Accurate Grasp and Profound Understanding of the Fundamental Connotations of the "Three-Step" Strategy for Building a World-Class Science and Technology Power: Postprint

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Abstract

The "three-step" strategy for building a world leader in science and technology serves as the action guide for China's scientific and technological innovation development in the new era. The article proposes that an accurate grasp and profound understanding of the core essence of this major strategic deployment should be achieved from the perspectives of the international development environment, the overarching trends in global science and technology development, and national innovation requirements. Building upon this foundation, the article elucidates the fundamental connotations of the "three-step" strategy from a developmental viewpoint that progresses from robust talent and strong science and technology, to powerful industry and a strong economy, and ultimately to comprehensive support for a strong nation. Furthermore, it puts forward several strategic initiatives for accelerating the construction of a world leader in science and technology, addressing aspects such as top-level design, innovation systems, innovation resources, and innovation models.

Full Text

Accurately Grasp and Thoroughly Understand the Basic Connotations of the "Three Steps" Strategy for Building a World Power of Science and Technology

Abstract: The "Three Steps" strategy for building a world power of science and technology serves as the action guideline for China's scientific and technological innovation and development in the new era. This paper proposes that we must accurately grasp and thoroughly understand the core essence of this major strategic deployment from the perspectives of the international development environment, the overarching trends of world scientific and technological

development, and national innovation requirements. On this basis, the paper elucidates the basic connotations of the "Three Steps" strategy from the developmental perspective of moving from strong talent and strong science and technology to strong industries and a strong economy, and then to fully supporting a strong nation. It also proposes several strategic initiatives for accelerating the construction of a world power of science and technology from the aspects of top-level design, innovation system, innovation resources, and innovation models.

Keywords: world power of science and technology, "Three Steps" strategy, strategic connotation, initiative suggestions

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Accurately Grasping and Thoroughly Understanding the Domestic and International Development Trends Facing the Implementation of the "Three Steps" Strategy for Building a World Power of Science and Technology

International Development Environment

From the perspective of the international development environment, the world structure is undergoing profound adjustments, and China faces increasingly complex and severe external environmental tests. Looking globally, the world today is once again in a major transformation unseen in a century, experiencing a new round of major development, transformation, and adjustment. China and other emerging market countries and developing nations are developing rapidly with continuously growing influence, while some developed countries, notably the United States, are attempting to constrain and suppress emerging economies like China through various means—including leveraging existing advantages and establishing new rules under the guise of maintaining national security, using transparency, rules, and standards as tools—to preserve their dominance. This has led to rising North-South and East-West contradictions in the evolution of world order and intensified economic competition. The Trump administration, in particular, has championed an "America First" strategy, repeatedly provoking trade disputes and endangering the free trade order. As the leader among emerging economies, China faces fierce international competition across multiple industrial sectors. Meanwhile, China' s core technologies, key equipment, and components in equipment manufacturing and high-tech industries remain highly dependent on foreign sources, while access to advanced technologies faces various constraints. Core technologies cannot be obtained through charity or market exchange, and the hidden danger of being constrained by others has never been so immediate. In the process of moving closer to the center of the world stage, China faces increasingly complex external environmental tests.

World Scientific and Technological Development Trends

From the perspective of world scientific and technological development trends, a new round of scientific and technological revolution and industrial transformation presents important strategic opportunities for China to catch up and achieve leapfrog development. Currently, global scientific and technological innovation is exhibiting new development trends and characteristics. The prospects for breakthroughs in major scientific questions such as dark matter and dark energy, microscopic material structures, the origin and evolution of life, brain science and consciousness are becoming increasingly clear. Innovations in information, intelligence, machinery, and life sciences are accelerating their integration, with disruptive technologies emerging continuously, constantly creating new products, new demands, and new business forms, and catalyzing major industrial transformations. This new round of scientific and technological revolution and industrial transformation will reconstruct human production and lifestyle, trigger profound adjustments in the global economic and social development pattern, and provide important strategic opportunities for latecomer nations to catch up and leap forward. Through trials and tribulations, China' s scientific and technological innovation capabilities have greatly improved, and it is becoming a major science and technology country with global influence, possessing the capability foundation and social conditions to seize opportunities and achieve leapfrog development. China urgently needs to grasp the trends of this new round of scientific and technological revolution and industrial transformation, fully leverage its latecomer advantages, accelerate innovation, fill gaps, and inject new momentum into achieving innovative leapfrog development, while providing new impetus for promoting economic globalization and multipolarization.

