

Deconstruction of Global Science and Technology Governance Path

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ABSTRACT

The global science and technology governance path is composed of governance philosophy, governance rules and synergistic governance. Governance philosophy is based on the concept of "community with a shared future for mankind", adheres to the value orientation of "technology for good", practices the principle of "Consultation, Contribution and Shared Benefits", and realizes the goal of "eco-technology"; governance rules focuses on the formulation of governance rules for key emerging technologies such as artificial intelligence, 5G technology standards, data protection and technology export control, and promotes the realization of international rule of law for key emerging technologies; synergistic governance is guided by cooperation and win-win, and aims to give play to the initiative of international science and technology organizations in global science and technology governance.

Keywords: *Global science and technology governance, Global governance, Key emerging technologies.*

1. INTRODUCTION

Currently, the New Crown Pneumonia epidemic is spreading globally, and emerging science and technology such as artificial intelligence, big data and 5G technology are playing an important role to effectively respond to the New Crown Pneumonia epidemic. Emerging science and technology are widely used in people's daily lives, generating a plethora of ethical, moral and legal issues, and the call for global science and technology governance has risen. The so-called global science and technology governance refers to the governance of science and technology and closely related global issues on a global scale and at a global level. [1] It can be argued that "global science and technology governance is a concrete manifestation of global governance in the field of science and technology, and it is the process by which the system and rule system of science and technology development, related science and technology policies and science and technology activities of countries around the world are affected by the international community and global issues." [2]

2. GOVERNANCE PHILOSOPHY: BASED ON THE VALUES OF "COMMUNITY OF SHARED FUTURE FOR MANKIND"

The concept of global science and technology governance has undergone several transformations after the Second World War: first, the concept of safeguarding military and national security; second, the concept of promoting knowledge diffusion and absorption; and third, the concept of systematically enhancing original science and technology innovation capabilities. [3] Today, the global science and technology governance concept is undergoing its fourth transformation, and the goal of the governance concept is to promote the coordinated development of science and technology and human society, which can be summarized as the concept of "community of human destiny" that adheres to science and technology for the benefit of mankind. The connotation of this concept lies in unswervingly following the path of peaceful development of science and technology, promoting global science and technology governance to

achieve mutual respect, fairness and justice, and win-win cooperation in the international community, and using science and technology to build a world of lasting peace, universal security, common prosperity, openness, inclusiveness, cleanliness and beauty.

Firstly, global science and technology governance should adhere to the value orientation of "science and technology for good". Science and technology ultimately serve human beings and are a tool for them to create a happier and better life. Science and technology personnel should be ethical and moral, and strictly adhere to the ethical and moral bottom line in the process of scientific and technological research and development. At the same time, make good use of the rule of law and incorporate the system of rules of science and technology into the system of international legal rules. If advanced science and technology cannot serve human beings and break the constraints of laws, ethics and other social rules, it will not be a "good" technology in the real sense and should be governed.

Secondly, global science and technology governance should practice the principle of "Consultation, Contribution and Shared Benefits". "Consultation" means to pool collective wisdom, as it is difficult for a country to solve global science and technology challenges by itself, and it needs global cooperation to deal with them; "Contribution" means to fully mobilize the enthusiasm and motivation of countries to participate in global science and technology governance; "Shared benefits" is to let the fruits of global science and technology governance benefit all countries in the world and strive to achieve win-win and multi-win, especially to improve the discourse power of developing countries in global science and technology governance.

Finally, global science and technology governance should aim to achieve "ecological science and technology". Ecological science and technology refers to science and technology respecting nature, conforming to nature, protecting nature, and following the ecological laws and the laws of natural development. The ultimate direction of global science and technology governance must be the harmonious coexistence of human and nature, economic society and nature. To know that science and technology is the first productive force, therefore, global science and technology governance should adhere to the path of green production and realize ecological science and

technology development, which is also the inherent requirement of the value of "community of human destiny".

