Strengthening the Legal Framework for Science Popularization and Promoting Rule of Law Construction: Postprint

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Abstract

General Secretary Xi Jinping emphasizes that scientific and technological innovation and science popularization are of equal importance, and that strengthening the legal construction of science popularization is the primary task to ensure the smooth development of science popularization work in China. Based on improving the legal system and achieving the goals of rule of law, this article systematically reviews the development trajectory, current status, and achievements of science popularization laws and institutional construction in China. It then identifies the challenges and problems faced by the legal construction of science popularization in China in light of the current development situation. Finally, on the basis of summarizing the experiences of legal construction in the field of science popularization from countries worldwide, it puts forward reflections and prospects for the current legal construction of science popularization in China.

Full Text

Improving the Legal System and Advancing the Rule of Law in Science Popularization

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President Xi Jinping has emphasized that scientific and technological innovation is equally important as science popularization, and that strengthening the rule of law in science popularization is the primary task to ensure its smooth development in China. Based on improving the legal system and achieving the goals of rule of law, this paper systematically reviews the developmental context, current status, and effectiveness of science popularization legislation and institutional construction in China. It then identifies the challenges and problems facing the rule of law in science popularization under current development

conditions. Drawing on international experiences in science popularization legislation, the paper proposes reflections and prospects for advancing the rule of law in China' s science popularization.

Keywords: science popularization, legal system of science popularization, construction of rule of law in science popularization

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Introduction

In building an innovative country, science popularization and scientific innovation exist in a relationship of mutual dependence and coupling. Their benign interaction and synchronized development facilitate the production and diffusion of scientific knowledge, deepen societal understanding of both the applications and risks of scientific achievements, and promote public participation in scientific decision-making processes. Therefore, prospering the cause of science popularization and developing a national science popularization system has become a foundational project for achieving the Party and state' s overarching goals and missions. For such important foundational work, only through a well-developed rule of law can its implementation and development be guaranteed. How to correctly understand the social value and practical significance of rule of law in science popularization from China' s national conditions, how to objectively evaluate the path traveled and current state of legislation and institutional construction in science popularization, and how to steadily advance the process of rule of law in science popularization on the existing basis to achieve ideal rule of law goals in this field—these are topics that require serious consideration by the government, scientific community, legal scholars, and the public.

Developmental Context, Current Status, and Effectiveness of China' s Science Popularization Legislation

In the early 1990s, as China' s socialist market economy developed, various sectors of society became increasingly urgent in their demand for science and technology, and the importance and urgency of science popularization work became more prominent. At the Fourth National Congress of the China Association for Science and Technology in 1991, Comrade Jiang Zemin explicitly stated that economic construction must be truly shifted to a track relying on scientific and technological progress and improving the quality of workers—this would be a broad and profound transformation. In 1994, the "Several Opinions of the Central Committee of the Communist Party of China and the State Council on Strengthening Science and Technology Popularization Work" clearly

proposed that the state would formulate special regulations and implementation rules based on the general requirements of "popularizing science and technology" in the Constitution of the People' s Republic of China and the "Law of the People' s Republic of China on Scientific and Technological Progress" (hereinafter referred to as the "Scientific and Technological Progress Law"), accelerate the pace of legislation on science popularization, and bring science popularization work onto the track of rule of law and institutionalization as soon as possible [2].

Using legislation to guarantee the popularization of science and technology is a major achievement and an innovative initiative in China' s rule of law construction in the new era. The promulgation and implementation of the "Law of the People' s Republic of China on Science and Technology Popularization" (hereinafter referred to as the "Science Popularization Law") in 2002 marked China' s incorporation of science and technology popularization work into the rule of law track. The Science Popularization Law takes "four sciences and two abilities" as its strategic foundation, legally defines the nature, connotation, and methods of science popularization work, clarifies the functional positioning of science popularization organization and management, and establishes that science popularization is a common task of the whole society. It also proposes corresponding legal obligations, responsibilities, and guarantee conditions. The main content of the Science Popularization Law provides clear guidance for science popularization work in various localities and departments, and its legislative concepts and institutional designs have become important foundations for departmental rule of law construction in science popularization and for local governments to formulate and revise science popularization laws and regulations. Provinces, autonomous regions, and municipalities directly under the Central Government have formulated local science popularization regulations or implementation measures, and revised previously formulated science popularization regulations accordingly. According to statistics, 25 provinces, municipalities, and autonomous regions have formulated corresponding science popularization regulations, while Shanxi Province, Liaoning Province, Zhejiang Province, and the Tibet Autonomous Region have formulated implementation measures for the Science Popularization Law [3].

