

# Research on the Countermeasures of Collaborative Innovation in China's Strategic Emerging Industries

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**Abstract.** Collaborative innovation is an effective way to promote the development of strategic emerging industries, enhance industrial competitiveness, and promote economic development. This article combines the development status of strategic emerging industries and the status of collaborative innovation in strategic emerging industries, and proposes mechanisms and countermeasures to promote collaborative innovation in strategic emerging industries. The research results are of great significance for enhancing the collaborative innovation capability of strategic emerging industries and promoting the development of strategic emerging industries.

## 1. Introduction

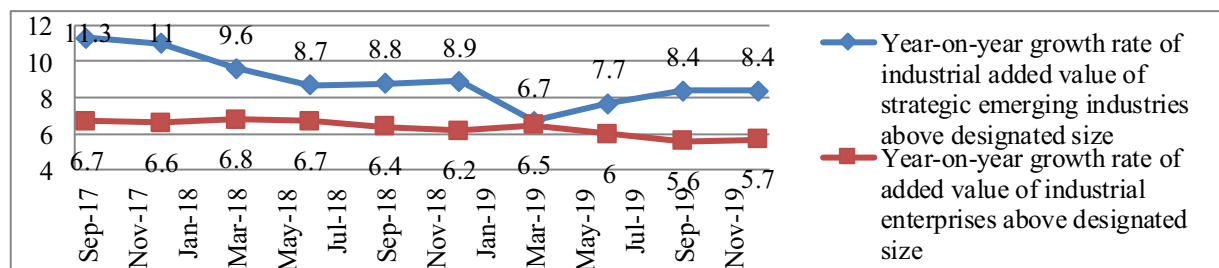
Since 2019, the development speed of global emerging industries has increased significantly, and various countries have formulated diversified policies and targeted plans to provide corresponding support to the industry. After ten years of rapid development, the development of strategic emerging industries is moving from the "cultivation stage" to the "growth stage".

Multi-agent collaborative innovation has become an important driving force for the development of strategic emerging industries. Technological innovation forms and industrial development methods are mainly developing in the direction of multi-institution, multi-team collaboration and collaborative innovation.

## 2. The development status of China's strategic emerging industries

### 2.1 The downward trend in growth rate has been reversed

In the first quarter of 2019, the year-on-year growth rate of the added value of China's industrial strategic emerging industries fell to 6.7%, the lowest growth rate in recent years; the growth rate was 7.7% in the second quarter and 8.4% in the third quarter, and the growth rate continued picking up. In recent years, the gap between the growth rate of the added value of strategic emerging industries and the growth rate of industries above designated size has been narrowing. The gap has dropped from 4.6 percentage points in the third quarter of 2017 to 4.4 percentage points in the first quarter of 2019 (see Figure 1). This shows that in recent years, the role of strategic emerging industries in driving the economy has weakened, and after bottoming out, it has shown a trend of recovery.<sup>[1]</sup>

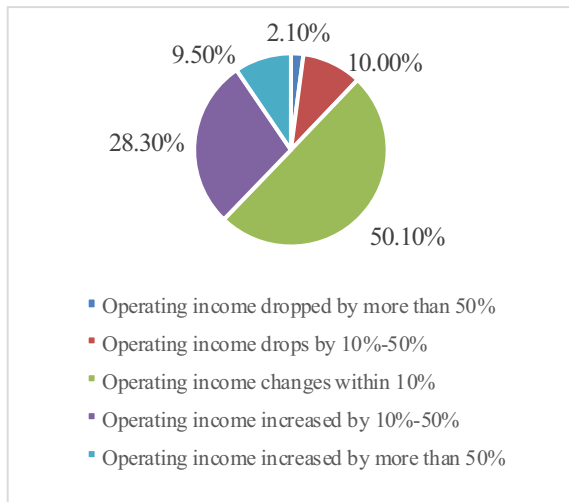


**Fig. 1.** The growth rate of industrial added value of China's strategic emerging industries above designated size from September 2017 to December 2019

According to the survey data of the National Information Center, by 2020, most Chinese companies have achieved good operating results. In 2020, only 12.1% of the surveyed companies have lower income levels than in 2019. Nearly 40% of the companies have a significant increase in their annual operating income compared to 2019, while 9.5% of the companies believe

that their annual operating income in 2020 will increase compared to 2019. Compared with the previous year, it has dropped by more than 50% (see Figure 2).

