

---

AI translation · View original & related papers at  
[chinaxiv.org/items/chinaxiv-202307.00093](https://chinaxiv.org/items/chinaxiv-202307.00093)

---

## On the Essential Characteristics and Construction Pathways of Science Popularization Modernization (Postprint)

**Authors:** Pan Jiaofeng, Shi Biao, Wang Guanghui

**Date:** 2023-06-15T00:00:00+00:00

### Abstract

The article proceeds from the new requirements for science popularization set forth at the 20th Party Congress, proposing development ideas for the modernization of science popularization. It deeply analyzes the dialectical relationship between science popularization and Chinese-style modernization, reviews the historical process of science popularization vigorously supporting and advancing Chinese-style modernization, assesses the new situation and problems faced by scientific and technological innovation and science popularization in the current modernization process, and proposes that Chinese-style modernization goals guide the development direction of science popularization innovation in the new era. It systematically explains the connotation and scope of modernization of science popularization, and puts forward five essential characteristics: modernization of objectives, modernization of system, modernization of coordination, modernization of mechanisms, and modernization of means. Furthermore, it proposes the vision and goals for modernization of science popularization from three aspects: vigorous development of science popularization undertakings and full satisfaction of public needs, a complete and efficient science popularization system and smooth transformation of innovation achievements, and deep-rooted scientific culture in people's hearts and continuous optimization of the innovation environment. Based on this, it proposes the construction ideas and implementation paths for modernization of science popularization.

### Full Text

### Preamble

**ChinaXiv Cooperative Journal: Research on the Connotation and Implementation of the Broad Science Popularization Strategy**

**Citation Format:** Pan Jiaofeng, Shi Biao, Wang Guanghui. Discussion on the Essential Characteristics and Construction Path of Modernization of Science Popularization. *Bulletin of Chinese Academy of Sciences*, 2023, 38(5): 726-731.

**Title:** Discussion on the Essential Characteristics and Construction Path of Modernization of Science Popularization

**Affiliation:** Institutes of Science and Development, Chinese Academy of Sciences

---

## Abstract

This study begins with the new requirements for science popularization articulated at the 20th National Congress of the Communist Party of China, proposing development ideas for modernizing science popularization. It deeply analyzes the dialectical relationship between science popularization and Chinese modernization, reviews the historical process through which science popularization has strongly supported and advanced Chinese modernization, examines the new situations and challenges facing scientific and technological innovation and science popularization in the current modernization process, and puts forward the direction for innovative development of science popularization in the new era under the guidance of Chinese modernization goals. The paper systematically elaborates on the connotation and scope of modernizing science popularization, proposing five essential characteristics: modernization of goals, systems, coordination, mechanisms, and means. Furthermore, it articulates a vision for modernized science popularization from three perspectives: the vigorous development of science popularization undertakings with full satisfaction of public demand; a complete, efficient system for science popularization with smooth transformation of innovation achievements; and deeply rooted scientific culture with continuously optimized innovation environment. Based on this analysis, the paper proposes construction ideas and implementation pathways for modernizing science popularization.

**Keywords:** science popularization; modernization of science popularization; human modernization

---

## Author Information

**PAN Jiaofeng** — Professor, President of the Institutes of Science and Development, Chinese Academy of Sciences (CASISD); Dean of the School of Public Policy and Management, University of Chinese Academy of Sciences; Chairman of the Chinese Association of Development Strategy Studies. Research focuses: S&T strategic planning, innovation policy, and think-tank theory and methods.  
**E-mail:** jfpan@casisd.cn

---

## Main Text

### **The Dialectical Relationship Between Science Popularization and Chinese Modernization**

The Party and state have always attached great importance to science popularization as a great undertaking with Chinese characteristics. The development of science popularization has accompanied the founding of New China and the process of modernization, serving as both a prerequisite for promoting substantial progress in S&T undertakings and an important pillar for S&T to drive sustained economic and social prosperity. The report of the 20th Party Congress outlines the grand blueprint for building a modern socialist country in all respects and advancing the great rejuvenation of the Chinese nation, stating that the essential requirements of Chinese modernization include upholding the leadership of the Communist Party of China and socialism with Chinese characteristics, achieving high-quality development, developing whole-process people's democracy, enriching the people's cultural life, realizing common prosperity for all, promoting harmonious coexistence between humanity and nature, building a community with a shared future for mankind, and creating a new form of human advancement [1]. Facing the great journey of Chinese modernization, how science popularization can advance with the times and innovate, and how modernized science popularization can empower Chinese modernization, have become important contemporary propositions.

