

Research on Principle and Process of Emerging Technology to Promote Economic Development

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Abstract—With the development of the society and the progress of science and technology, technology is becoming more and more big influence on economic and social. Especially with the coming of the "knowledge explosion", "fusion technology", "the accelerating of the technology diffusion" and "technology globalization" for the characteristics, based on information technology, biotechnology and other disciplines, the emerging technologies has emerged and developed rapidly, and the influence of human society is more and more significant and far-reaching to a country, industry and the competitiveness of the enterprise. In this paper, based on analyzing the commercialization and industrialization of emerging technology from the industrial structure, trade structure, the pattern of economic development three angles to illustrate the impact of emerging technologies on economic principles and processes.

Index terms—Emerging technology, Industrial structure, Trade structure, Economic development pattern

I. INTRODUCTION

In order to accelerate transformation of the mode of economic development, promote strategic adjustment of economic structure and keep the stability of economic growth to grab the international competitive advantage, the eighteenth big report of the party clearly put forward to "promote the healthy development of strategic emerging industries, advanced manufacturing industry". It suggests that, with the development of strategic emerging industries work and the rapid development of industrial, the party central committee expected a more and more out of strategic emerging industries. And the basis support of strategic emerging industry is the emerging technology, the development of strategic emerging industries in essence is the emerging technology industrialization evolution course, is the concept of the knowledge form or theory into physical form of the product or service, the formation of new industries and gradually realize the fundamental transformation of the industrial structure, and then drive the whole industry and the economic development of the process. Therefore, the development of emerging technology play a vital role in chinese economy .

II. THE LITERATURE REVIEW OF EMERGING TECHNOLOGIES

George s.day and Paul J H.Schoemaker in University of Pennsylvania, Wharton school first studied emerging technologies , They think the emerging technology is a innovation based on science, they may create a new industry,

or they can change an old industry is generated by the discontinuity of technology breakthrough innovation, by focusing on independent research results in the integration of the multiple past and formation of the more innovative technology ,at the same time they also summarized the connotation of emerging technologies : ①The base of emerging technology knowledge is expanding; ②Emerging technology application in the current market is experiencing innovation; ③Emerging markets are developing or forming. Domestic scholars also did some relative research on emerging technology: (1) HongMing Hua, Shaolian Zheng (in 1995) argued that the emerging technology refers to "is not commercial, but in 3 to 5 years can be commercialized technology; Or is now has been used but the technology will change significantly. (2) Zhenyuan Zhao, Lu Yin and others(in 2005) argued that, emerging technologies are those that appear recently or are developing, have an important impact on economic structure or industry development of high technology. And points out that the characteristics of emerging technologies: ① Market uncertainty; ②Technology uncertainty; ③ Management uncertainty; ④High complexity. [1] (3) Xukun Wang, Yang Liu (in 2011) from the economic dimension, the science and technology, history three dimensions view reveals the basic connotation of strategic emerging technology, and finally made a preliminary definition: Strategic emerging technology is a country and region in a certain period of traction and support the formation and development of strategic emerging industries and high technology. [2] (4) Jiyong Chen, Qi Zhou (in 2012) suggested that the development of strategic emerging industries in essence is the emerging technology industry evolution process. [3] (5) Danfeng Wang studies the path of the strategic emerging industries impact on economic growth from the upgrading of industrial structure and foreign trade structure optimization and so on two aspects .

In the above studies, although there are some research on the emerging technology and new technology industry, but for the emerging technology to promote the process of economic development without specific and comprehensive research results, and therefore need to be further in-depth study.

III. THE PRINCIPLE OF EMERGING TECHNOLOGY TO PROMOTE ECONOMIC DEVELOPMENT

On the basis of the research literature review by the concept of emerging technologies emerging technologies to create a new industry or change an old industry, is a high technology has important impact on economic development or the industry development. Thus is on the basis of the industrialization of emerging technologies through the adjustment of economic structure to promote economic development; In addition, according to the feature of uncertainty by emerging technology, it is not all emerging technologies can impact on economic development, and only those who really has the potential to achieve commercialization and industrialization of emerging

technologies can really promote the development of the economy. This article from the emerging technology through commercial, further formation of industrialization, and on this basis, through the optimization and upgrading of industrial structure, optimizing the structure of foreign trade, the transformation of the mode of economic development from three aspects to promote the economic development path for research (figure 1).

