

# Research on the Development of Global Future Industries

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**Abstract.** Future industries are an important part of the modern industrial system and will become the core engine for reshaping the competitiveness of countries and regions. At present, the iteration of cutting-edge and disruptive technologies is accelerating, the demand for industrial discovery and cultivation of innovation is more urgent, policies in various countries and regions are continuously intensifying, and the competition in cutting-edge technologies is becoming increasingly fierce. It is necessary for China to accelerate the layout of future industries and strive for the initiative in the global competition of the science and technology industry.

**Keywords:** Future Industries, Innovation, Experience, Inspiration.

## 1. Introduction

Future industries are an important part of the modern industrial system. They are the main battlefield for breaking through cutting-edge and disruptive technologies and the main industrial carriers for developing new forms of productive forces. They will become the core engine for reshaping the competitiveness of countries and regions. Currently, the global economic recovery faces multiple challenges, and countries are actively exploring new economic growth points. Developed countries have taken the lead in laying out industries that are likely to thrive in the future and have introduced a series of regulations, investment plans, and policy documents<sup>[1]</sup>. This paper studies the overall development of global future industries and sorts out the strategic measures of developed countries such as the United States, Germany, and Japan, with the aim of providing experience and inspiration for China's forward-looking planning of future industries.

## 2. Development of Global Future Industries

**The iteration of cutting-edge and disruptive technologies is accelerating, and the need for innovation in industry discovery and cultivation is becoming more urgent.** Currently, basic research and breakthroughs in disruptive technologies have become a global focus, giving rise to new directions and tracks with strong technological driving force and great market development potential, such as the metaverse, humanoid robots, and brain-computer interfaces. For example, the metaverse is an integrated application of new-generation information technologies, with broad space and huge potential. Goldman Sachs predicts that the global market size of humanoid robots is expected to reach \$154 billion in 2035, showing an exponential growth trend. Brain-computer interface technology is gradually entering the public eye and has carried out a series of demonstration applications in fields such as bionics, medical diagnosis and intervention, and consumer electronics. McKinsey predicts that the potential market size of global brain-computer interface medical applications is expected to reach \$40 billion in 2030. During the 15th Five-Year Plan period, the iteration of cutting-edge and disruptive technologies will continue to accelerate, and a series of new technologies and business forms will continue to emerge. The "window period" from technological innovation to industrial implementation will continue to narrow<sup>[2]</sup>. It is of greater urgency and importance to continuously track the latest global cutting-edge technology trends and evolution trends, focus on efforts and breakthroughs in track identification, technological innovation, product research and development, industrial implementation, and ecological support, and take the lead in forming a future industry mechanism of dynamic discovery, precise cultivation, and rapid application, so as to accelerate the construction of a preemptive competitive advantage.

**Policies in various countries and regions continue to be strengthened, and content such as security, market, and rules is further enhanced.** Currently, a new round of scientific and technological revolution and industrial transformation is evolving in depth. The world's major developed countries and regions are accelerating the layout of future industries to seize the strategic commanding heights of future scientific and technological development. The "2030 Vision" released by the US National Science Board (NSB) proposes a development strategy to maintain key technology advantages and plans the direction of science and technology policies and basic research for the next decade. Germany has released the "National Industrial Strategy 2030", aiming to further deepen and specify the Industry 4.0 strategy and promote the all-round upgrade of its industry in the digital and intelligent era. France focuses on 10 priority areas such as energy, transportation, health, electronics, and robotics, and launches a €30 billion "France 2030" investment plan, aiming to "find the path to independence" and "take back the destiny of France and Europe". Japan focuses on the hydrogen energy field, formulates the "Basic Hydrogen Energy Strategy", clarifies the roadmap and goals for reducing hydrogen production costs, and proposes to commercialize hydrogen power generation around 2030. China seizes the development opportunities of future industries and releases the country's first special document on future industries - the "Implementation Opinions on Promoting the Innovative Development of Future Industries", systematically laying out six future industries and aiming to build an important source of future industries in the world by 2027. During the 15th Five-Year Plan period, the position and role of future industry policies led by the state will become more prominent in various countries. Developed countries such as the United States, Germany, Japan, and South Korea will attach great importance to the formulation and implementation of industrial policies, continuously strengthen the use of industrial policy tools, especially focus on cutting-edge technologies and future industries such as artificial intelligence, quantum technology, and biotechnology, and national security, market supervision, international rules, etc., which are closely related to industrial policies, will also continue to be improved.