3. GOVERNANCE RULES: FOCUSING ON KEY EMERGING TECHNOLOGY GOVERNANCE RULEMAKING

The focus of global science and technology governance lies in the construction and improvement of governance rules. At present, the world's major powers compete for the formulation of governance rules for key emerging technologies such as artificial intelligence, big data, and 5G technical standards.

3.1 Artificial Intelligence Governance Rules

The New Crown Pneumonia outbreak highlights the wide application prospects and huge commercial potential of artificial intelligence as an emerging technology, and also brings the global artificial intelligence governance rules debate to a climax. In 2020, the Group of Seven (G7) Science and Technology Ministers' Meeting released the COVID-19 joint statement, proposing to formally launch the Global Partnership for Artificial Intelligence (GPAI). [4] The International Organization for Standardization (ISO) has also included artificial intelligence standards in its formulation work, marking that the formulation of international governance rules for artificial intelligence has entered an accelerated stage. At present, various regions and countries around the world also attach great importance to artificial intelligence technology as their national strategies.

In 2017, the United States Congress enacted the "Future of Artificial Intelligence Act" to promote the development and application of artificial intelligence in the United States. In 2019, the President of United States signed the "Artificial Intelligence Initiative" and issued the "The National Artificial Intelligence Research and Development Strategic Plan: 2019 Update". In 2020, the "National Strategy for Critical and Emerging Technology", the "Endless Frontier Act" were successively promulgated, involving artificial intelligence governance rules.

In 2018, the European Union issued the "European Union Artificial Intelligence Strategy" and formulated the European Union's artificial intelligence action plan to promote the European

Union's position in the international artificial intelligence competition. In 2020, the European Commission released the "White paper on Artificial Intelligence—A European approach to excellence and trust", using various measures to promote the rapid development of artificial intelligence in the European Union. In order to strengthen the use, investment and innovation of artificial intelligence throughout the European Union, the European Commission passed the "Artificial Intelligence Act" proposal in 2021, proposing a set of legal frameworks in the field of artificial intelligence, with a view to regulating and restricting the application of artificial intelligence, protect people's daily life and legitimate rights from infringement.

The State Council of China issued the "New Generation Artificial Intelligence Development Plan" in 2017. The goal is to build China's first-mover advantage in the development of artificial intelligence, and accelerate the construction of an innovative country and a world power in science and technology. Since then, China has successively released the "New Generation Artificial Intelligence Development White Paper" and the "Artificial Intelligence Standardization White Paper". The five departments of the State Council of China issued the "Guidelines for the Construction of the National New Generation Artificial Intelligence Standard System" in 2021, forming standards to lead the comprehensive and standardized development of the artificial intelligence industry. China's National Governance Committee for the New Generation Artificial Intelligence issued the "New Generation Artificial Intelligence Ethics Code" in 2021, marking that China's artificial intelligence policy has gradually shifted from promoting application to supervision, ensuring that artificial intelligence is under human control.

3.2 5G Technical Standard Rules

The global 5G technical specifications and the development of standards are implemented and promoted by the Third Generation Partnership Project (3GPP). The United States emphasizes that the formulation of 5G technical standards should consider the legal environment, governance model, and security cooperation agreements of the country where the supplier is located. The European Commission issued the European Union toolbox for 5G security, calling on member states to look at 5G technical security issues from the perspective of national security. [5] China attaches great importance to the possession of essential patents for

5G technical standards. In terms of the number of standards, China's 5G standard-essential patents accounted for more than 38%, ranking first in the world. It can be seen that the competition among countries in the world for the right to speak in the formulation of 5G technical standards is increasing.

3.3 Data Governance Rules

At the international level, the "Digital Economy Partnership Agreement" involves personal data information protection, cross-border data flow and other international data governance rules.