IV. THE PROCESS OF EMERGING TECHNOLOGY TO PROMOTE ECONOMIC DEVELOPMENT

1. The process diagram of emerging technology to promote economic development

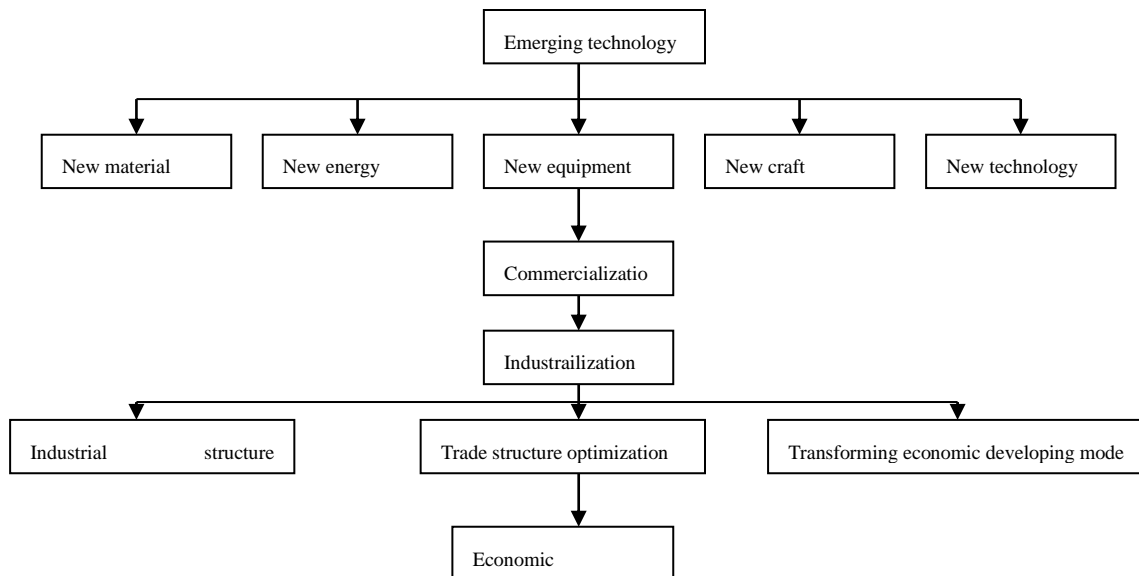


Figure 1. The process diagram of emerging technology to promote economic development

2. The commercialization and industrialization of emerging technologies

At present, about the new technology commercialization process, the researchers' divided method are not the same, but their main line is the basic consistent, is divided the new technology commercialization process into Technology acquisition, product development, production capacity development (or engineering) and market development, (or product sales) [5] and market feedback five phases[6] (figure 2). "Technology commercialization" is the cornerstone of emerging technologies to emerging industry. Emerging technologies has commercial properties, which indicates that the market demand for technology and enterprise based on the technology creation and competitive advantage may gain profits, also make the technology into productivity. So "technology commercialization" is the base

of emerging technology transition, marketization and industrialization. Generally speaking, After enterprises choose the commercial potential of technology ,through building a product prototype, putting the production prototype into the test market, to test the market to accept it or not, then put the mass production of resource factors into large-scale production, and constantly stimulate the market demand to expand production[3]. As more companies enter, emerging industries gradually formed and rapid expanded. The formation of the emerging technology industry has great impact on the economic development of the whole society, not only can it optimize the industrial structure, trade structure but also the transformation of the mode of economic development.