The promulgation of the Science Popularization Law has greatly enhanced the construction level of science popularization laws and institutions in China, gradually forming a science popularization legal, institutional, and policy operation system based on the Scientific and Technological Progress Law and the Science Popularization Law, supported by departmental legislation in the field of science popularization, and supplemented by State Council administrative regulations, local science popularization regulations, rules, and relevant departmental rules.

Under the regulation, promotion, and guarantee of China' s science popularization legal and institutional system, the basic conditions for science popularization have significantly improved, public science service capabilities have markedly enhanced, science popularization undertakings have achieved remark-

able development, and citizens' scientific literacy has rapidly increased. National science popularization funding increased from 4.683 billion yuan in 2006 to 15.198 billion yuan in 2016, with government appropriations rising from 3.25 billion yuan in 2006 to 11.575 billion yuan in 2016. Per capita science popularization funding grew from 1.18 yuan in 2006 to 4.63 yuan in 2015, nearly tripling. The national science popularization workforce increased from 1.62 million in 2006 to 2.05 million in 2015 [4]. In 2015, the proportion of Chinese citizens with basic scientific literacy reached 6.20%, nearly 90% higher than the 3.27% in 2010 [5].

Challenges and Problems Facing China' s Rule of Law in Science Popularization

As social democratization advances and public scientific literacy improves, citizens are increasingly concerned about the development of science and technology and policy formulation, and are more actively participating in scientific dialogue and decision-making. As a channel for communicating science and society, the important role of science popularization under new circumstances will become further prominent. How to guarantee citizens' rights to participate in scientific affairs will become the core of rule of law construction in science popularization, which is of great significance for improving citizens' scientific literacy, promoting democratic government decision-making, building a modern national governance system, and ensuring healthy and sustainable social development.

Meanwhile, a new round of technological and industrial transformation is unstoppable, bringing profound changes to people' s production and lifestyle and social structure. Science popularization work has great potential in economic, cultural, livelihood, social, and environmental fields, becoming an important interface of concern for multiple fields and multiple stakeholders. How to promote multi-stakeholder participation in public science services will become a top priority in rule of law construction for science popularization.

Additionally, new media is on the rise, and the field of science popularization and science communication has become a source of new ideas and mechanisms. How to regulate science popularization content in the new media environment has become a serious problem facing current rule of law construction in science popularization. The continuous development of new media technology has caused traditional "gatekeepers"in cyberspace to gradually decline. Most science and technology information disseminated through new media omits editing and review steps, making the scientific accuracy and authority of such information difficult to guarantee. Due to the "circle-based" characteristics of new media, information spreads through social networks, causing people to tend to believe and widely disseminate it, thus turning new media into a breeding ground for "pseudoscience" [7] and leading to incidents such as the "PX incident," "salt rush," and "genetically modified organism incident," which have caused adverse social impacts. Therefore, how to regulate science popularization content in the new media dissemination chain has become a severe challenge for current rule

of law construction in science popularization.

The development of science popularization models has endowed rule of law construction in science popularization with new connotations and objectives. Due to the transformation of scientific knowledge production models and multidirectional social changes, traditional science popularization has gradually enriched and developed into a symbiotic and coexisting situation of multiple models including science popularization, public understanding of science, and science communication. Science popularization models have gradually shifted from authority-centered models with the government and scientific community as the core to democratic models centered on the public, and from advocating public understanding of scientific knowledge to support scientific endeavors to public participation in scientific dialogue, consultation, and decision-making, jointly developing socially robust knowledge for the benefit of all humanity. This development has endowed rule of law construction in science popularization with new connotations and objectives, raising questions that require in-depth analysis: how to legally define the new nature, connotation, and methods of science popularization work, the new functional positioning of science popularization organization and management, and the legal obligations and responsibilities of relevant stakeholders.

How to guarantee "citizen' s right to science" will become the core of rule of law construction in science popularization. In modern society, citizen participation in science is both a right and a responsibility. The concept of "citizen' s right to science" fully embodies this dual connotation: citizens have the right to understand scientific knowledge and participate in scientific discussion and decision-making, as well as the responsibility to respond to risks and challenges brought by scientific and technological achievements and to safeguard overall social interests. Citizens participate in scientific activities and affairs both as individuals and as a collective. Only when citizens fully enjoy the right to participate in science, fulfill corresponding obligations, and assume corresponding responsibilities can they make due contributions to the development of science and society. Therefore, how to guarantee "citizen' s right to science" through law and transform "elite science" of the few into "public science" of the many will become the core of rule of law construction in science popularization [6].

