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The 4th Industrial Revolution and the Formation of
Innovative Industries

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The 4th Industrial Revolution and the Formation of Innovative Industries

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Abstract: As innovative crowdsourcing is increasingly replacing the conventional outsourcing, the global manufacturing industry has passed mass standardization and is moving towards customization. Innovation in technology has helped upgrading traditional industries and created many new. The whole picture of industry has changed.

Industrial innovation is driven by demand, competition, technological innovation and entrepreneurship. High-value technology is essential. In addition, diversified capital structure, high-quality human resources and external factors such as policies are aslo indispensable.

China has not yet won a place in the world 's club of advanced industrial innovation. The country still has a long way to go to promote independent innovation capability, resource utilization efficiency, industrial structure, informationization, quality and benefit. Many efforts have to be made to build an innovative industry system and move China upward the hierarchy of global value chain. For example, we need to examine global trade and investment configuration and identify our comparable industrial advantages. We

need to cooperate across sectors, industries and national boundaries to upgrade industrial organization. Other tasks include better using internet platforms for industrial innovation, promoting industry-university research and development cooperation, facilitating transformation of scientific and technological achievements, and formulating special policies to support innovative industries.

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1 The background of the birth of the 4th industrial revolution and its impact on the new economy

1.1 The effect of the first three industrial revolutions on industrial transformation

From the mid-18th century to the end of the 19th century, the first industrial revolution took place. Railways and steam engines were widely used. Humans entered the steam era, and the industrial structure was greatly adjusted. Therefore, the first industrial revolution was also called the industrial revolution, and its largest. The change is that the machine industry has gradually replaced the handicraft industry, and the factory has replaced the workshop as the most common mode of production in the industrial era. However, the production organization in this period is still dominated by small-scale production, the scale economy characteristics are not significant, and the market concentration is low, which is not enough to complete large-scale production.

At the end of the 19th century, the European and American countries broke out the second industrial revolution, and human beings entered the electrical age. The industrial revolution has spawned a series of new technologies such as assembly lines and emerging industries such as electricity, petrochemicals, internal combustion engines and automobiles. Enterprises began to concentrate on production and the scale is getting bigger, capital and production are moving closer to concentration, large-scale, vertically

integrated enterprises appear, economic monopoly is formed, and the industrial structure is correspondingly changed from the primary industry to The second and third industries dominate.

Since the 1960s, the world has witnessed the third industrial revolution with the development of information technology and knowledge industry. Human beings have entered the information age, the digital intelligence era and the new energy era. The change of new technologies and the rapid development of new industries are its main features. The combination of the Internet and new energy tends to be a socialized and democratic sharing and cooperation mechanism. Information technology and digital intelligent technology and new energy systems cater to the increasingly individual needs of the world, and have spawned large-scale customized production. New demand and modular innovation with external economies of scale and innovation costs have become the dominant mode of innovation. Vertical structure and centralized large enterprise groups will be disintegrated into network-like modular industrial organization models.

After the birth of the first three industrial revolutions, the industry model in the world has mainly formed a technology-driven model, a policy-driven model, a corporate linkage model, and an environmentally-driven model. However, under the leadership of innovation, a number of companies such as Silicon Valley and Germany have been created. Industries, China's smart manufacturing

and other industry representatives that are influential in the world.

1.1.1 Several major industry innovation models worldwide

(1)Technology-driven. After the Second World War, especially in the 1950s and 1960s, Japan's rank among the major economic powers was largely due to the revitalization of the industry. The key to Japan's industrial economy's leapfrog development in the short term was industrial technology. From the experience and lessons, successes and failures of Japanese industrial development, one can draw an important conclusion: for a country or a regional industrial development, the basic driving force for industrial mutation is technological progress, especially the technological revolution.