**Historical Process: Science Popularization Strongly Supporting Chinese Modernization** In the early days of New China, science popularization focused on serving industrial construction, promoting scientific production methods, and actively serving agricultural construction by deeply penetrating rural areas to disseminate agricultural technologies, becoming a powerful support and important means for national industrial and agricultural modernization. After the Third Plenary Session of the 11th Central Committee, with economic construction as the central task, the great historical process of reform and opening up began. Science popularization closely integrated with economic construction, both promoting development and revitalization and endowing popularization work with strong vitality. With the proposal of building a moderately prosperous society in all respects, science popularization continuously promoted economic, social, and technological prosperity, advancing the "Four Modernizations." Following the proposal of the strategy of revitalizing the country through science and education and the scientific development concept, science popularization vigorously enhanced the scientific and cultural quality of the people, widely promoting concepts and knowledge of people-oriented, comprehensive, coordinated, and sustainable development, becoming a main component of socialist spiritual civilization and an important means of cultivating advanced socialist culture. Since the 18th Party Congress, General Secretary Xi Jinping

has fully affirmed the historical and contemporary significance of science popularization and highly evaluated its strategic role and position [2], proposing that scientific and technological innovation and science popularization are the “two wings” of innovative development, and that science popularization should be placed on an equal footing with scientific and technological innovation. The 20th Party Congress report identifies strengthening national science popularization capacity building as an important measure for improving the level of social civilization. Throughout the development of China’s science popularization, it has consistently centered on modernization goals at different periods, actively playing a foundational supporting role and striving to consolidate the foundation for Chinese modernization.

### **New Situations and Challenges in the Current Modernization Process**

In the current process of Chinese modernization, China has entered a stage of high-quality development, with the pace, level, and scope of scientific and technological innovation accelerating and expanding. The main connotation, content forms, and external extensions of science popularization are constantly iterating and changing. Scientific and technological innovation and science popularization have entered a new development stage while constantly facing new problems and challenges. As global scientific and technological competition and games intensify, Western countries, led by the United States, are accelerating their “knowledge blockade” against China, strengthening key technology restrictions and targeted technological “decoupling,” making S&T strength a key factor and “decisive move” in great power competition. Meanwhile, with the arrival of a new round of scientific and technological revolution, the research paradigm is undergoing profound changes, and the value chains of scientific and technological innovation and science popularization are forming a double-helix fusion trend, with the two interacting and advancing in a coupled ascent, jointly determining the efficiency and output of the national innovation system. The “double-edged sword” characteristics of S&T development and value differences among multiple stakeholders [3] have led to many new problems in the interaction between S&T and economy-society, creating numerous S&T hot-button issues and heightening public concern about the negative effects of S&T. How to promote benign interaction between S&T and the public increasingly requires the intervention of science popularization to enhance modern S&T governance capacity and level. Against this background, the responsibilities of scientific and technological innovation and science popularization will become even greater, with both playing more prominent roles in innovative talent cultivation, shaping innovation soft power, cultivating scientific culture, and improving S&T governance.

**Chinese Modernization Goals Leading New-Era Science Popularization Innovation** Chinese modernization is modernization of a huge population, common prosperity for all, coordination of material and spiritual civilization, harmonious coexistence between humanity and nature, and peaceful