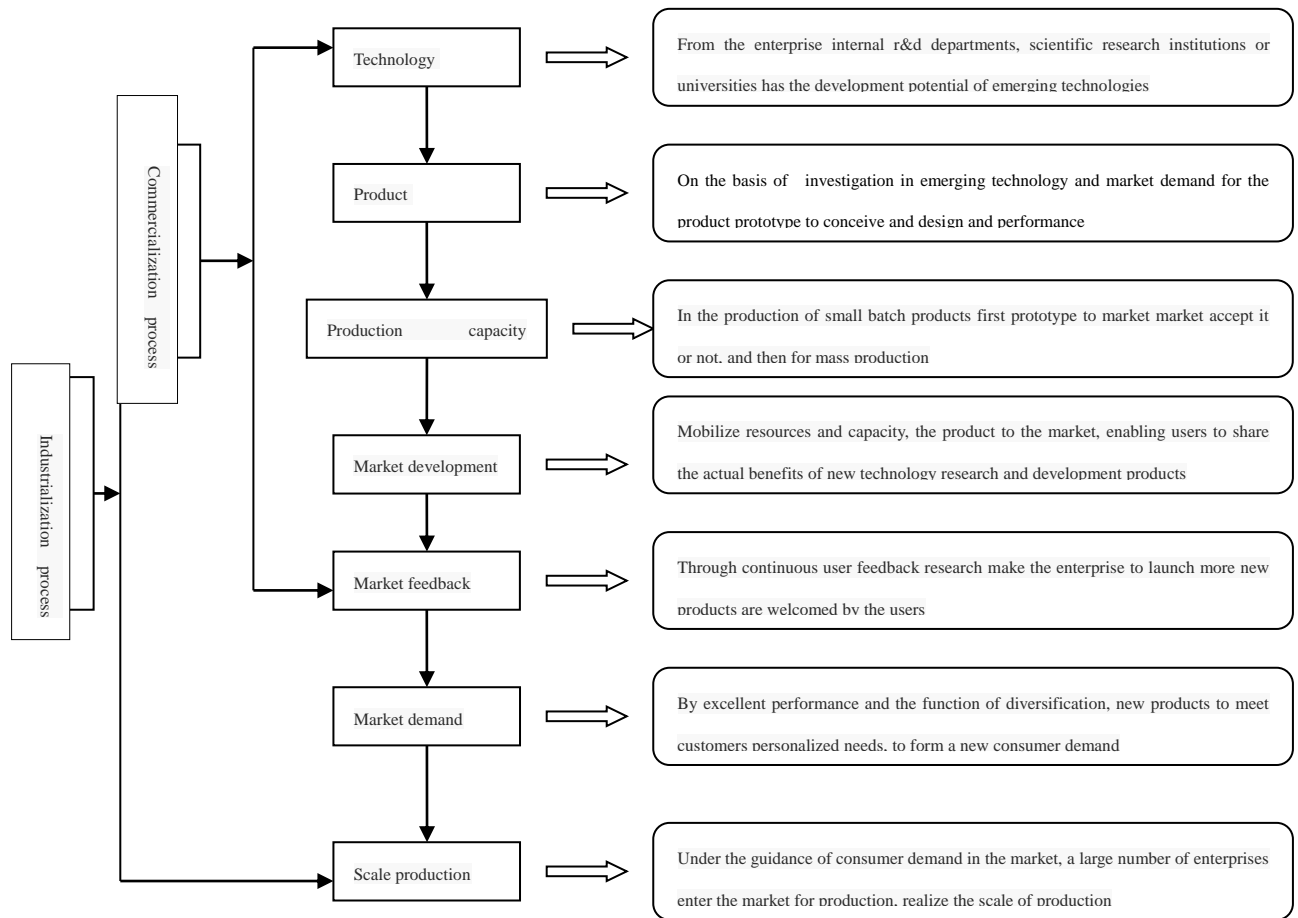


Figure 2 emerging technology industrialization and commercialization process

3. Promoting the optimization and upgrading of industrial structure

On the basis of the commercialization and industrialization, emerging technologies and emerging technology industry first to promote the optimization of industrial structure, and promote the development of the economy. This paper explains the emerging technology and new technology industry the optimization of industrial structure from two aspects of high-level rationalization of industrial structure and industrial structure, taking the industrial structure as the intermediary, and ultimately promoting the development of the economy.