(2)Policy-driven. From the perspective of innovation in the US, Japan and South Korea, the development of the industry is inseparable from the effect of government policies in a certain period of time. Focusing on industrial policy, the Japanese government is centered on the Ministry of International Trade and Industry, which has broad powers. It is backed by strong legal, economic and administrative management methods and has strong management of various industries, especially pillar industries and strategic industries. Measures. The United States advocates free market competition, but in strategic industries that are related to the country's development prospects, the government actively organizes and supports through the implementation of strategic projects, making the United States a

series of industries in the international arena. After the 1990s, South Korea also supported the industry's innovation activities through necessary industrial policies, finance, and taxation, thereby promoting the development of the industry.

(3)Enterprise-driven. The South Korean economy has undergone an export-oriented industrialization stage in the 1960s and 1970s, a heavy industry and chemical industry promotion stage in the 1970s, and trade liberalization in the 1980s. It has transformed a dynamic industrial country from a poor agricultural country. The basic experience lies in the fact that it actively guides, promotes and promotes enterprises from the perspective of macroeconomic regulation and control. On the other hand, it supplements the regulation of economic levers such as policies and taxes, and promotes self-exchange, exchange, merger and promotion among enterprise groups. Innovations and developments in semiconductors, petrochemicals, ships, automobiles, power generation equipment, aviation industry and railway locomotives led by large companies such as Hyundai, Samsung, Daewoo, LG and SK.

(4)Environment-driven. Industrial innovation is not only the role of policy, technology, and organization, it is also affected by the national or regional macro environment. Creating a good industrial development environment is one of the important factors to create industrial competitive advantages and enhance industrial competitiveness.

1.1.2 representative industries after the birth of new technologies

(1) Silicon Valley, USA. Silicon Valley is the Santa Clara Valley, gathering high-tech companies together in northern California. It was originally known for researching and producing semiconductor chips. It is a pioneer in the information technology industry in the United States and around the world. Silicon Valley currently has more than 1 million scientific and technical personnel, with an annual output value of more than 700 billion US dollars, bred a large number of well-known high-tech companies including Apple, Google, Intel, Hewlett-Packard, Cisco, Oracle, IBM, etc., forming Industrial clusters such as microelectronics industry, information technology industry, new energy industry, and biomedical industry. The Silicon Valley of the United States has experienced four stages of development: breed, growth, development and maturity.

(2) German manufacturing. Undoubtedly, technological innovation is the root cause of German manufacturing's long-term prosperity. Germany has established a corresponding national innovation system to ensure the vitality of the country in the field of technological innovation, and invested a large amount of human, material and financial resources to ensure national technological innovation. Through the establishment of a national innovation system, Germany has achieved mutual support and mutual cooperation between industry, academia and research, starting from the practical problems of the industry, guiding the teaching and research, and carrying out

teaching activities for the future.

(3) Smart manufacturing in China. Since the reform and opening up, China's advanced manufacturing technology and high-end equipment manufacturing industry has developed rapidly. Through various scientific and technological projects and relying on major national projects, it has broken through a number of high-end equipment and intelligent equipment that have long been subject to foreign imports and long-term dependence on imports, such as Shield machine, large-scale automation control systems, precision machining centers, etc., while a number of leading enterprises in the industry have grown and developed, and some enterprises have gradually become internationally renowned enterprises. In the major fields of energy, metallurgy, chemical industry, construction materials, machinery and equipment, electronic communication equipment manufacturing and transportation equipment manufacturing and various consumer goods, it has formed a huge production capacity, and the output of major industrial products ranks among the top in the world.

1.2 Synchronic presentation of the 4th industrial revolution and industrial transformation

The 4th Industrial Revolution refers to change in the new wave of global technological revolution and industrial transformation, with the theme of intelligent manufacturing and green development, throwing a new generation of information technology, such as the

Internet, cloud computing, big data, Internet of things, artificial intelligence, and so on. It also profoundly changes the past resource allocation mode, production organization mode and value creation mode, and promotes the reform of R & D, design, manufacture and management mode, and also profoundly changes the process of human thinking, production, life and learning. The speed of development, the scope of the new industrial revolution, and the depth of the new industrial revolution are no less than the first three industrial revolutions that have taken place.

The main characteristics of the 4th industrial revolution are network, intelligence and greening, which has brought about a reshaping of the global industrial division of labor. The global industrial division of labor will change from the industrial chain to the industrial network, and the multi-level networked manufacturing pattern will be gradually formed.