International Experiences in Rule of Law for Science Popularization

Governments worldwide regard science popularization, science communication, and science education as important national strategic issues. They provide rule of law guarantees for the development of science popularization work and the improvement of public scientific literacy through relevant laws, institutions, and policies, promoting standardized, institutionalized, and routine development of science popularization work. In terms of the current state of legal system construction, regulations on science popularization are mainly distributed across fields such as science and technology, education, culture, and communication, belonging to the category of social law aimed at protecting citizens' rights to sci-

ence, education, and culture. From a legal positioning perspective, they feature characteristics of rights law, responsibility law, and promotion law, emphasizing the combination of central and local legislation in the construction of the rule of law system.

Principles and Positioning of International Science Popularization Legislation

(1) **Recognizing the right to participate in science and cultural activities as a basic citizen right.** Article 15 of the United Nations' International Covenant on Economic, Social and Cultural Rights stipulates that contracting states must recognize that nationals have the right to "enjoy the benefits of scientific progress and its applications; to enjoy protection of the moral and material interests resulting from any scientific, literary or artistic production of which he is the author." The Vienna Declaration and Programme of Action states that "everyone has the right to enjoy the benefits of scientific progress and its practical applications." The Declaration of the Human Environment, the Declaration on the Right to Development, the World Charter for Nature, the Declaration on Environment and Development, and Agenda 21 have all proposed requirements for public participation in scientific affairs in accordance with international law.

(2) **Highlighting the government's obligation to improve citizens' scientific literacy.** The United States has formulated multiple specialized laws including the National Literacy Act, Adult Education and Family Literacy Act, Reading Excellence Act, No Child Left Behind Act, and Literacy for All Act to improve citizens' scientific literacy. In its 2000 "Guidelines for Preparing National Action Plans," the United Nations explicitly stated that in improving national literacy, the government should assume a leadership role and take responsibility for coordinating and consolidating forces from all sides. The U.S. Government Performance and Results Act incorporates public science services into the performance evaluation system for government officials. Additionally, legislative bodies in various countries have clearly defined government support for public science popularization services through relevant bills, emphasizing government financial responsibilities. The U.S. Congress explicitly stipulates that the federal government must allocate a fixed proportion of funds to public science services annually, with strict restrictions on the use of government appropriations—they cannot be used only for the operation of public science service institutions but also for the development and provision of public science and cultural service products. The French government stipulates that government investment in public science and cultural services must account for no less than 1% of national or local fiscal budgets.

(3) **Cultivating, supporting, and promoting multi-stakeholder participation in providing public science services through legislation.** The U.S. Federal Internal Revenue Code explicitly stipulates that

social forces participating in the supply of public science and cultural services are exempt from income tax. The French government has formulated specialized regulations to encourage social forces to enter the field of public science and cultural services, with its Corporate Cultural Sponsorship Tax Law, Cultural Sponsorship Tax System, and Co-sponsorship Law clarifying the pathways for social forces to participate in French public science and cultural services and corresponding tax incentives. Germany' s Foundation Tax Act stipulates that non-profit organizations and individuals participating in public welfare science and cultural activities are exempt from value-added tax.

(4) **Regulating science and culture-related content disseminated on the Internet through legislation.** The First Amendment to the U.S. Constitution and Germany' s Basic Law explicitly stipulate citizens' freedom of speech and expression but also propose principles and conditions for citizens' freedom of speech. Meanwhile, the U.S. Communications Decency Act, Germany' s Multimedia Law, and the National Convention for the Protection of Minors in the Media regulate Internet dissemination content.

Characteristics of Foreign Science Popularization Legal System Construction

(1) **Combining national legislation with local legislation, highlighting local legislative characteristics.** International science popularization and related field legislation adopts a combination of central government legislation and local government legislation, focusing on local government legislation. For example, the United States, France, Germany, and other countries stipulate in their constitutions that citizens enjoy rights to science and culture, and also require states to formulate corresponding state constitutions, administrative laws, and case laws based on their public science and technology and cultural service institutions, public science and technology and cultural products (activities), and the specific circumstances of public science and technology project implementation to protect citizens' rights to science and culture.

(2) **Coordinating public welfare legislation with for-profit industry regulations.** Countries have adopted a series of programs to ensure the development of public welfare science and technology and cultural undertakings. Germany' s Non-profit and Donation Law, Foundation Tax Act, and other laws contain specialized provisions on public science and technology and cultural service guarantees; France ensures funding support for science and technology museums through the Museum Funding Act. In addition, countries have confirmed the status of the for-profit industry in science popularization through legislation, based on market operation mechanisms of the industry, while strengthening intellectual property protection through legislation, safeguarding operators' rights and interests, creating a favorable market environment, and promoting industrial devel-

opment.

Reflections and Prospects for Rule of Law Construction in China' s Science Popularization

The Thought on Socialism with Chinese Characteristics for a New Era proposes that the general task of the new era is to build a modern socialist strong country, continuously promote the comprehensive development of individuals, modernize the national governance system and governance capabilities, and build a socialist rule of law country. In this historical context, the current period is a critical time for rule of law construction in China's science popularization field. The scientific community, legal scholars, media professionals, and all sectors of society should work together to formulate a complete legal system for science popularization, create a favorable rule of law environment for science popularization, pursue ideal rule of law goals in science popularization, and shoulder their respective responsibilities.