development [4]. The goals of Chinese modernization place higher demands on science popularization in the new era, urgently requiring comprehensive innovative development in purpose, concept, institutional mechanisms, and forms and methods to support the great process of Chinese modernization with modernized science popularization. First, in terms of purpose, value guidance should be the goal, with science widely disseminated as a core value concept, making the scientific spirit the core of rational thinking among the people, making scientific methods an important means of production and life for the public, shaping the innovative culture of the Chinese nation, and forming a scientific culture with Chinese characteristics. Second, in terms of means, people-oriented principles should be adhered to, with content full of humanistic care, vivid and lively forms, and precise and standardized content, effectively enhancing people's sense of gain, participation, identification, and reputation, and promoting S&T to benefit the masses [5]. Third, in terms of concept, the role of science popularization in addressing global challenges, promoting sustainable human development, and building a community with a shared future for mankind should be fully valued, deepening S&T and cultural exchanges, enhancing mutual learning among civilizations, and proposing Chinese solutions for promoting the improvement of global citizens' scientific literacy.

### **Connotation and Essential Characteristics of Modernized Science Popularization**

**Connotation and Scope of Modernized Science Popularization** Facing the goals of Chinese modernization, the construction of modernized science popularization in the new era must be guided by Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, deeply comprehend General Secretary Xi Jinping's "Two-Wings Theory," grasp the new situations, characteristics, and connotations facing science popularization, plan a blueprint for high-quality development of science popularization, strive to build a new pattern of broad science popularization work, and consolidate the scientific foundation and strategic support for the great rejuvenation of the Chinese nation. The core purpose of modernizing science popularization is to safeguard the people's right to access scientific and cultural knowledge, meet their needs for science and culture, and ultimately achieve human modernization. The development goal is to comprehensively improve citizens' scientific and cultural literacy, cultivate and form an innovation culture with Chinese characteristics, enhance national innovation soft power, help build China into a world S&T cultural center and development highland, and contribute Chinese wisdom to building a community with a shared future for mankind. The institutional mechanism for modernizing science popularization involves, under the leadership of the Party and government, making full use of the institutional advantages of nationwide innovation, with government departments coordinating planning, innovation entities bravely undertaking responsibilities, and the whole society jointly acting and participating to establish a top-level strategic design and a coordinated implementation pattern of joint construction and sharing, forming a national S&T innovation

system where scientific and technological innovation and science popularization develop synergistically.

### Five Essential Characteristics of Modernized Science Popularization

1. **Modernization of Goals and Positioning:** Modernized science popularization takes improving citizens' scientific and cultural literacy and achieving human modernization as its basic goals. By continuously strengthening and enhancing national science popularization capacity building and development levels, science popularization becomes an interactive fusion interface for important national work in S&T, education, and culture, promoting a broad science popularization pattern with scientific guidance from government departments, strong support from the public, and active participation from various entities, giving full play to the important role of science popularization in economic and social development, innovative talent cultivation, and ecological civilization construction, strongly supporting the building of a modernized powerful country and a world S&T power.
2. **Modernization of Systems and Content:** In terms of system composition, modernized science popularization includes not only central and local government departments but also various innovation entities such as research institutions and universities, while various social organizations are also main system members. In system operation, the regulatory role of market mechanisms should be fully played, balancing both public welfare science popularization undertakings and for-profit science popularization industries. In terms of content, it should include not only cutting-edge international scientific innovation progress but also S&T content closely related to people's production and life; it should address both global S&T issues and main content concerning S&T benefiting the people.
3. **Modernization of Institutions and Mechanisms:** In terms of institutions and mechanisms, modernized science popularization should both inherit the history and evolution of nationwide science popularization work and mobilize the initiative and enthusiasm of market and social sectors, guiding various social organizations, innovation entities, and companies to participate in science popularization undertakings and industries. In terms of mechanisms, it should highlight institutional concept innovation and resource model innovation, gradually improving effective science popularization work systems and governance mechanisms, forming scientific and effective management models, and gradually achieving systematization, networking, and socialization of science popularization work, forming a governance model of whole-society collaborative participation.
4. **Modernization of Means and Methods:** In terms of means and methods, modernized science popularization should widely adopt methods from popularization, education, and communication fields with full

cross-integration, committed to creating a good environment for lifelong S&T learning for the broad masses. It should also fully emphasize individual S&T needs, employing new methods, approaches, and means of the data era to accurately portray user groups, analyze user needs, fully supply science popularization content, timely respond to S&T hot topics, provide three-dimensional, ubiquitous, timely, and precise science popularization services, achieve sharing of S&T achievements across society, and enhance people's welfare and sense of gain.