1.2.1 Countries actively respond to a new round of scientific and technological revolution and industrial transformation

The 4th industrial revolution drove the ambition of the developed world to revive manufacturing. In recent years, many countries have introduced medium- and long-term development strategies for manufacturing, pushing for the formation of new technological frontiers and new production possibilities boundaries .

As a traditional manufacturing powerhouse, Germany has continued to consolidate its position as a manufacturing powerhouse

and seized the trend of smart manufacturing. In 2012, it established the Industry 4.0 working group and released the Industry 4.0 report the following year. It is the first in the world to declare that the world is moving towards the 4th industrial revolution. In addition, Germany has also implemented smart plant-related production system development projects, additive manufacturing and engineering simulation and topology optimization technology combined projects. With the outbreak of the financial crisis in 2008, the United States gradually realized the important position of the real economy in the national economy. The United States began to adopt the policy of re-industrialization and the return of manufacturing industry, and gradually increased the proportion of manufacturing industry in the national economy, and put forward various strategic plans to promote the development of manufacturing industry, headed by “National Strategic Plan for Advanced Manufacturing Industry”. American General Electric Company put forward the concept of “Industrial Internet”, and set up the Industrial Internet Alliance, which echoed the American government's strategic measures, and its intelligent theme triggered the concept tide in the transformation of industry and Internet. As one of the most powerful countries in science and technology, Japan has put forward the strategy of developing the future and the competition strategy of Japanese manufacturing industry, and has carried out the technology development project of ultra-precision 3D shaping system and the

revolutionary plan of 3D printing manufacturing, etc. Britain, France, South Korea and other countries have also promoted advanced manufacturing and intelligent manufacturing technology to the national strategic level to implement them, actively seizing the commanding point of the development trend of intelligent manufacturing.

Despite its size, China's manufacturing industry still cannot be compared with that in developed countries. Due to the late start of China's industrial revolution and uneven development level, China's industrial enterprises are now in a situation of mechanization, automation and information coexistence. The level of intelligence in manufacturing needs to be greatly improved. In order to achieve overtaking of the curve, China has successively issued the "Twelfth Five-Year Development Plan for Intelligent Manufacturing Equipment Industry", "The 13th Five-Year National Strategic Emerging Industry Development Plan", and "The Guiding Opinions from the State Council on Deepening the Integration of Manufacturing and Internet Development", etc., implement the information technology core technology capability improvement project and industrial Internet network transformation and integration application projects. In addition, we have seized the development opportunities of smart manufacturing, and introduced the ten-year plan of "Made in China 2025" and the "13th Five-Year Plan for Intelligent Manufacturing", which regards smart manufacturing as

the main direction to cope with the challenges of manufacturing transformation and upgrading.

1.2.2 Development of the global innovation chain

The 4th industrial revolution is bringing about the pattern of new technologies, new industries and new trade divisions, and profoundly affects the future development and changes of global value chains.

From “outsourcing” with value creation as the core to “crowdsourcing” with value innovation as the core. Along with the deepening of Internet technology and the growth of personalized demand in the consumer market, the “crowdsourcing” model with openness and synergy came into being. This model refers to the effective use of the network to gather public wisdom and attract micro-individuals to participate in corporate innovation activities. It is a new type of cooperation model that effectively interacts between enterprises, the public and the society. The integration of global value chains is transformed from “outsourcing” with value creation as the core to “crowdsourcing” with value innovation as the core. Unlike the “outsourcing” model in which the third industrial revolution emphasizes professionalism and specificity, the “crowdsourcing” model emphasizes universality, difference and innovation, which is a new process of production mode and resource element configuration in the digital network background.

Value innovation in the integration process of global value

chains. From the intrinsic value level of R&D products, foreign large multinational companies are no longer blindly pursuing the “outsourcing-scale competition” strategy of achieving value creation in participating in global value chain competition, instead, they actively try to develop a “crowdsourcing” network platform or develop a “crowdsourcing” business, in the hope of extending the company’s original “inside R&D” to the online public, continuously expanding the product innovation boundary and enhancing its value innovation advantage.