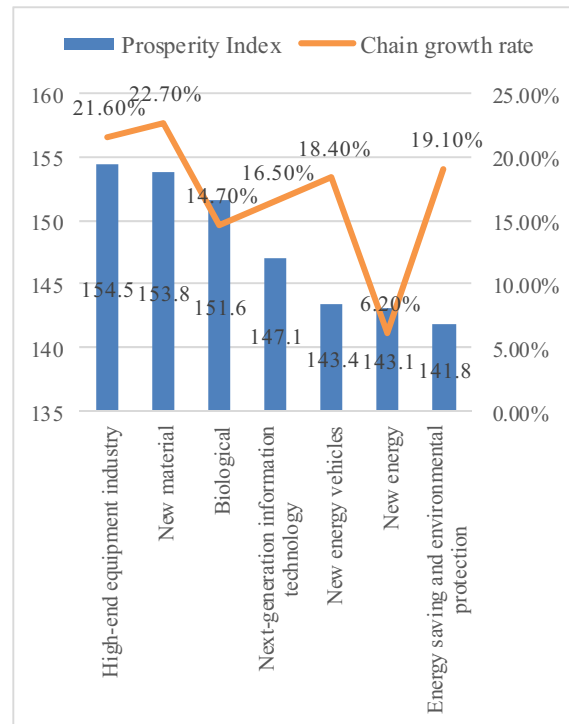
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**Fig. 2.** Changes in the company's full-year operating income in 2020 compared with 2019

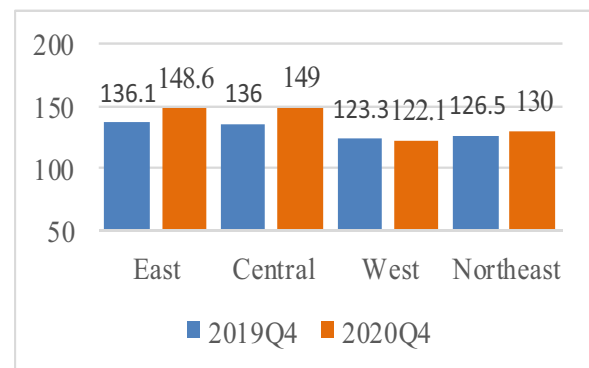
### 2.2 The overall prosperity of the industry has improved

According to statistics from the China National Information Center, by the fourth quarter of 2020, with the exception of the digital creative industry, the prosperity indices of the other seven industries have rebounded significantly. Among them, the new material industry prosperity index increased by 22.7% from the previous quarter, and the high-end equipment industry increased by 21.6%. The new materials, high-end equipment industry, and the biological industry have entered the "stronger boom" range; the new generation of information technology, new energy vehicles, and energy conservation and environmental protection have all grown to the "better boom" range, showing a good momentum of recovery (see Figure 3).



**Fig. 3.** China's industry climate index and quarter-on-quarter growth in the fourth quarter of 2020

From a regional perspective, the role of eastern and central China in the acceleration of the development of strategic emerging industries will be further strengthened in 2020. China's Hubei and other provinces and cities were severely affected by the epidemic in the first quarter of 2020, but after the epidemic changed production methods and increased government support, the industry prosperity index has exceeded the eastern region for two consecutive quarters. The prosperity index of Anhui Province in China is as high as 165.5. During the same period, the prosperity index of Northeast China and Western China also continued to rise. In the fourth quarter of 2020, the industry prosperity index rebounded to 130 and 122.1 respectively, which is basically the same as the same period in 2019 (see Figure 4).



**Fig. 4.** Comparison of Prosperity Indexes by Regions in the fourth quarter of 2019 and the fourth quarter of 2020 (seasonally adjusted)

### **2.3 The pace of new infrastructure construction is accelerating and key industries are growing rapidly**

New infrastructure construction referred to as "new infrastructure" includes 5G, artificial intelligence, industrial Internet, Internet of Things, etc. One of China's main tasks in 2019 is to accelerate the construction of new infrastructure. <sup>[1]</sup> As of the end of 2019, the number of 5G base stations in China has exceeded 130,000, and 5G users are growing at an extremely fast rate. The diversification of "new infrastructure" will update business models and consumption models, thereby creating more space for the development of innovative companies.