### **Vision Goals of Modernized Science Popularization**

**Vigorous Development of Science Popularization Undertakings with Full Satisfaction of Public Demand** National science popularization capacity will be comprehensively improved, with science popularization venues, content supply, technical means, and industrial foundation achieving leapfrog development. Various science and technology museums will become immersive experiential learning venues combining online and offline platforms, and science popularization resource platforms will provide massive high-quality content both domestically and internationally. Advanced media convergence technology will drive transformation of the science communication system, forming a science communication entity matrix integrating the authority of mainstream media, the diversity of self-media, and the broadness of public communication. The entire process of science popularization content production and communication will become increasingly efficient and decentralized, with significantly enhanced richness and accessibility of communication channels. Leading science popularization brands and enterprises will emerge, fully meeting various science popularization demands.

**Complete and Efficient Science Popularization System with Smooth Transformation of Innovation Achievements** Science popularization work will continuously improve in quality and efficiency, with significant improvements in basic conditions, talent team building, and transformation rates of S&T resources. Governments and departments at all levels will integrate science popularization into national development plans in various fields, achieving smooth information flow, efficient consultation, transparent decision-making, and timely response in science popularization work; research institutes, universities, and social organizations will collaborate and share resources; the initiative and creativity of the S&T community and public participation in science popularization will be fully stimulated. The system and mechanism for transforming and displaying scientific and technological innovation achievements will be complete, smooth, standardized, and efficient. University majors in science popularization will be well-established, the professional talent training system will be perfected, high-quality talent will be concentrated, career development guarantees will be sound, reserve talent will be abundant, and part-time teams such as science popularization volunteers will be significantly improved, with the concept of volunteer service deeply

rooted in people's hearts.

**Scientific Culture Deeply Rooted with Continuously Optimized Innovation Environment** Major achievements will be made in scientific culture construction, with the innovation environment continuously optimized and a scientific and rational atmosphere deeply rooted in society. Citizens' scientific and cultural levels will be substantially improved, with scientific literacy reaching world-advanced levels. The scientific spirit will become an important value orientation in society, and the influence of scientific spirit encouraging exploration, tolerating failure, rational questioning, and seeking truth from facts will be significantly enhanced. Teenagers' curiosity and exploratory interests will be greatly stimulated and protected, society's overall innovation concepts and capabilities will achieve tremendous leaps, and the innovation environment will continuously improve with a significantly expanded group participating in innovative thinking and undertakings.

## **Construction Ideas and Implementation Paths for Modernized Science Popularization**

### **Construction Ideas for Modernized Science Popularization**

- 1. Adhere to People-Oriented Development and Value Guidance:** Uphold the people-centered development philosophy, placing the people in the highest position in our hearts, taking the people's most concerning, direct, and practical interest issues as the starting point and foothold, and taking the people's most expected, needed, and satisfying results as goals and standards. Focus on meeting people's needs to improve their scientific literacy and participate in public S&T affairs, respecting people's needs for knowledge exploration, ideological creation, and cultural expression in promoting economic and social development.
- 2. Adhere to Integrated Development and Collaborative Governance:** Fully utilize laws, regulations, rules, and policy measures to provide strong legal and institutional guarantees for S&T innovation and popularization work, strengthening legal awareness and spirit in S&T innovation and popularization, and improving the rule of law level and institutional execution. Promote the organic integration of S&T innovation and popularization systems, breaking departmental barriers, regional divisions, and field segmentation to achieve coordinated linkage, mutual benefit, and common development.
- 3. Adopt a Long-Term Perspective and Guide According to Circumstances:** Increase S&T innovation empowerment of science popularization, using advanced S&T means and methods to improve the relevance, effectiveness, and attractiveness of science popularization activities, enhancing public cognition and understanding of scientific knowledge and methods, and improving public ability to explore and solve scientific prob-

lems and phenomena. Establish long-term mechanisms supporting science popularization in cultivating innovative talent and fertile ground for innovation, stimulating public interest and enthusiasm for science through multi-level, multi-form, and multi-field science popularization education and training.