Intelligent and personalized trends in manufacturing. The proportion of mental labor and smart devices in global value chain activities continues to increase, and the global value chain presents a new trend of flexibility and customization. In the future global value chain competition, the 4th industrial revolution will accelerate the speed of technology update in the manufacturing process and increase the added value of differentiated innovative products. The global manufacturing model is undergoing a profound transformation from traditional large-scale standardization to the future of mass customization and customization.

1.2.3 The concentrated outbreak of technological change in the 4th industrial revolution

Different from previous industrial revolutions, it is difficult for people to simply attribute the new round of industrial revolution to a breakthrough innovation of a common technology, but to highlight

the concentrated outbreak of advanced technology in multiple fields. New material technologies, new energy technologies, digital technologies, artificial intelligence technologies, machine learning technologies, bioengineering technologies, and 3D printing technologies have all achieved unprecedented breakthroughs. These epoch-making technological advances not only promote the rapid development and upgrading of existing related traditional industries, but also cultivate a large number of new industries, and are widely used in other related industrial fields to promote the development of the “big industry” pattern of the whole society. Such breakthroughs in new materials technology have led to the development of a large number of industries including chemical, mechanical, electronic, aerospace, medical, energy, and construction. The breakthrough in big data application technology has brought about historical changes in almost all industries including manufacturing, retail, finance, education, and so on.

In the book *The 4th Industrial Revolution*, Klaus Schwab, President of the World Economic Forum, presented 23 major technological changes including implantable technology, digital identity, and vision as a new interactive interface. . Each of these technological changes will directly contribute to the overall social progress and bring a series of new opportunities for the formation and expansion of innovative industries.

1.2.4 The construction of new industries has become the most

prominent feature of the new economy

The basic technological advancement of the 4th industrial revolution is based on information technology innovation, and cloud computing, big data, artificial intelligence, and the Internet of Things form a new technology group. They promote the formation of new industrial combination models such as “new technology + industry”, “new business + industry”, “new model + industry”, and jointly build a multi-wheel drive modern industrial system with strong advanced manufacturing and modern service industries, and welcome the arrival of the new economy.

2 The formation and development of innovative industries

2.1 The formation mechanism of innovative industries

Innovative industry is an industry with innovative enterprises as the main body, knowledge or technology-intensive industries and brand products as the main content, innovative organization networks and business models as the basis, and the system and culture conducive to innovation as the environment. The formation mechanism of innovative industries has a natural connection with the dynamic mechanism of industrial innovation. Industrial innovation is a process of industrial abrupt change. The industrial structure of any era is a comprehensive reflection of certain demand structure, technology level and resource structure, and it is constantly evolving under the influence of these factors. Therefore, the driving force of

industrial mutation is also derived from the dynamic system of industrial evolution. It is the interaction of these forces that induces and promotes industrial innovation.

2.1.1 Demand is the source of ideas and the source of power for industrial innovation

Demand is the fundamental driving force of industrial innovation. The birth of any new industry or the transformation of old industries are the products of demand.

First, customer orientation is the initiator of passive innovation in enterprises. Professor Porter believes that complex and discerning users are important factors in improving product quality, performance and service. He cited a number of examples of countries that are guided by companies to passively innovate, and consumers are keen to chase the most fashionable and best quality products. This has promoted the continuous innovation of manufacturers, maintained the unique competitiveness of the Japanese video recorder industry in the world, and further launched star products, so branded products have become an important symbol of enterprise innovation.

With the wide application of information technology, information exchange between people is more and more convenient, and production customization and sales network provide a rich source of ideas for enterprise industry innovation. The realization of user innovation and user participation in innovation makes the demand

for industrial innovation more powerful.

Second, the potential need is a driving light for active innovation. Industrial insight or foresight is the starting point and foundation for industrial innovation. Industry development foresight capabilities are based on deep insight into trends in technology, demographics, regulations, and lifestyles.

