade of Manufacturing Enterprises

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**Abstract:** *The manufacturing industry undoubtedly occupies an important position in the development of the country. This paper discusses the development of manufacturing industry from the perspective of identifying problems, analyzing them and solving them. The article combines the relevant theories of international trade with China's technological innovation and manufacturing exports, and analyzes the mechanism of technological innovation's influence on China's manufacturing industry and the magnitude of its role. It aims to conclude with recommendations that can be drawn upon.*

**Keywords:** *Technological innovation; Manufacturing; Export; Competitiveness*

## 1. Introduction

China is currently at a critical juncture of economic development and trade restructuring. Through appropriate financial subsidies and relevant laws and regulations, the current problem of China's difficult exports and export difficulties can be well resolved. At the same time, after years of adjustment, China's export trade has not reached the optimal level, the optimization of export trade structure has become an urgent task. Both the National People's Congress and the National Committee of the Chinese People's Political Consultative Conference (CPPCC) in 2021 proposed that to drive the economy toward high-quality development, it must be driven by innovation. This illustrates the importance of innovation. Therefore, how to accelerate innovation, especially technological innovation, transform the innovation value chain and reduce the dependence on core technologies is the primary issue facing China now. Faced with a series of complex problems such as China's economic restructuring, product restructuring, high export trade costs, trade barrier restrictions, and the prevalence of trade protectionism, corresponding countermeasures and measures are proposed to make the freedom, openness, and technological innovation of China's foreign trade possible. Therefore, this thesis summarized the impact of China's foreign trade export policy and export trade structure on China's technological innovation by combining the research of domestic and foreign scholars, pointed out the shortcomings in the current research on China's technological innovation, and aimed to put forward suggestions that can be drawn on.

## 2. Analysis of the Current Situation of China's Technological Innovation and Manufacturing Exports

From 2005 to 2017, the investment in research funding in China in all three phases showed a year-on-year increase. This shows that the country's attention to scientific and technological innovation research is gradually increasing, while China's investment in experimental development is the sum of the previous two periods. A higher level of experimental development based on basic and applied research is needed to ensure both investment in basic and applied research, and to ensure that the development of science and technology in our country has roots and goes more steadily. Both scientific and innovative talents are increasing at the national level. As of 2017, the number of R&D employees had increased by 1.96%. R&D spending increased from 64.54 billion yuan to 348.74 billion yuan in 2017. The ratio of R&D spending to GDP also increased from 1.32 to 2.13. It is because of the high priority the country places on research and innovation that our technology has developed rapidly in the last decade. However, with today's global economic integration and increasingly fierce competition among countries, what really determines a country's scientific and technological strength is still the quantity and quality of scientific talent. China ranks only behind Brazil and Turkey in terms of investment in innovative talents, and there is still a big gap compared to developed countries such as Europe and the United States.

With 14% of the world's manufacturing exports, China is now at the forefront of the world, both in

terms of production and exports. However, with the deepening of reform and opening up, China's manufacturing industry has gradually shifted to the Yangtze River Delta and the Pearl River Delta, while Beijing-Tianjin-Hebei, an important political center and former trade base, has seen its manufacturing industry flourish. However, because of the geographical location and the support from the state, the domestic manufacturing industry has not developed as fast and the production and export are far less than those of developed countries [1].

### **3. Analysis of the Impact of Technological Innovation on China's Manufacturing Exports**

#### ***3.1. Analysis of the impact mechanism of technological innovation on China's manufacturing exports***

This paper explores the impact of export trade on technological innovation from two perspectives: government subsidies and laws and regulations. First, there are relatively few studies on this issue by domestic and foreign scholars in terms of China's government R&D subsidy policy. Although many scholars have explored this issue since 2013, most of them argue from an empirical perspective whether government R&D subsidies will promote the improvement of enterprises' technological innovation capability. Second, in terms of government subsidies and tax incentives, foreign scholars have conducted little research on government subsidies and tax incentives. Our scholars have only compared our fiscal and tax policies since 2015 and found that they promote the role of science and technology innovation in China, but their relationship with technological innovation is inconclusive. In terms of tariff barriers and non-tariff barriers, there are only two studies on tariff barriers in foreign countries for three years. Although there are many research materials on tariff barriers in China, they are diametrically opposed from the domestic and foreign perspectives. Foreign scholars believe that reducing tariffs can enhance the competitiveness of enterprises and promote their technological progress and technological research. In contrast, scholars in China believe that appropriate tariff barriers can promote technological transformation and technological innovation of enterprises [2]. The reasons for this contradiction are related to the chosen research objectives and the severity of trade barriers. Therefore, future scholars need to analyze and study them more deeply, both theoretically and practically. At present, scholars at home and abroad have conducted more comprehensive studies on non-tariff barriers, and their opinions are more consistent. They generally believe that non-tariff barriers have certain incentive effects and can promote technological innovation of enterprises. However, the current research mostly stays at the empirical level, and further improvement of relevant theories and mechanisms is needed in the future.