**Scientific and technological ethics has gradually become a global hot topic, and it is increasingly important to adhere to both scientific and technological innovation and safe development.** As an industry driven by the innovative development of emerging technologies, future industries have given rise to cutting-edge technologies such as artificial intelligence, brain-computer interfaces, gene editing, and synthetic biology, accompanied by unprecedented scientific and technological ethics issues. The governance of scientific and technological ethics has become a global key issue. Countries around the world are accelerating the release of governance documents in key areas. Taking artificial intelligence as an example, the United States, Japan, the European Union, etc. have successively released documents such as the "Ethical Guidelines for the Design of Artificial Intelligence", the "Human-Centered Artificial Intelligence Social Principles", and the "Ethical Guidelines for Trustworthy Artificial Intelligence", highlighting that the development of artificial intelligence should follow the principle centered on human rights. China has also released documents such as the "Ethical Norms for the New Generation of Artificial Intelligence" and the "Measures for the Review of Scientific and Technological Ethics (Trial)", comprehensively promoting the national scientific and technological ethics governance work. At the same time, countries are also accelerating the establishment of scientific and technological ethics regulatory agencies. The United Kingdom has gradually constructed a digital science and technology ethics regulatory agency system covering government departments and public institutions, advisory groups and committees, cross-government organizations such as networks and communities, and decentralized administrative agencies. China has also successively established supervision and management agencies in the biomedical field, such as the Organ Transplant Ethics Committee, in the form of industry ethics committees. In the future, with the continuous emergence and iterative development of emerging technologies, building a comprehensive, systematic, and effective scientific and technological ethics governance system will become a powerful guarantee for better promoting scientific and technological innovation and social development.

**The competition in cutting-edge science and technology is intensifying, and the uncertainty of international cooperation in some fields is increasing.** Since the 14th Five-Year Plan period, the world economic growth momentum has been insufficient, regional hot issues have occurred frequently, and the complexity, severity, and uncertainty of the external environment have increased. Facing the complex and severe international environment, the international competition in science and technology is becoming more and more intense. The world has entered an unprecedented era of innovation intensity and industrial revitalization. Countries pay more and more attention to the improvement of cutting-edge scientific and technological innovation capabilities and strive to seize the initiative in the development of future industries. The trend of maximizing the interests of individual countries and small regional groups is obvious, which will further intensify the resurgence of protectionism and unilateralism<sup>[3]</sup>. In addition, emerging countries are actively seizing the "overtaking" opportunities brought by the new round of scientific and technological revolution and industrial transformation, vigorously laying out and developing future industries, and shifting from seeking single breakthroughs to overall improvement, getting rid of the "low-end lock-in" and "high-end containment" of the global value chain. In the future, the competition between countries around the world, especially Western countries led by the United States and emerging developing countries represented by China, will further intensify in fields such as future networks, quantum information, artificial intelligence, and deep sea and aerospace. This may form breakpoints in the flow of factors such as industry, science and technology, and talents, posing a threat to the globalization of future industries.

### **3. Strategic Measures of Major Developed Countries to Promote the Development of Future Industries**

**The United States Integrates Innovation Resources through National Strategies to Promote the Development of Future Industries.** As a superpower leading in many aspects such as economy, science and technology, and military, the United States has accelerated its layout of future industries in recent years. Since 2018, the United States has successively issued policy documents related to the development of future industries, such as "The United States Will Lead the Future Industries", "NSF Future Act", and "Endless Frontier Act", proposing that frontier fields such as artificial intelligence, next-generation communication networks, advanced manufacturing, quantum technology, semiconductors, and biomedicine are the development directions of future industries that the United States is targeting. The United States focuses on increasing investment in fields such as advanced manufacturing, artificial intelligence, quantum technology, advanced communication, and biotechnology.