2.1.2 Technological innovation is the engine of industrial innovation

In general, technological breakthroughs are the first external source of industrial innovation. Technological breakthroughs not only refer to the invention and discovery of science and technology, but also extend its connotation to the advent of scientific research results that can be used for production. The industry life cycle is similar to the technology life cycle. The 4th industrial revolution that is taking place now brings new technologies that are emerging to the market, replacing the former technology and becoming the core technology of the industry. The level of industrial technology is constantly rising to a new level, and it is a well-known fact that technological innovation directly promotes industrial change and industrial evolution.

2.1.3 Entrepreneurship is the inexhaustible motive force of industrial innovation

Schumpeter emphasized and attached importance to the unique role of “entrepreneur” in the development of capitalist economy, and

regarded “entrepreneur” as the “soul” of capitalism. Entrepreneurs are the “innovation”, the “new combination” of production factors and the main organizers and promoters of economic development. Industrial innovation is the highest level of entrepreneurial innovation. Entrepreneurs who have a great influence on history are pioneers of new industries. The industrial revolution is essentially an entrepreneurial revolution, entrepreneurs are the soul of the industrial revolution, and the entrepreneurial spirit of innovation is the inexhaustible motive force for industrial innovation.

2.1.4 Enterprise competition will become the driving force of industrial innovation

Competition is the basic feature of industrial life and the direct driving force of industrial innovation. The competition of enterprises in the industry promotes industrial innovation from the following aspects:

First, companies use innovative investments to develop new products or improve the performance of existing products. If the company does not have a competitive threat, there is no incentive to invest in innovation. The universal innovation investment of enterprises in the industry will promote industrial technology advancement or accelerate the diffusion of new technologies within the industry, or open up new products, which promotes industrial innovation in many aspects.

Second, corporate competition promotes industry segmentation

and industrial restructuring. Due to the existence of competition, in order to obtain living space, enterprises continuously increase the degree of product differentiation or develop new alternative products. On the other hand, they continue to break through the boundaries of the original industry and extend to related industries. The result of these actions is the production of industrial refinements, alternative industries or emerging industries.

In addition, changes in government policy systems and factor supply are also the driving force for industrial innovation. The government's support for emerging industries, mainly high-tech industries, has greatly promoted the pace of industrial innovation. Changes in the scarcity or relative price of industrial supply factors such as raw materials, energy and human resources will also become the driving force for industrial innovation.

2.2 Development of innovative industries

Innovative industry development is a systematic process, and the associated innovation elements include external factors such as technology, capital, manpower and policy.

2.2.1 High value technology is the standard match of innovative industry

The germination of a new industry is often due to the breakthrough of a new technology, which is a key element of an innovative industry. On the one hand, technological innovation is the

most essential means of resource allocation. When technological innovation is achieved and technological breakthroughs are obtained, and the results of technological innovations are also tested by the market, resources will be allocated around technological innovations under the influence of the market, which will also bring differentiation opportunities to the industry. On the other hand, due to the breakthrough of technology, the efficiency is improved, the demand is more satisfied, the price of the product will be lower, and the function will be better, which can stimulate more demand, thereby which ensure the growth of the market demand of the industry and providing a larger market space for the industry.

2.2.2 Diversified capital structure, consolidating the foundation of innovative industry development

As far as high-tech industries are concerned, relying on modern production equipment and production methods for production, the capital investment is much larger than that of traditional industries. In line with the high risks of high-tech industries, capital factor supply includes the supply of venture capital in addition to traditional industrial capital. Only by establishing a venture capital investment mechanism that is compatible with the high-tech industry and compatible with traditional industrial capital, the capital element conditions required for the development of high-tech industries and their growth poles are complete.

2.2.3 High-quality human capital guarantees the innovation endowment of the industry

Human factors play an important role in the formation of high-tech industries, especially innovative talents with innovative capabilities are more important to the formation of high-tech industries. Human capital is a supporting factor for technological innovation. Whoever has high-quality innovative talents will be able to make breakthroughs in technological innovation and take a leading position in industrial innovation.