The factor concentration rate of Chinese manufacturing industry has changed, when the quantity of labor, a factor of production, has decreased, and capital, a factor of production, has gradually increased. Technological innovation has led to a change in capital and labor as factors of production, which has led to the optimization of the trade structure of the manufacturing industry, as well as to the full utilization of our products in the world, thus enhancing the competitiveness of our products [3]. Along with technological innovations, the level of technology and product quality in manufacturing has improved. In the growing TBT market, it is only through technological innovation that we can open up the market for our production and high-tech products and bring greater benefits to our business.

#### ***3.2. Analysis of the degree of impact of technological innovation on China's manufacturing exports***

This paper explores the impact of export trade on technological innovation from three perspectives. First, little research has been done on export trade abroad. Although a large number of domestic studies have been conducted on it, academics generally agree that there are still some problems with China's export products, and the difference in their product structures can make different degrees of technological innovation behavior. Therefore, how to properly adjust China's export commodities, promote their optimization and upgrading, so that the advantages of capital and technology-intensive can be maximized is the primary issue at hand. Secondly, as far as the market structure of China's export trade is concerned, complete competition and absolute monopoly are detrimental to technological innovation, while between the two, they are a boost to technological innovation. However, the current domestic and foreign studies are mostly inclined to theoretical analysis and lack of empirical tests. Therefore, we can try to establish an econometric model to test it empirically in the future. Finally, in China's export trade, the industrial structure of different regions has different degrees of influence on technological innovation. Regions with a high degree of technological innovation will also have an enhanced innovation capacity. There is a large trade gap between the East, the Middle and the West, which creates a difference in regional innovation capacity. The current priority is to improve the regional economic development imbalance and reduce the gap between the East and the Midwest so as to maximize the efficiency of technological

innovation in each region.

### **3.2.1 International market share (MS)**

The international market share index is the ratio of a country's exports of a particular commodity to the global exports of the same commodity, and is used to measure a country's international competitiveness. Its calculation formula is as follows: it is measured that during the past decade, China's investment in scientific and technological research and development has continued to grow. And its market share has consistently remained above 10% during the past decade, with an upward trend except for a slight decline during 2016 and 2017. Horizontally, China's manufacturing exports have been in a relatively good position [4]. In the last two years, several countries such as the United States, the United Kingdom, Japan, and Korea have shown a trend of shrinking market share, with domestic market share decreasing by more than 1% in 2017 compared to 2016. Korea, which has always been a very strong manufacturing industry, has been in a stable state for the last two years. Therefore, although our manufacturing industry is large and extensive in terms of exports, there are certain risks.

### **3.2.2 Revealed comparative advantage index (RCA)**

No country has had a manufacturing export RCA indicator above 2.5 in the last decade. In addition to China, Korea is also highly competitive internationally. The gap between Korea's comparative performance advantage and ours has grown in the last five years, suggesting that we are not at an absolute advantage in exporting our products worldwide. In most countries, the export competitiveness of manufacturing is moderate and strong.

China's composite export trade index is around 1.3-1.5, indicating that China's manufacturing exports have been highly competitive internationally for more than a decade. China's RCA index has been in a declining state since 2013 [5]. The lower output of technological innovation has led to a decrease in the competitiveness of China's product exports and also shows the impact of technological innovation on its competitiveness.

### **3.2.3 Trade competitiveness index (TC)**

In comparison with the two previously mentioned indicators, the TC index also incorporates the impact of imports on trade competitiveness. Also, the TC index excludes other macro factors, such as inflation, and directly analyzes their impact on imports and exports as relative values. The trade surplus index is -1 to 1, regardless of the absolute value of a country's imports and exports.

In all of these indicators, Japan was higher than us until 2012. Korea's trade surplus is slightly lower than ours, but it is also rising. Korea's exports are more internationally competitive by any metric. China needs to increase its manufacturing exports. Both Korea and Italy are highly competitive. In contrast, our manufacturing products export trade competitiveness index is always above (0.2, 0.4), which shows that our manufacturing products have a strong competitive advantage in export. From the growth of China's investment in various fields of technological innovation, technological innovation has a positive effect on the exports of China's manufacturing enterprises.

## **4. Countermeasures and Suggestions of the Promotion of Technological Innovation on the Development of China's Manufacturing Exports**

China is in a new stage of development. Manufacturing is an important part of the country's development from high speed to high quality development. It must seek a new development path to shift from the traditional crude development approach to high value-added products, thus driving China from a "a large manufacturing country" to "a world manufacturing power" [6]. The computer, communication and other electronic equipment manufacturing industry is the main industry of China's high-tech industry. Improving their market competitiveness plays a great role in supporting China's economic development. Improving the competitiveness of China's manufacturing industry and improving the development of the manufacturing industry is the key to improving the core competitiveness of China's manufacturing industry and improving the development of the manufacturing industry [7]. In this study, 182 computer, communication and other electronic product manufacturing companies in China were selected as a sample to conduct the impact of technological innovation on the service level of manufacturing industry.