### **2.4 The trend of clustering is obvious, a booster driving the economic development of various regions**

The National Development and Reform Commission actively promotes the construction of strategic emerging industrial clusters, and concentrates advantageous resources to promote the "specialized" development of industrial clusters in various regions. In 2019, the state organized the application of the first batch of national strategic emerging industrial clusters. 66 strategic emerging industrial clusters were selected from more than one hundred industrial clusters as the first object of criticism, and corresponding financial support was implemented at the same time. The National Development and Reform Commission actively promotes the construction of national-level strategic emerging industrial clusters, specifically including the construction of industrial infrastructure such as optimizing industrial chain coordination platforms, inspection and testing, and smart parks; providing intellectual property services, key technology development, special bond financing, and talents support for training programs and other aspects. <sup>[2]</sup> National-level strategic emerging industrial clusters have driven various regions to accelerate the construction of "specialized" strategic emerging industrial clusters, effectively promoting the economic development of various regions. The development of industrial clusters is a new engine to promote the development of various regions, forming emerging industries with prominent leading roles.

### **2.5 Intensified opening up to the outside world, forming an innovative development network**

China is actively establishing win-win long-term cooperative relations with more countries to further expand the development space of my country's strategic emerging industries. At the same time, guide enterprises to integrate into the global innovation system, make extensive use of global factor resources, accelerate the sharing of innovation results, and accelerate the pace of industrial development. Actively implement an open policy, reduce restrictions on new industries with a good

foundation for development, and accelerate the transformation and upgrading of enterprises.

## **3. Status Quo and Problems of Collaborative Innovation in Strategic Emerging Industries**

China now has relatively complete infrastructure, scientific research teams, and scientific research intermediary services, and it continues to gather talents with innovative potential. This article will explain the collaborative innovation situation of strategic emerging industries from the following four parts.

### **3.1. Financial aspect**

From January 2020 to September 2020, China's manufacturing investment increased by 9.3% year-on-year in the form of overall investment decline. Among them, the computer and office equipment manufacturing industry invested 9.3%, and the pharmaceutical manufacturing industry invested more. It is an increase of 21.2%. In terms of financial support, Xinjiang has 13 planned projects and the government has invested 20 million yuan in special funds; Jiangsu has 41 planned projects and the government has set up 688 million yuan in special funds; As a powerful city for the development of strategic emerging industries in China, Shenzhen has 118 plans. The total amount of government funding for the project is as high as 126.49 million yuan. <sup>[3]</sup> Although capital investment in strategic emerging industries has greatly increased, according to China's national conditions and economic development, the level of development and capital investment in strategic emerging industries is still lower than that of developed countries, and the gap is obvious.

### **3.2 Human resources aspect**

In 2019, the total R&D expenditure of the whole society was 2.21 trillion yuan, an increase of 790 billion yuan over 2015. In 2019, China's basic research expenditure was 133.56 billion yuan, R&D investment intensity was 2.23%, and the growth rate during the "13th Five-Year Plan" period was as high as 8.3%. In addition, in 2019, China's annual full-time research and development personnel equivalent was 4.8 million, an increase of 240,000 yuan per capita over 2015. The increase was 27.7%. <sup>[4]</sup> However, the collaborative innovation of China's strategic emerging industries still has problems such as insufficient investment in R&D personnel, shortage of key areas and high-tech talents. Take China's integrated circuit profession as an example. Around 2020, the "White Paper on Talents in China's Integrated Circuit Industry (2017-2018 Edition)" report pointed out that the demand for integrated circuit professionals was 720,000. As of the end of 2017, the number of talent shortages was 720,000. 320,000 people. <sup>[5]</sup> In the field of artificial intelligence, the number of employees in the basic artificial intelligence field in the United States is 13.98

times that of related employees in China; the number of employees in the field of artificial intelligence technology in the United States is 2.26 times that of China. This shows that in the field of artificial intelligence, the number of talents in both the basic and technical levels is far less than that of the United States.

### 3.3 Innovation aspect

In terms of growth rate, in 2019, among the industries above designated size, the value added of strategic emerging industries increased by 8.4% over the previous year, and the growth rate was 2.7 percentage points higher than that of industries above designated size. From the perspective of various provinces and cities, among the industries above designated size in Beijing, the added value of strategic emerging industries increased by 5.5%; among the industries above designated size in Zhejiang Province, the added value of strategic emerging industries increased by 9.8%. The new generation of information technology, new energy, new biology and other industries are growing rapidly.<sup>[5]</sup> The innovation output capacity of collaborative innovation in China's strategic emerging industries continues to improve, and there is still a certain gap compared with developed countries. Due to the lack of core technology, the low added value of Chinese products, combined with low R&D investment and weak independent innovation capabilities, the technology digestibility is poor and the degree of regional integration of production, education and research is low.