4. **Uphold Inheritance, Innovation, and Open Cooperation:** Grasp the new characteristics and requirements of S&T innovation and popularization in the new era, continuously carry out self-revolution based on deeply summarizing historical experience and lessons, continuously achieve self-transcendence by inheriting traditional advantageous resources, continuously improve self-perfection to adapt to era changes, and continuously achieve self-breakthrough to meet social expectations. Promote conceptual changes in S&T innovation and popularization, continuously update concepts under correct direction guidance, continuously solve difficulties driven by problem orientation, continuously optimize strategies led by demand orientation, and continuously improve methods under effect-oriented evaluation.
5. **Adopt Precise Policies for Practical and Efficient Results:** Implement classified guidance according to regional and industry innovation characteristics, analyzing and researching the current situation, problems, needs, and potential of S&T innovation and popularization work in different regions, departments, and fields to formulate targeted, differentiated, and motivating policy measures. Employ development policies and evaluation standards conforming to S&T innovation and popularization laws, following scientific, market, and social laws to formulate development policies and evaluation standards suitable for national conditions, the era, and reality, motivating all regions, departments, and fields to pursue quality improvement, efficiency growth, and value creation.

**Action Program for Modernized Science Popularization** Aiming to achieve national innovative development, place equal emphasis on S&T innovation and science popularization, building a complete work system and institutional arrangement where both are equally important. Give play to the supporting role of modernized science popularization in major national strategies such as the innovation-driven development strategy, the strategy of revitalizing the country through science and education, the new-era talent-strong country strategy, the rural revitalization strategy, and the *Outline of the National Action Plan for Scientific Literacy (2021–2035)*. Take the supply-side reform of S&T innovation and addressing weaknesses in science popularization work as important starting points, promoting effective communication between S&T innovation and popularization resources, building an organic integration of S&T innovation and popularization systems, and creating a favorable atmosphere where the whole society cares about, serves, supports, and participates in innovation. Accelerate the improvement of specialization, socialization, industrial-

ization, and internationalization levels of S&T innovation and popularization, optimize the layout structure, coordinate development processes, and form a national innovation system and modern S&T governance pattern where S&T innovation and popularization mutually support and promote each other. Provide strong support for enhancing hard power in S&T innovation and soft power in innovation culture, provide continuous momentum for national innovative development and building a world S&T power, and contribute Chinese wisdom to building a community with a shared future for mankind.

---

## References

- [1] Xi J P. Hold High the great banner of socialism with Chinese characteristics and work together to build a modern socialist country in an all-round way—Report at the 20th National Congress of the Communist Party of China. (2022-10-25). [http://www.gov.cn/xinwen/2022-10/25/content\\_{5721685}.htm](http://www.gov.cn/xinwen/2022-10/25/content_{5721685}.htm). (in Chinese)
- [2] Science Popularization Research Group of the National Committee of the Chinese People’s Political Consultative Conference. Deeply understanding the great significance of General Secretary Xi Jinping’s “Two-Wings Theory” of scientific and technological innovation and science popularization, and suggesting the implementation of the “Strategy for Big Science Popularization” (Series I). *CPPCC Daily*, 2021-12-15(12). (in Chinese)
- [3] Zhang S G, Zhou J Z, Xiao Y D. Science popularization responsibility of scientific community in the new era—Based on the perspective of science popularization rule of law. *Studies on Science Popularization*, 2022, 17(2): 29-38. (in Chinese)
- [4] Liu S G. Adhere to the Chinese modernization path. *Journal of South-Central University for Nationalities (Humanities and Social Sciences Edition)*, 2022, 42(11): 6-10. (in Chinese)
- [5] Science Popularization Research Group of the National Committee of the Chinese People’s Political Consultative Conference. Deeply understanding the great significance of General Secretary Xi Jinping’s “Two-Wings Theory” of scientific and technological innovation and science popularization, and suggesting the implementation of the “Strategy for Big Science Popularization” (Series III). *CPPCC Daily*, 2021-12-17(03). (in Chinese)

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

*Source: ChinaXiv — Machine translation. Verify with original.*