National Development Requirements

From the perspective of national development requirements, new changes in the principal social contradictions urgently demand that we rely on scientific and technological innovation to lead and open up new realms of development. The report of the 19th Party Congress scientifically revealed the new changes in China' s principal social contradictions in the new era and clarified the new phased characteristics of China' s social development. Simultaneously, it emphasized from a new historical height that innovation is the primary force driving development and a strategic support for building a modern economic system, requiring accelerated construction of an innovative country and a world power of science and technology. This has endowed scientific and technological innovation with a new mission and put forward new requirements, further clarifying the focal points and main directions of scientific and technological innovation. On the one hand, we must firmly grasp the major issues of unbalanced and insufficient economic and social development, focusing on the key points of economic competitiveness, the direction of consumption upgrading, the shortcomings of supply-side issues, and the bottleneck constraints on social development. We

must strengthen the overall coordination of industrial chains, innovation chains, and capital chains, accelerate major breakthroughs and integrated innovations in key core technologies related to national economy and people' s livelihood, and build a scientific and technological system and modern economic system that are innovation-driven and development-supporting, thereby providing more mid-to-high-end scientific and technological supply for achieving high-quality development. On the other hand, we must aim at the frontiers of world science and technology, strengthen basic research, enhance applied basic research, promote the integrated and innovative development of basic and applied research, and focus on achieving major breakthroughs in forward-looking basic research and leading original achievements to comprehensively enhance innovation capabilities, solidify the foundation for development, and strengthen development momentum. This will provide strong support for building a strong country in science and technology, quality, aerospace, cyberspace, transportation, and digital China, as well as a smart society. Additionally, we must closely focus on the strategic deployments of the 19th Party Congress regarding targeted poverty alleviation, rural revitalization, Beautiful China, Healthy China, and Safe China, which concern major livelihood needs. We must adjust and enrich the scientific and technological innovation layout in relevant fields, substantially increase scientific and technological supply that satisfies people' s aspirations for a better life, and continuously enhance people' s well-being.

Thus, taking the construction of a world power of science and technology as the guide and deeply implementing the innovation-driven development strategy is a major national development strategy that considers the overall situation, faces the world, focuses on key points, and drives overall development. It is also a major strategic choice for developing socialism with Chinese characteristics in the new era. We must accurately grasp and thoroughly understand the core essence of this major strategic deployment, and forge a path from strong science and technology to strong industries and economy, and then to a strong nation.

Accurately Grasping and Thoroughly Understanding the Connotations and Essence of the "Three Steps" Strategy for Building a World Power of Science and Technology

In 2016, the *National Innovation-Driven Development Strategy Outline* proposed the strategic goal of building a world power of science and technology through a "Three Steps" approach, clarifying eight major strategic tasks. Based on the strategic deployment of the 19th Party Congress, analysis of future development environment and trends, and understanding of national innovation development requirements, we must accurately grasp and thoroughly comprehend the essential connotations and main objectives of each stage of the "Three Steps" strategy.