### 3.4 External environment aspect

The macro environment is an objective factor that affects the collaborative innovation of strategic emerging industries, the development of enterprises, and the daily

business activities of enterprises. At present, with the gradual decline of factor prices in the international competitive advantage, the development of various industries is shifting to the side of R&D and innovation. The cost competitive advantage will disappear, and it will be replaced by the R&D and innovation of high-precision technology. For a long time, the development of China's strategic emerging industries really relies on independent innovation technology to bring very little benefits, and more relies on the technology diffusion brought by globalization, which will force China to improve its independent innovation capabilities and promote the development of strategic development of emerging industries. In the context of the global epidemic, long-term economic fluctuations will hinder the development of China's strategic emerging industries in the direction of internationalization, severely affect the international market demand of certain industries, and be forced to squeeze the domestic market space, leading to vicious domestic market competition.

## 4. Countermeasures for Collaborative Innovation in Strategic Emerging Industries

Collaborative innovation can promote the development of strategic emerging industries. Based on the previous description of the development status of China's strategic emerging industries and the status of collaborative innovation of strategic emerging industries, combined with China's national conditions, a mechanism for collaborative innovation of China's strategic emerging industries (see Figure 5) and corresponding countermeasures are proposed. From the government's point of view, four measures are pointed out that can promote the high-quality development of the industry.

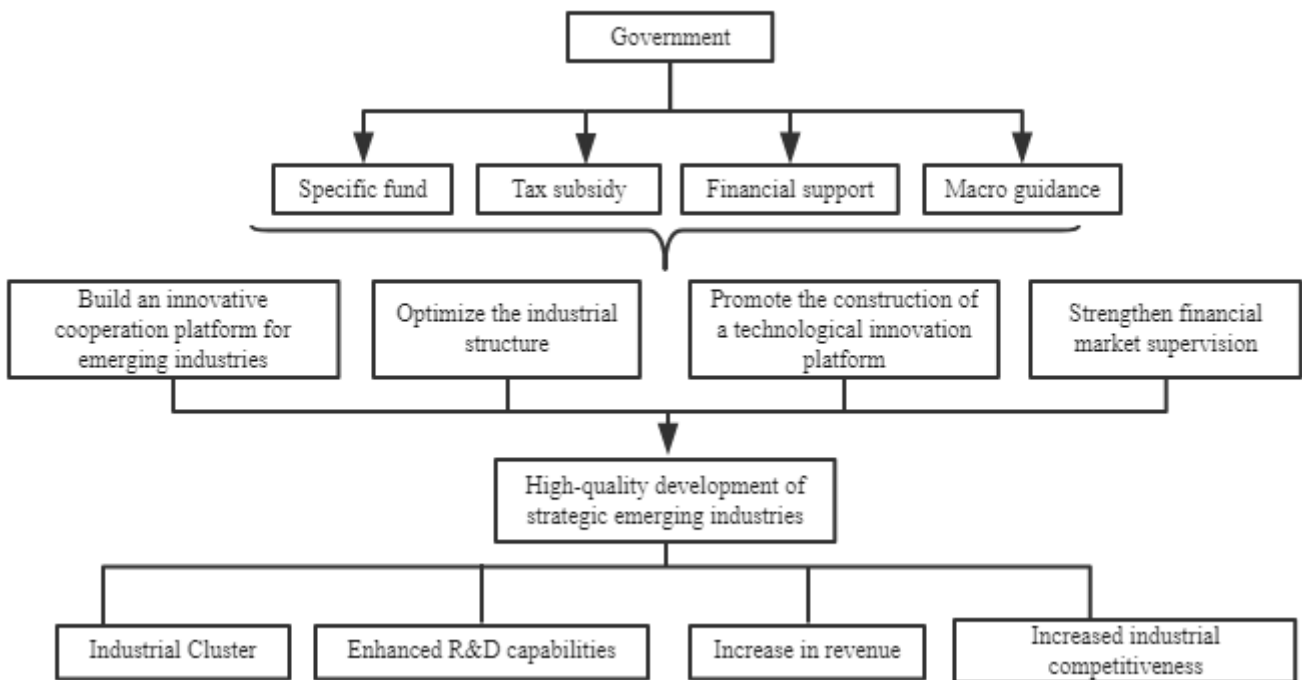


Fig. 5.Strategic Emerging Industry Collaborative Innovation Countermeasure Mechanism