### **4.1. Use policy support to balance development across regions**

In terms of technological innovation and production, there is a large gap between the East and West

regions. The economic development of the southeast coast is better than that of the central and western regions. For this reason, China should introduce new policies to promote our technological innovation and increase exports to our manufacturing industry. The policy emphasizes the strengthening of research funding for production manufacturing enterprises. It indicates to actively explore the development strategy of supporting private manufacturing enterprises, small and medium-sized manufacturing enterprises and manufacturing enterprises in the central and western regions, in order to enhance the risk resistance of manufacturing enterprises, improve the sustainable competition and profitability of manufacturing enterprises, and promote the smooth service transformation of manufacturing enterprises. It encourages large manufacturing industries and state-owned enterprises with strong capital to actively use their own funds for technological innovation and change their development models to drive development through innovation. At the same time, it is necessary to clarify the purpose and target of financial grants and establish a tracking mechanism for financial aid funds in order to improve the effectiveness of the use of financial aid.

#### ***4.2. Increase innovation investment and optimize investment ratio***

China's investment in technological innovation is growing, but it's not enough. The transformation from big to great can only be achieved through technological change. Technological innovation requires relatively large amounts of money and takes a long time. Therefore, continuous investment and support is necessary to achieve technological results. The number of innovative talents in China is increasing, but compared to other countries in the world, the number of technological innovation talents in China is still relatively lagging behind, so it is essential to pay attention to the cultivation of talents.

#### ***4.3. Enhance the international competitiveness of the brand***

In the world, there are few domestic well-known manufacturing enterprises. In the international arena, our manufacturing industry is still at the low end of the "world factory". To change the traditional world view, it is very necessary to establish a number of brands with international influence. On the one hand, our manufacturing enterprises must continuously improve in technology to meet the requirements of international standards. At the same time, we must also conduct strict checks on the quality of our products, learn from the developed countries' attitude of pursuing perfection in quality, and stop poor quality products from entering the market and damaging the image of our enterprises.

#### ***4.4. Improve the conversion mechanism of technological innovation achievements of manufacturing enterprises***

The government should support manufacturing enterprises to carry out the transformation of technological achievements, so as to form a virtuous cycle consisting of technology and capital research, thus achieving continuous innovation. Through the establishment of science and technology incubators, the establishment of key laboratories, and the strengthening of industry-university-research cooperation, private small and medium-sized manufacturing enterprises are provided with lasting and stable financial support for technological transformation, market development, service business, and service business income for manufacturing manufacturing enterprises to carry out subsequent technological innovation and development mode transformation.

#### ***4.5. Improve the intellectual property protection system***

China needs to strengthen implementation and supervision to encourage technological innovation in the manufacturing industry. Since technological innovation requires a large amount of capital and a large number of externalities, the government should continuously improve the legal system related to intellectual property rights, strengthen the legal system related to intellectual property rights, and increase enforcement and supervision. It should also amend relevant laws and regulations in a timely manner according to the changes in the market and society to protect the intellectual property achievements of manufacturing enterprises. The government should strengthen the protection of enterprise invention patents, and should strengthen the investigation and crackdown on pirated and counterfeit products. At the same time, the government should encourage production manufacturing enterprises to actively carry out technological innovation, enhance their technological innovation capacity, and promote their transformation to service industries. Incentive mechanisms should be established to motivate manufacturing enterprises to take the initiative to transform into production services.

#### **4.6. Explore the establishment of training mechanisms for private manufacturing enterprises, small and medium-sized manufacturing enterprise leaders and managers to help them improve their management and strategic decision-making capabilities**

The government should increase training for leaders and managers of manufacturing enterprises, so that those at the helm of manufacturing enterprises can gain timely insight into the changing market situation and reasonably adjust the business scope, development direction and operation mode and operation model and talent structure of manufacturing enterprises. At the same time, it should strengthen the entrepreneurial consciousness of operators and motivate them to be innovative and challenging in order to promote the sustainable high-quality development of China's manufacturing industry.

### **5. Conclusion**

In summary, in the context of structural adjustment and restructuring of China's manufacturing industry, technological innovation can no longer adapt to the needs of high-quality development, while trade barriers, trade protectionism and other issues also restrict the development of China's export trade. In order to better promote the export trade of China's manufacturing enterprises and promote China's economic growth, it is necessary to play an important role of technological innovation and promote the continuous development of China's economy.

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