2.2.4 External factors such as policies are indispensable

The innovation goal of countries such as Germany, Germany and Japan is to focus on market value or application prospects to promote economic and industrial development. Their so-called innovation is a complete innovation chain integrating marketization, industrialization and process, including technology, equipment, product design, production process, market, management, organization and so on. In fact, we are talking about industrial innovation. Among them, technology transformation and technology development are closely linked and become the connecting link of industrial innovation. The main body of industrial innovation is showing a diversified trend, not only in laboratories, but also in enterprises and industry alliances. In order to promote the industrialization effect of innovation, develop emerging industries

and occupy the highest point of emerging industries, these governments have introduced many policies on industrial innovation.

Among all the factors affecting the development of innovative industries, technological elements play a very important role. First, the technical elements have fundamentally formed the differences between industries, and can separate emerging industries from traditional ones. No matter how the capital increases, it will not bring about changes in the nature of the industry. Although human capital can become a supporting factor for technological innovation, if it is not transformed into a technical element or an institutional element, it will still not form a new industry. In the process of the formation of emerging industries, it is still the technical elements that play a decisive role. Second, the rejection of technological elements is stronger. This role allows the industry to protect itself through technical barriers and maintain its independence. The capital and human factors that enter the industry are not difficult to obtain because of their versatility, and the technical elements cannot be obtained randomly because of their monopoly. Therefore, technology will have high industrial barriers and will inevitably become an important factor in competition among enterprises.

3 The path choice of China's innovative industry development

3.1 Challenges facing the Development of innovative Industries in China

3.1.1 “Two-way squeeze” in developed and other developing countries

China's manufacturing industry continues to develop rapidly, and has built a complete, independent and complete industrial system, effectively promoting the process of industrialization and modernization, significantly enhancing overall national strength and supporting the status of a world power. However, compared with the world's advanced level, the gaps in independent innovation capability, resource utilization efficiency, industrial structure level, informationization level, quality and efficiency are obvious, and the tasks of transformation and upgrading and leapfrogging development are urgent and arduous. After the international financial crisis, developed countries have implemented the “re-industrialization” strategy, reshaped the new advantages of manufacturing competition, and accelerated the new round of global trade and investment. Some developing countries are also accelerating planning and layout, actively participating in the global division of labor, undertaking industry and capital transfer, and expanding international market space. China's manufacturing industry faces the challenge of “two-way squeeze” between developed countries and other developing countries. It must focus on the whole world, step up strategic deployment, focus on building a strong country, solidify its strengths, turn challenges into opportunities, and seize a new round of competition in manufacturing.

3.1.2 The environment and situation of industrial development becoming more and more complex and severe.

At present, the mechanization, electrification, automation and informationization of China's manufacturing industry coexist, and the development of different regions, different industries and different enterprises is uneven. The development of intelligent manufacturing faces the difficulties of the key technical equipment subject to other countries, weak foundation of intelligent manufacturing standards / software / network / information security, the New Model of Intelligent Manufacturing has not yet started, intelligent integration application is slow. As a strategic task that must be adhered to for a long time, the intelligent transformation of our manufacturing industry is promoted, the environment is more complex, the situation is more severe, and the task is more arduous.

3.1.3 The degree of integration of industrialization and informatization being low .

Intelligent manufacturing technology is based on a comprehensive combination of information technology, automation technology and advanced manufacturing technology. However, the degree of integration of China's manufacturing industry is relatively low, low-end CAD software and enterprise management software are well popularized, but the intelligent high-end software products used in various complex product design and enterprise management are missing. Most domestic enterprises apply automation technology to a

certain extent in the manufacturing process, but the intelligent technology used to improve product quality, achieve energy saving and emission reduction, and improve labor productivity is seriously lacking. At the same time, information technology and related software products are not sufficiently integrated with manufacturing process technologies.

3.2 To create an innovative industrial system with Chinese characteristics.

In the past 40 years of reform and opening up, although China's production factors such as talents, technology, capital, and information have achieved two-way flow in the process of integration into the world economy, the industrial system has been deeply integrated into the world trade and division of labor system. However, it is still at the lower end of the global value chain, and the characteristics of “big but not strong” are obvious. Under the general trend of world interconnection, the degree of investment and trade facilitation has been continuously improved, the conditions for the free flow of goods and factors have been continuously improved, and the wave of international industrial transfer and the “great migration” of industries between domestic regions have been faced. China should seize the historical opportunity to promote China's industry to the high end of the global value chain.