The White House Office of Management and Budget released the "Federal Data Strategy and 2020 Action Plan" in 2019. The core goal is to develop data as a strategic resource, it establishes a long-term framework for how government agencies use federal data, builds it from the national level Data-driven cultural atmosphere. [6] The United States is concerned about the free flow of data and has issued the "Clarifying Lawful Overseas Use of Data Act", making it easier for United States law enforcement agencies to obtain information about their citizens overseas.

The European Union issued the "General Data Protection Regulation" (GDPR) in 2018, which requires more detailed data privacy protection measures for companies, more detailed data protection agreements, and more user-friendly and detailed disclosures about company privacy and data protection practices. The European Data Strategy will be released in 2020. The goal is to propose more policy measures and investment strategies on the basis of data legislation to cope with the current era of big data and ensure the free flow of data across sectors. The "Digital Services Act" and the "Digital Market Act" promulgated in 2021 aim to further restrict the anti-competitive behavior of United States technology giants, regulate the European Union digital market order, and increase the data regulatory pressure faced by large technology companies in Europe. [7]

China promulgated and implemented the "Data Security Law of the People's Republic of China" in 2021, aimed at regulating data processing activities, ensuring data security, promoting data development and utilization, protecting the legitimate rights and interests of individuals and organizations, and safeguarding national sovereignty, security and development interests. The "Personal Information Protection Law of the People's Republic of China" implemented in the same year provided a "safe

lock" for personal data protection, which restricts excessive collection of user information, prevents big data from being "cracked", strengthens the protection of sensitive personal information and reinforces supervision and illegal punishment. In addition, the "Civil Code of the People's Republic of China", the "National Security Law of the People's Republic of China", the "Cybersecurity Law of the People's Republic of China", the "Consumer Protection Law of the People's Republic of China", the "Amendment (VII) to the Criminal Law of the People's Republic of China", and the "Amendment (IX) to the Criminal Law of the People's Republic of China" all involve the legal provisions of data governance.

3.4 Technology Export Control Rules

At the international level, the WTO legal framework on technology export control is contained in the Agreement Establishing the World Trade Organization and the Agreement on Technical Barriers to Trade, the Wassenaar Agreement focuses on the control of technology exports of dual-use items and conventional weapons. In 2020, under the leadership of the United States, the Wassenaar Agreement included in the scope of technology export control semiconductor manufacturing materials and network software that can be converted to military use. [8]

Two important bills, the "Export Control Reform Act" and the "Foreign Investment Risk Review Modernization Act", which came into force in the United States in 2018, further strengthen technology export controls and establish a linkage between the foreign investment security review system and the technology export control system, realizing a double technology embargo in trade and investment. Meanwhile, the United States has accelerated the revision of the Wassenaar Agreement and coordinated it with its own technology export control policy to further strengthen the discourse on the construction of international rules for technology export control.

European Union technology export control laws and regulations include the "European Union Dual-Use Export Control Regulation", the "Community Customs Code", and the "Common Rules Governing the Control of Exports of Military Technology and Equipment". In addition, the European Union has listed a detailed export control list for the export of dual-use items, technology and military supplies, and implemented an export

licensing policy for the export of dual-use items. The European Union is trying to achieve "technological independence", using multilateral mechanisms to control the export of key emerging technologies, and has issued a plan to review and restrict the export of "specific sensitive equipment and technologies." [9]

China's legal system of technology export control mainly consists of three levels: laws, administrative regulations, and departmental regulations. Before the adoption of the "Export Control Law of the People's Republic of China", China's legal system of technology export control lacked unified legislation, and the core of the technology export control system consisted of administrative regulations, departmental regulations, and related documents. In 2020, the "Export Control Law of the People's Republic of China" to safeguard national security and interests, and to fulfil international obligations such as non-proliferation, and to strengthen and regulate technology export control. At this point, China has achieved compliance with the law in technology export control.