1) Realize the rationalization of industrial structure

Creating the new technology, new product, new craft by information, biology, new material, high-end equipment and other emerging industry, raising the level of intelligent ,greening in traditional industries, promoting the mechanization of agriculture technology integration, labor process, the production and business operation information, constantly developing new forms of operation in the service industry, to better improve the industry structure. To promote the first, second and third industry health coordinated development, Gradually forming an industrial pattern which takes agriculture as the foundation, take the high and new technology industry as the forerunner, basic industries and manufacturing for support, services development in an all-round way, insisting on the

economical development, clean development, safe development and sustainable development. Emerging technologies to promote the coordinated development of the first,second and third industry, so as to finally realize the rationalization of industrial structure.

2) Realize the upgrading of industrial structure

Emerging technology in the transformation of traditional industries at the same time, also promote the emergence of new industries and production department. On the one hand, because of the improvement of the emerging technology and the innovation of production equipment, the development and promotion of a new manufacturing technology, the optimization of original elements combination and the reduction of the waste and pollution, thus,it will promote transformation and upgrading of traditional industries. As in the third revolution of science and technology ,the development of information technology makes the traditional industry in such aspects as production, transportation and sales, unprecedented changes have taken place, not only improves the production efficiency and product quality but reduce the production cost, improve the production efficiency of enterprises. On the other hand, due to the emergence of new material, new technology, new equipment and new products, will drive a series of new industries and the emergence of the new

department. Such as with the development of electronic, information, biology, new materials, new energy, Marine, space and other new technology, there emerged and developed a series of emerging industrial sectors. [7] It is because of the emergence of new high technology industries to promote the industrial structure from labor-intensive to capital intensive to technology intensive evolution, finally realizes the upgrading of the industrial structure.

3) Realized the change of demand structure, optimize the industrial structure

First of all, emerging technology improves the industry's efficiency, reduces the production cost, and the price of products was decreased, thus expanded products consumer market, changed the original demand structure and realized the optimization of the industrial upgrading. Second, emerging technologies improved the diversity of the product, prompted the consumer upgrade, met the various personalized needs of consumers, to further promote the optimization and upgrade of industrial structure. For example, apple's iphone is due to its personalized design set off a global apple fever.

Upgrading of industrial structure is the important path for the emerging technology to promote economic growth, as intermediate converters, it promoted the economic effects emerging technologies to the most, realized the double driving effect on economic growth. [4] Emerging technologies to transform traditional industries and develop new industries, at the same time, promote the rationalization and upgrading of industrial structure, achieve the optimization and upgrade of industrial structure. As the intermediate converters, the upgrade of industrial structure achieved the optimal allocation of resource, eliminating the backward industries, improving the resource utilization of traditional industry, promoting the development of new technology industries, transferring the limited resources to the economic benefits of higher industry, promoting the sound and rapid economic development of a country effectively. Changed to rely too much on "three tall one low (high energy consumption, high pollution, high emission and low efficiency of industry)," the present situation of the industry, realized the change from labor-intensive, resource intensive to technology intensive.

4. Optimized the structure of foreign trade

Emerging technology promotes the foreign trade structure optimization through technology progress and the optimization of industrial structure, while foreign trade structure optimization can further promote the economic development, this is the emerging technology to promote the economic development of another important process.

1) Optimizing the export structure

First, emerging technology development brought the improvement of processing technology and equipment, improve the traditional mainly labour-intensive export product quality and grade, kept the existing export competitive advantage, and speeded up cultivating new advantage with technology, brand, quality and service as the core competitiveness. Second, technological progress brought by emerging technology development improved the proportion of high-tech and high value-added products in foreign trade goods, improved the added value of export

products, promoted the transition of the export products from the industrial chain of low-end to high-end development, and achieved the shift of export products from the labor-intensive and resource-intensive to capital-intensive, technology-intensive. In addition, a country's trade structure is built on the basis of its industrial structure, the status of the industrial structure determines the level of trade structure, the structure of products trade also reflects the country's industrial structure level. Emerging technology achieve the shift of the industry from low efficiency to high efficiency, from low added value to the high added value, from labor-intensive to capital intensive to technology intensive, on this basis, it must be achieved the shift of export products from low level to high level, so as to improve the competitiveness of a country's products.

2) Optimizing the imports structure

With changing the structure of export commodity, emerging technology also optimizing the structure of import of the goods. In order to meet the demand of the development of the high and new technology, the import of high technical content of components and related products will continue to increase. In addition, as the industry upgrading, the demand for energy conservation and environmental protection material will increase.