3.2.1 Thinking about the future investment and trade layout from a

global perspective.

Innovative companies should base themselves on the global market and think about how to use the new opportunities such as the “Belt and Road” to promote the development of the company itself. Enterprises should strengthen the top-level design, formulate the “Overall Strategy for Manufacturing Going Global Development”, establish and improve the overall coordination mechanism, actively participate in and promote international industrial cooperation, and implement major strategic arrangements such as the Silk Road Economic Belt and the 21st Century Maritime Silk Road. Enterprises will accelerate the construction of interconnected infrastructure with neighboring countries and deepen industrial cooperation. Give play to the advantages of opening up along the border and build a number of overseas manufacturing cooperation parks in countries and regions with conditions. Adhere to the government-driven, enterprise-led, innovative business model, and encourage high-end equipment, advanced technology, and superior production capacity to be transferred overseas. Strengthen policy guidance and promote industrial cooperation from processing and manufacturing links to high-end links such as cooperative R&D, joint design, marketing, and brand cultivation, and improve the level of international cooperation. Innovate the processing trade model, extend the domestic value-added chain of processing trade, and promote the transformation and upgrading of processing trade.

3.2.2 Highlight the characteristics and advantages of one's own Industry

While carrying out international cooperation, we will clarify the unique advantages of our own industrial development and focus on the cultivation of industrial development advantages. If the advantage of the United States lies in the breakthrough of science and cutting-edge technology, the advantage of Japan lies in the lean production mode, and the advantage of Germany lies in the engineering technology, then the future advantage of China can be expressed as the modular production mode and the structure of the complex equipment field creativity. Therefore, we can explore more modular industrial Internet technology lines, give full play to the technological advantages of China's module field as the initial strategy for developing intelligent manufacturing, and gradually transform into a comprehensive integration model that can structure the whole and the whole process. Taking high-end equipment that restricts China's industrial safety as a breakthrough, the influential and driving technology and equipment are the main direction, focusing on breaking through intelligent high-end equipment and overcoming a number of key technologies and common technologies.

3.2.3 Developing collaborative innovation across domains, industries, and borders

We will improve the manufacturing innovation system with

enterprises as the mainstay, market-oriented, and in-depth integration of production, education and research, focusing on four aspects: first, to strengthen the networked layout of manufacturing innovation centers, and second, to further organize and implement major science and technology projects. The third is to explore an effective mechanism for cooperation between industry, universities and research institutes. The 4th is to strengthen the construction of innovative talents for production, education and research. Reasonable cooperation with industrial advanced countries in technology and industry is a favorable way for the development of China's smart manufacturing industry. At present, China has launched a number of cooperation programs with Germany to enhance the international competitiveness of intelligent manufacturing. In the future, we should continue to carry out industrial cooperation with the United States, Germany, Japan and other countries, and take the lead in establishing dialogue and cooperation mechanisms, conducting industrial strategic research cooperation, strengthening standardization cooperation, building industrial parks, conducting pilot demonstrations and exchange of experiences, and strengthening personnel exchanges and training, etc.

3.2.4 Promoting the reform of industrial organization model

In the information age, the characteristics of manufacturing

innovation are undergoing significant changes, scientific research tools are increasingly digital and intelligent; innovation models are developing in different directions and synergies; users are more likely to participate in the innovation process, and the mass-creation model is gradually popularized; the technology update cycle is shortened, and the innovation speed is Accelerate; research and development methods are virtualized and networked.

Driven by these trends, China's existing industrial system will gradually collapse and rebuild, and new manufacturing models, organizational methods, and industrial forms will emerge. “Internet +” promoted the innovation of industrial organizations, and the networking and flattening became the new features of the organizational structure of enterprises.