#### **4.1. Set up special funds to build an innovative cooperation platform for emerging industries**

In order to promote the expansion of the capital scale of emerging industries, the Chinese government has established a special fund aimed at supporting the development of emerging industries, providing certain financial support for research projects in areas where major research results have been obtained and core factors restricting the development of emerging industries. At the same time, part of the funds is used to build a platform for innovation cooperation in emerging industries, to give full play to the advantages of institutions of higher learning, enterprises, scientific research institutes and other institutions to integrate resources. Promote the integration of technology research and development, talent cultivation, production experimentation, and industrial development, and carry out cooperative research projects to achieve the synergy of industry, university, research and application in response to the bottleneck that restricts industrial upgrading.

#### **4.2. Optimize the economic structure and accelerate the development of industrial integration**

Quite a number of strategic emerging industrial enterprises in China are facing the dilemma of small industrial scale and uncoordinated industrial structure and regional structure. The government can optimize the economic structure through taxation and financial means, and guide efficient enterprises to merge inefficient companies, further improve the overall efficiency of the industry and increase industry agglomeration. In recent years, strategic emerging service industries have continued to emerge, adopting the form of innovative development and cross-border integration to make social services more intelligent, diversified and coordinated.

#### **4.3. Promote the construction of scientific and technological innovation platforms and attach importance to the cultivation of innovative talents**

At present, the development of industry relies more on technological innovation to explore new economic growth points. Technological innovation has become a factor for countries to enhance their industrial competitive advantages and overall quality. Strengthen the construction of technical platforms and service platforms, technical intermediary service institutions, comprehensively manage the technical resources of strategic emerging industries, establish a diversified participation and open innovation model, and increase the degree of resource sharing on the technical innovation platform. At present, China's innovative talent policy has begun to take shape. Facing the complex international environment, continuous innovation, learning, improvement and change are very necessary. The state should attach importance to

personnel training, shift the policy orientation to innovative technologies and high-level talents, and promote the high-quality development of the industry through policy support.

#### **4.4. Pay attention to risk prevention and strengthen financial market supervision**

With the spread of the new coronavirus and the severe international situation, the development of strategic emerging industries has a certain degree of uncertainty. In order to make emerging industries more sustainable, we must raise our awareness of crisis. In the collaborative innovation environment of strategic emerging industries, the mutual participation of industrial sectors and financial institutions has increased the financial risks between the two parties. Therefore, in order to reduce unnecessary losses caused by unexpected risks, it is necessary to strengthen the supervision of internal related transactions to prevent the inflow of risks. In addition, it is necessary to clearly stipulate the supervision content and supervision methods of the financial supervision department. Specifically, different categorized supervision methods should be adopted for various industries in the entire financial system to ensure the sustainable and healthy development of the financial industry. Strictly control the emergence of speculative activities in the internal capital market, strictly regulate market access conditions and manipulate financial oligarchs, and give full play to the government's regulatory role in reducing market risks.

### **5. Conclusions**

In the era of knowledge economy, a country's innovation capability represents a country's overall strength and core competitiveness, and is an inexhaustible driving force for economic development. Achieving collaborative innovation in strategic emerging industries can not only improve the innovation capability of the entire country, but also promote coordinated economic development to achieve the "1+1>2" synergy effect. This research aims at the status quo of collaborative innovation in strategic emerging industries. From the government's perspective, this study builds an innovative cooperation platform for emerging industries, optimizes the industrial structure, promotes the construction of technological innovation platforms, and strengthens the regulatory policy mechanism of financial institutions. And put forward countermeasures to promote the development of China's strategic emerging industries. This is of theoretical significance for realizing the internal and external coordination of strategic emerging industries, improving the effective integration and optimal allocation of scientific and technological resources, enhancing the comprehensive strength of China's strategic emerging industries, and giving better play to their leading role. Provide reference suggestions for the Chinese government to formulate relevant policies, accelerate the development of strategic

emerging industries, and promote economic growth and industrial upgrading.

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