Step One: By 2020, Focusing on "Strong Talent and Strong Science and Technology" to Enter the Ranks of Innovative Countries

This period represents the sprint stage for China to enter the ranks of innovative countries, fight the decisive battle against poverty, and comprehensively build a moderately prosperous society. With the stage goal of "strong talent and strong science and technology," the focus is on filling gaps and strengthening weak links, consolidating and expanding advantages, and achieving leapfrog development in major fields. This involves cultivating and gathering world-class scientific and technological innovation talents, consolidating the material and technological foundation supporting the construction of a science and technology power, deepening institutional reforms, creating a favorable innovation environment, clarifying the functional positioning of innovation entities, stimulating the potential of various innovation entities, enhancing the overall efficiency of the innovation system, and effectively supporting the realization of the goal of comprehensively building a moderately prosperous society.

1. **Collaborative and Efficient Innovation System Adapted to Demand.** Form an innovation layout that faces future development, welcomes scientific and technological revolutions, and promotes industrial transformation, with overall improvement and advantages formed in major innovation fields. Innovation entities should be full of vitality, innovation chains should be organically connected, innovation governance should be more scientific, and innovation efficiency should be greatly improved.

2. **Significantly Enhanced Independent Innovation Capability with Breakthroughs in Original Innovation.** Continuously consolidate the foundation of scientific and technological research, achieve leapfrog development at the frontier, and make breakthroughs in a number of major scientific and technological issues that restrict economic and social development and national security. Initially reverse the passive situation of key core technologies being constrained by others for a long time, form unique advantages in several strategically contested areas, and provide strategic reserves and expand strategic space for national prosperity and development.

3. **Smoother Integration of Science and Technology with Economy, Initially Forming an Innovation-Driven Economic Development Pattern.** Several key industries should enter the mid-to-high end of the global value chain, and a group of internationally competitive innovative enterprises and industrial clusters should grow, continuously increasing the proportion of knowledge-intensive service industries and high-tech manufacturing added value in GDP.

4. **More Sound Innovation Policies and Regulations and Optimized Innovation Environment.** The legal, policy, and institutional systems that encourage innovation are increasingly improved, the intellectual property environment is further optimized, and a value orientation and cultural

atmosphere that advocate, dare, and encourage innovation are formed throughout society.

Step Two: By 2035, Achieving "Strong Industries and Strong Economy" to Rank Among the Front Ranks of Innovative Countries

This period is the critical stage for China to rank among the front ranks of innovative countries and basically achieve socialist modernization. With the stage goal of "strong industries and strong economy," the focus is on using scientific and technological innovation to support and lead the transformation of development drivers, optimizing structures, filling gaps, and placing independent innovation capabilities at the forefront of the world. The development drivers should fundamentally shift from catch-up development mainly driven by factors and investment to leading development that relies more on innovation and gives greater play to first-mover advantages, and establish production relations compatible with this highly developed productive force. Innovation should become an important driving force for economic and social development and national defense construction, with significantly improved economic and social development levels and international competitiveness, presenting a social development picture characterized by innovative globalization, low-carbon industrialization, intelligent urbanization, intelligent informatization, ecological circulation, and green consumption, laying a solid foundation for building a world power of science and technology and comprehensively achieving socialist modernization.

1. **Science and Technology Achieve Innovative Leaps and Rank Among World Science and Technology Centers.** The national innovation system becomes more complete, and strategic scientific and technological forces are increasingly strengthened and expanded. Innovation and development capabilities shift from quantitative leadership to quality leadership, generally reversing the situation where scientific and technological innovation mainly follows others. Move from parallel to leading positions in several basic frontiers and major strategic fields, producing a batch of original achievements that have important impacts on world scientific and technological development and human civilization progress. Have global competitiveness in some important technology fields, with patent quality and value approaching developed country levels. Overcome major bottleneck issues that constrain national defense science and technology. The national innovation system becomes more complete, with a group of research universities and institutions entering the international first-class ranks.