**Germany Promotes Systematic Innovation in Key Fields.** Germany's scientific and technological innovation path is different from that of other developed countries. It emphasizes continuous, incremental, and systematic innovation, and the coordinated innovation of its scientific and technological innovation policies and scientific research organizational structure is worthy of reference<sup>[4]</sup>. In recent years, Germany has successively issued documents such as "National Industrial Strategy 2030", "Artificial Intelligence Strategy", and "Federal Government Data Strategy", focusing the national strategy on strengthening the construction of digital infrastructure, consolidating and enhancing the international status of industrial manufacturing, and focusing on key fields such as clean energy, supercomputers, and autonomous driving. Germany has a complete and well-defined innovation system organizational structure, including the federal government, state governments, education and research institutions, enterprises, and intermediary organizations. The German federal government is responsible for legislation, planning, management, and supervision, etc. Universities, research institutions, and professional research units jointly undertake technical research, and intermediary organizations are responsible for technology transfer and achievement transformation.

**Japan Promotes the Development of Future Industries Guided by the Needs of Economic and Social Development.** Japan has achieved rapid economic growth relying on its world-leading

scientific and technological capabilities and education level. However, due to long-term deflation and the appreciation of the yen, Japan's economic development faces medium- and long-term structural problems, and the economic growth rate has continued to slow down. To revive the Japanese national economy, Japan is guided by the "Society 5.0" needs and vigorously promotes scientific and technological and innovation policies. Technology foresight surveys are an important basis for Japan to prospectively formulate scientific and technological innovation policies and plan the development strategies of future industries. Japan deepens the investment mechanism of basic research funds with scientific and technological talents as the core.

#### **4. Implications for China's Future Industry Development**

**Focus on the long - term and overall situation and systematically layout the key points of future industry development.** China should firmly seize the opportunities of the new round of scientific and technological revolution and industrial transformation, leverage the advantages of epidemic response and stable economic development, understand global development trends as well as its own strengths and weaknesses, select fields of great strategic significance, broad development prospects, and good technological foundations. At the national level, plan a number of future industries as a whole, focusing on developing frontier technologies and areas of future industrial transformation such as brain - like intelligence, quantum information, future networks, genetic technologies, biomedicine, new energy and energy storage. At the same time, identify several strategic industries to fully ensure technological sovereignty and supply chain security, develop a path with Chinese characteristics in the increasingly fierce global competition pattern, and seize the initiative in future development.

**Anticipate new scenarios and top - level plan the development path of future industries.** The most prominent feature of future industries is "newness", which is driven by new demands and relies on new technologies to create new impetus for high - quality economic development and expand new space for industrial development and regional innovation. China should formulate visionary plans for 2035 and 2050, anticipate future production and living scenarios of humanity, depict the application scenarios of future industrial technologies, and plan the development paths of future industries. It should fully utilize the advantage of the largest domestic demand market to create new demands. In regions with outstanding scientific, educational, and industrial resources, comprehensively plan the key industries to be cultivated in each region to form future industry demonstration zones with distinct characteristics.

**Adapt to new demands and create a new R & D organizational model that gives full play to the roles of various innovation entities.** Future industries involve deep integration and coupling between technologies and between technologies and industries, requiring the breaking of boundaries between innovation entities to achieve full integration. China should actively build a good innovation ecosystem and institutional environment, provide personalized and diversified support at every stage of the cultivation and development of future industries and at every link of the innovation chain. With the joint efforts of the market and the government, explore the construction of new R & D institutions such as future industry research institutes that span different fields and institutions and run through the innovation chain, as well as innovation parks as carriers, to help the transformation of technologies and industries through the innovation of the R & D and production organization model, and promote the vigorous development of China's future industries.

#### **5. Conclusion**

Future industries are driven by cutting-edge technologies. Currently, they are in the stage of incubation or the initial phase of industrialization. They are forward-looking emerging industries with significant strategic, leading, disruptive, and uncertain characteristics. At present, countries are laying out corresponding fields according to their own characteristics in the hope of obtaining the dominance

of development. Globally, the key areas of countries' layouts focus on directions such as digital, health, and low-carbon. They rely on the full collaboration and transformation and upgrading of innovation entities to promote the development of future industries. It is recommended that China strengthen the top-level design of the layout of future industries, systematically arrange development priorities, and lead the development of advantageous fields.

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