The foreign trade structure optimization to promote economic development mainly shows in: Upgrading and optimization of foreign trade structure can improve a country's product competitive advantage, expand the product of the international market, it also means in foreign trade activities, can obtain more trade benefits, so as to accumulate more wealth for its economic development. And also can create a good investment environment for foreign businessman, and it is conducive to the introduction of high and new technology and capital, and further promote the development of a country's economy and technology.

5. Transforming the way of economy development

The content of the pattern of economic development includes the content of the economic growth pattern and also includes industrial structure, income distribution, residents' life and urban and rural structure, regional structure, resource utilization, the content of the ecological environment, etc. Transformation of the mode of economic development requires both from extensive growth to intensive growth, and growth in demand from the usual into a comprehensive, coordinated and sustainable development. This paper explains the emerging technologies of role in promoting the economic development from the perspective of transformation of the mode of economic growth and the pattern of economic development.

The development of emerging technology transformed the mode of the economic growth, improved the labor productivity, realized the change of the extensive growth to intensive growth. In the past quite a long time, the economic construction

of our country depends on large amount of manpower and material resources, financial resources, followed the "three high three low", that is high input, high consumption, high cost, low output, low quality, low benefit of extensive way of economic development. First, the development of emerging technologies change previous energy structure, supply of materials is more inclined to the demand for new clean energy. For example, with the development of solar energy, wind energy, nuclear energy technology, changed the past to coal, oil and other leading energy structure, thus technological progress greatly reduced the consumption of resources and waste and improved the resource allocation efficiency through the development and application of new energy and new materials. Second, the improvement of technical level will also be able to remould the production process and technology of traditional industry, and determine the factors of production in what proportion and form, recombine the factors according to the different characteristic, in order to realize the optimization of factor combination, to improve the production efficiency and the quality of the product of traditional industry, and enhance the scale. [8] It is through this way, emerging technologies to realize the change of the extensive growth to intensive growth, in improving the level of output at the same time improve the quality of the output.

Emerging technology not only change the economic growth mode, but also changed the pattern of economic development. Through the connotation of the pattern of economic development, to realize the transformation of the pattern of economic development not only need to change the pattern of economic growth, but also need to optimize the economic structure. Emerging technology optimize economic structure by optimizing the consumption demand structure, industrial structure, element structure, and changed the pattern of economic development. Optimization of industrial structure has been referred in the previous paper, so below mainly from two aspects of changing consumer demand structure and elements of structure is discussed.

1) Changing the structure of consumer demand

With the actuation of emerging technology and the emerge of new material, new energy and new craft, the original supply structure of has been improved, the price of products has been reduced, the quality of products has been improved, the diversity of products has been increased, effectively meet the personalized requirements of the consumers, so as to expand the consumption demand, optimize the structure of the demand.

2) Changing the structure of elements

The main mechanism of emerging technology promoting structural transformation main show is promoting new combination, increase the flow of the elements of alternative and promote. Under the guidance of emerging technologies, enterprises recombine the production factors in the production process, to achieve reasonable proportion of various elements reduce the waste of resources, with minimal input to obtain the biggest output, so as to maximize economic benefits. In the production of all kinds of scientific and technological innovation, can realize the functional substitutes, a new generation of information technology, biology, high-end equipment manufacturing,

new energy, new materials and so on energy conservation and environmental protection of the resources gradually replace the original high pollution, high energy consumption of resources, fundamentally achieved green production, promote the sustainable development of economy. Emerging technology elements are different from traditional factors of production such as land, capital and resources, it has more strong liquidity than traditional elements, in particular, multinational company's global business activities increasingly become the international flow of fast emerging technological elements of the driving force for development. Science and technology innovation is not only promoting the frequent flow, also promote a country or region by elements flow elements of the structure of the shift.

V. CONCLUSION

With the development of the information technology, biotechnology, green manufacturing, new energy and other emerging technologies, the role of emerging technologies in economic development increasingly highlight, in-depth understanding of emerging technologies is how to affect the economic development is of great importance. This will help us realize the importance of emerging technologies, and in the future to take a series of effective measures to through the development of emerging technologies, finally achieve the aim of our country's economy.

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