2. **Deep Integration and Mutual Promotion of Science and Technology and Economy, with Significantly Enhanced Industrial Innovation Capability.** Major industries should enter the mid-to-high end of the global value chain, with international competitiveness entering the front ranks of the world. Industries should generally exhibit green, low-carbon, intelligent, and service-oriented development characteristics, with

indicators such as energy consumption, water consumption, and pollutant emissions per unit of GDP reaching the average level of OECD member countries. Innovation becomes the main driving force for industrial development, continuously creating new technologies, products, models, business forms, demands, and markets, achieving more sustainable development, higher-quality employment, higher income levels, and higher-quality life. Achieve a dual transformation: from complementary cooperation to competitive cooperation with developed countries, and from competitive cooperation to complementary cooperation with developing countries, basically changing the passive situation where key core technologies in important strategically critical industries are constrained by others. Several industries that lead the world should emerge, along with a group of multinational enterprises that guide global industrial development directions. China' s contribution to global "new economy" growth should continuously exceed one-third.

3. **Leapfrog Development of Social Innovation and Ecological Environment, with Public Sector Management Efficiency Reaching the Level of Moderately Developed Countries.** Compulsory education, basic medical care, elderly care and health, job transfer training, employment counseling, public transportation, and social security should generally meet the needs of urban and rural residents. The level of high-quality education and training, medical and health services, and information network resource sharing, as well as the equalization level of high-quality public service resource allocation, should be significantly improved. The ecological environment quality should meet livable and business-friendly requirements, with significantly improved intelligent informatization levels of urban production, living, and ecological environments. Production and lifestyle should lead the world, building a safer, more reassuring, more convenient, and more comfortable intelligent information society. Innovation culture becomes a decisive supporting force for the new security system, with national defense science and technology reaching world-leading levels.

4. **Innovation Becomes a Core Factor in Policy Formulation and Institutional Arrangements.** The innovation institutional environment, market environment, and cultural environment are further optimized, with respect for knowledge, advocacy for innovation, protection of property rights, and tolerance for diversity becoming common concepts and value orientations throughout society.

Step Three: By the Mid-21st Century, Build a World Power of Science and Technology and Fully Support a "Strong Nation"

This period is the decisive stage for China to move from the front ranks of innovative countries to a world power of science and technology and comprehensively build a modern socialist strong country. With the stage goal of a "strong

nation," the focus is on shaping comprehensive leading development, building an open and efficient innovation network, greatly enhancing original innovation capabilities, becoming a world major science center and innovation highland, making Chinese contributions in solving major fundamental scientific problems, opening up new scientific fields and directions, and building new scientific theoretical systems, making innovation the main driving force for economic and social development, comprehensively supporting China in building a prosperous, strong, democratic, civilized, harmonious, and beautiful modern socialist strong country and realizing the Chinese Dream of the great rejuvenation of the Chinese nation.

1. **Science and Technology Innovation Achieves Overall Leapfrog Development, with Comprehensive Strength Entering the World Front Ranks and Continuously Producing Major Original Scientific Ideas and Achievements that Lead World Scientific Trends.** Science and technology and talent become the most important strategic resources for national strength, with a group of world-class scientific research institutions, research universities, and innovative enterprises emerging. China becomes an important gathering place for global high-end scientific and technological talents to innovate and start businesses, with world-class scientific masters and innovative talents gathering in large numbers and entrepreneurial spirit being fully released. China' s major scientific and technological achievements exceed one-quarter of the world' s total. The number of patents obtained by China in major world markets (the United States, Japan, and the European Union) ranks among the global front ranks.

2. **Support China in Becoming a Country with Leading Comprehensive National Strength and International Influence, Comprehensively Improving Material, Political, Spiritual, Social, and Ecological Civilizations, and Basically Achieving Common Prosperity for All People to Enjoy a Happier and Healthier Life.** Improvements in labor productivity and social productivity mainly rely on scientific and technological progress and comprehensive innovation, with high-quality economic development, low energy and resource consumption, strong industrial core competitiveness, and a social development picture characterized by green, intelligent, healthy, safe, and inclusive features. Innovation becomes the decisive supporting force for the new security system, with national defense science and technology reaching world-leading levels.