Further Improving the Existing Legal System for Science Popularization

China' s rule of law construction in science popularization is still in a process of gradual formation and development. Further improving the legal system for science popularization and establishing a series of enlightened, standardized, and effective legal institutions, concepts, and principles to achieve the rule of law in science popularization should be our long-term task [7]. Based on current realities, the author believes that the practical path to improving China' s existing science popularization legal system should include the following four points:

(1) **Establish the important cornerstone of rule of law construction in science popularization: protecting citizens' rights to science and culture.** The logical starting point of rule of law construction in science popularization should be "realizing, safeguarding, and developing the rights to science and culture granted to citizens by current laws," which can be specifically divided into the right to participate, the right to expression, the right to protection, and the right to equality. The full realization of these rights constitutes the foundation of the rule of law in science popularization. Among them, the exercise of the right to expression is the premise, the satisfaction of the right to protection is the content, the implementation of the right to participate is the means, and the maintenance of the right to equality is the pursuit [9].

(2) **Build the two wings of the science popularization legal system: promoting coordinated development of science popularization undertakings and industries.** Science popularization undertakings and industries are components of the science popularization field, mutually promoting, permeating, and developing in coordination. To improve the legal system for science popularization, we should focus on building the two wings of science popularization undertakings and industries: in terms

of science popularization undertakings, we should meet the basic science popularization needs of the public, be oriented toward social public welfare, and provide basic legal guarantees for promoting social solidarity, progress, stability, harmony, and healthy development; in terms of science popularization industries, we need to support, cultivate, and regulate profit-oriented science popularization forms oriented toward the market in accordance with economic laws and value principles.

(3) **Emphasize innovation and characteristics in departmental and local legislation to jointly promote science popularization work.** Departmental and local regulations should become important components of the science popularization legal system. Science popularization legislation at the departmental and local levels should emphasize the importance of legislation in maintaining and enhancing the vitality of science popularization undertakings. Strengthening departmental and local legislation should particularly emphasize legislative innovation; however, institutional construction should have breakthroughs while not losing principles.

(4) **Combine protection of freedom of speech with content regulation to ensure the scientific nature and standardization of science popularization.** Science popularization and communication not only have individual attributes but also social attributes; they not only have the attributes of freedom and rights but also political effects and ideological functions. Rights and obligations, freedom and responsibility are interdependent. The government' s effective management and guidance of science popularization and communication through legal regulation is a common political practice in modern international society. Therefore, improving the existing legal system for science popularization, stipulating the obligations and responsibilities that science communicators should bear, and clarifying restrictions on the abuse of freedom of rights in science communication are also very important.

Creating a Favorable Rule of Law Environment for Science Popularization

Governing the country according to law and using legal means to cultivate the scientific consciousness of the entire nation is a matter that complements and reinforces the construction of a socialist rule of law country. To create a favorable rule of law environment, the primary task is to cultivate the scientific and rational spirit of the entire nation and to establish a scientific approach to viewing and understanding things and problems in daily life. Science popularization contributes to the generation of democratic and rule of law spirit. At the same time, we must continuously increase publicity efforts to create a favorable rule of law environment for science popularization, enabling governments at all levels and various social organizations to truly clarify their responsibilities. We also need to strictly enforce laws, legally penalizing organizations and individuals at all levels who violate relevant laws in practice and making them assume corre-

sponding legal responsibilities. Only through vigorous implementation of laws can we demonstrate the use of legal means to regulate science popularization work, and scientific rational spirit can gradually take root in people' s minds along with the implementation effects of laws.

Achieving the Combination of Legal Heteronomy and Moral Autonomy in Science Popularization Activities

In regulating science popularization activities, legal heteronomy and moral autonomy should be combined and complement each other. Practice has proven that the regulation of science popularization activities cannot rely solely on legal heteronomy but also requires the professional ethics and conscience of science communicators for self-restraint and self-adjustment. Law relies on external coercive power imposed by laws and regulations, while morality relies on internal binding force formed by spiritual beliefs. Abandoning either one is incomplete and cannot achieve good results. Only the combination of the two can produce comprehensive effectiveness.

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Citizens possessing basic scientific literacy generally refers to understanding necessary scientific and technological knowledge, mastering basic scientific methods, establishing scientific thinking, advocating scientific spirit, and having certain abilities to apply science to solve practical problems and participate in public affairs—namely, the so-called "four sciences and two abilities."

Note: Figure translations are in progress. See original paper for figures.