From the point of view of production division, collaborative manufacturing has become an important mode of production organization; from the perspective of cooperation mode, network virtualization has become a new form of enterprise cooperation; from the perspective of marketing methods, e-commerce has enriched the sales channels of enterprises. From the perspective of supply chain management, network real-time has become a new trend of upstream and downstream cooperation in the industry chain. In addition, “Internet +” also promotes the upgrading of industrial structure and the transformation of industrial innovation methods. Manufacturing service has become a new trend in industrial development, and

collaborative innovation has become a new model of industrial technology innovation. At present, China's manufacturing enterprises need to reduce costs and increase efficiency, improve quality and efficiency, so enterprises need to integrate traditional enterprise business with a new generation of information technology, intelligent technology, big data analysis technology, artificial intelligence technology and so on.

3.2.5 Developing Industrial Internet platform

As a product of the deep integration of the new generation of information technology and manufacturing industry, Industrial Internet not only provides new network infrastructure for the digitization, network and intelligent upgrade of the manufacturing industry and the entire real economy, but also continuously promotes new models, new formats and new industries. The country needs to coordinate the promotion of industrial Internet development activities, and strive to build three major systems: network, platform and security. Among them, the network system is the foundation, the platform system is the core, and the security system is the guarantee. Its essence is the data plus model to provide services, the service content includes collaborative design, production optimization, quality inspection, and life cycle management of operational decision-making. Large enterprises need to accelerate integration and innovation, and SMEs need to be universally applied. The country

needs to continuously improve the three major supports of industry, ecology and internationalization.

3.2.6 Promoting the alliance of industry, university and research

The state needs to establish a patent operation mode of government guidance, enterprise-led, university cooperation, government, industry, research and research, realize the circulation and sharing of scientific research resources in the region, accelerate the transformation of scientific research results, and promote the industrialization of scientific and technological achievements.

The enterprise intelligent manufacturing technology needs to be strengthened. The country encourages the establishment of a truly effective technology alliance for production, learning, research and use with enterprises as the main body, institutions of higher learning and research institutes, and pays attention to the vertical integration of the industrial chain. For the design, manufacturing, sales, maintenance and other aspects, through the long-term support of “project-talent-base”, the state explores an effective mechanism for combining production, learning, research and use. We will improve the talent cultivation system, focus on cultivating innovative innovative talents in smart manufacturing, and cultivate a talented team with proficient management, professional skills and high skills to meet the requirements of high-quality development and promote the transformation of “Made in China” to “Created in China”.

3.2.7 Accelerating the transformation of scientific and technological achievements

In order to promote the transformation of scientific and technological achievements into real productive forces, it is necessary for the state to explore the standardized management path for the transformation of scientific and technological achievements, to enhance the scientific nature of the transformation of high-tech achievements, to create a standardized environment for guiding, coordinating, supervising, serving, and so on, in order to improve the quality of the high-tech industry and the standardization level of the enterprises, the quality of the transformation project of the high-tech achievements in China has been raised to a new level. We will further strengthen the research and development of technical standards, improve the system of technical standards, and improve the fusion mechanism between scientific and technological innovation and technical standards, so as to promote the transformation of innovative achievements.

3.2.8 Special Policy promotes the Prosperity of Innovation-oriented Industry

Cultivating and developing strategic emerging industries and traditional manufacturing transformation and upgrading has become two important tasks for the development of manufacturing. There is an urgent need to promote the integration of informatization and industrialization, and to improve the innovation capability and added

value of China's manufacturing industry through the development of intelligent manufacturing technology. Through government guidance and promotion, the domestic first (set) equipment risk compensation system will be fully utilized to enhance the confidence of users in purchasing and using the first (set) equipment. The government gives play to the guiding role of industrial policies on social funds, attracts capital investment from all parties, shares the financial pressure and innovation risks of enterprises, and solves the worries of users. Other departments of the coalition government, science and technology departments at all levels and relevant industry associations work together to form a joint force. We encourage social capital and private capital to invest in smart manufacturing basic technologies and components, intelligent manufacturing processes, and intelligent high-end equipment manufacturing technologies, promote the implementation of major independent innovation projects, set up special funds and industrial funds, and help entrepreneurial innovation and industrial upgrading.

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