4. SYNERGISTIC GOVERNANCE: A WIN-WIN APPROACH TO COOPERATION

Global science and technology governance requires the concerted participation of multiple forces. International science and technology organizations have a demonstration effect in the process of global science and technology governance, and it is necessary to enhance their status in solving global science and technology issues. Win-win cooperation in science and technology between developing and developed countries is also an important asset to promote the realization of an orderly functioning of the global science and technology governance system.

4.1 International Science and Technology Organizations Play a Role

International science and technology organizations are international organizations whose purpose is to promote the progress of science and technology or the development of a scientific field, and are composed of scientists or other people dedicated to this purpose. [10] In the process of global science and technology governance, many scientific and technological challenges should be

addressed within the framework of international science and technology organizations.

First, international science and technology organizations should actively set global science and technology governance issues. Issues should be set with international and professional perspectives, take into account the interests of all mankind and achieve "science and technology for good", should be consistent with the positioning of international science and technology organizations and organizational building standards, focus on hot science and technology events and key emerging technologies rule-making, and encourage interdisciplinary and multi-disciplinary cooperation to solve global science and technology problems. Second, international science and technology organizations should actively promote issue consultation. Finally, international science and technology organizations should promote the participation of professionals in issue resolution. They should provide financial guarantee for professionals, improve the echelon construction of talents within the organization, and broaden the academic network for young and middle-aged scientific and technological talents. In addition, international science and technology organizations should make good use of "soft law". "Soft law" has certain advantages in global science and technology governance, such as convenient, efficient and flexible, furthermore, soft law is less costly and more operative. [11] The purpose of "soft law" is to coordinate the will of all parties, so that global science and technology governance can be promoted. In the process of continuous practice, the "soft law" will be referred to and applied by national courts, legislatures and industry stakeholders, becoming the legal standard that actually influences global science and technology governance, and promoting the formation of legally binding "hard law".

4.2 Strengthened Cooperation Between Developed and Developing Countries

Developed countries have long dominated the discourse of global science and technology governance, using their scientific and technological advancement to promote science and technology governance concepts in their own interests globally. Developing countries should gradually integrate into global science and technology governance and actively participate in the formulation of global science and technology governance rules, remove the institutional barriers for science and technology

authorities to establish international science and technology organizations in the country, actively promote international science and technology societies, associations, and standardization organizations to settle in their countries, set up special channels for science and technology funding to support their scientists to serve in international science and technology organizations, encourage private science and technology institutions and high-tech enterprises to take the lead in global science and technology governance, so as to enhance their own participation in the global science and technology governance discourse.

Meanwhile, developed countries and developing countries should jointly formulate and implement a "regional innovation" strategy, accelerate the process of regionalized science and technology cooperation, and promote global science and technology governance through "regional innovation". The strategy focuses on building a coordinated multilateral and bilateral network for international science and technology cooperation, relaxing investment access standards in some high-tech service areas, expanding the opening up of science and technology to the outside world and improving dialogue and exchange mechanisms, promoting the improvement of international rules and standards for intellectual property rights and related international trade and international investment, building a science and technology risk prevention and control system, strengthening cooperation with science and technology review agencies in various countries and promoting information sharing on reviews. Form high level constraints in areas such as regulatory coordination, mutual recognition of standards and cross-border flow of data to achieve win-win cooperation in global science and technology governance.

5. CONCLUSION

In the Post-Epidemic Era, the world is undergoing a major change unprecedented in a century, and a new round of global technological revolution and industrial change is developing rapidly. No country can become an independent innovation center or enjoy the fruits of innovation exclusively. Science and technology innovation is a major driving force for global development, and there is an urgent need to reform and improve the global science and technology governance system. Countries around the world need to join hands to promote the global science and technology

governance system in a more just and reasonable direction, in line with the universal requirements of countries around the world.

AUTHORS' CONTRIBUTIONS

Yanying Fei built the article framework and put forward ideas. Xufan Zhang wrote the manuscript.

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