3. **Innovation Becomes a Core Factor in Policy Formulation and Institutional Arrangements.** The innovation institutional environment, market environment, and cultural environment are further optimized, with respect for knowledge, advocacy for innovation, protection of property rights, and tolerance for diversity becoming common concepts and value orientations throughout society.

Scientifically Planning New Initiatives for the "Three Steps" Strategy to Build a World Power of Science and Technology

Aligning with the basic connotations and target tasks of building a world power of science and technology, we should comprehensively adopt measures and coordinate efforts from the aspects of top-level design, innovation system, innovation resources, and innovation models to promote scientific and technological reforms in depth.

Improving Top-Level Design for Building a World Power of Science and Technology

A world power of science and technology cannot be achieved overnight. It requires building consensus at the national level, strengthening top-level design and overall planning, and coordinating promotion with key priorities and persistent efforts.

1. **Strengthen the Leadership and Decision-Making Mechanism for Building a World Power of Science and Technology.** Coordinate reforms in the scientific and technological system, economic system, education system, and administrative management system, reasonably define the functions of government and market, formulate a promotion plan for building a world power of science and technology, form a timetable and roadmap, and coordinate the formulation of scientific and technological innovation policies and plans across departments while decomposing and implementing various work responsibilities.
2. **Improve the National Scientific and Technological Innovation Decision-Making Consultation System.** Establish a national scientific and technological decision-making consultation committee that transcends individual departments, form a government science and technology advisory network, establish scientifically standardized scientific and technological decision-making consultation procedures, and provide scientific, accurate, forward-looking, and timely scientific and technological consultation suggestions for major strategic formulation, planning compilation, and policy making.
3. **Improve the National Science and Technology Management Basic System.** Scientifically divide the scientific and technology management powers between central and local governments, strengthen unified coordination among government departments, reasonably determine the functional division of labor among central departments, strengthen scientific and technological development planning, optimize the science and technology plan management system and national science and technology plan management process, improve the national science and technology report system and national innovation survey system, and build a supervision and evaluation system covering the entire process.

4. **Further Strengthen Planning and Layout in Major Innovation Fields.** Aiming at major national needs and world science and technology frontiers, organize the formulation of new national medium- and long-term science and technology development plans. Based on existing major science and technology layouts, focus on major innovation fields such as information, energy, materials, aerospace, oceans, ecological resources and environment, life and health, and basic frontier intersections, formulate China' s leapfrog development goals, layout, and paths, and timely adjust and optimize major science and technology layouts through rolling reviews.

Building a National Innovation System Compatible with a World Power of Science and Technology

The comprehensive strength of national innovation depends to a large extent on the innovation capability and operational efficiency of the innovation system.

1. **Adjust and Optimize the National Science and Technology Force Layout, Strengthen Strategic Scientific and Technological Forces.** Focus on national strategic key areas such as aerospace and oceans, energy resources, information security, and transportation, rely on advantageous forces, and strengthen world-class scientific research institutions and national laboratories as national strategic scientific and technological forces. Simultaneously, further clarify the functional positioning of various innovation entities such as enterprises, research institutes, and universities at different stages of the innovation chain, and build an open, cooperative, efficient, and dynamic national innovation system that effectively supports the construction of a strong country in science and technology, quality, aerospace, cyberspace, transportation, and manufacturing, while effectively ensuring national security and sustainable development.
2. **Optimize Regional Innovation Layout and Create Regional Innovation Highlands.** Surrounding national regional development strategies such as the coordinated development of the Beijing-Tianjin-Hebei region, the Yangtze River Economic Belt, the Guangdong-Hong Kong-Macao Greater Bay Area, and the Xiong' an New Area, optimize the regional innovation layout, integrate innovation resources, realize the aggregation and flow of innovation elements, promote rational industrial division of labor, and accelerate the construction of globally influential science and technology innovation centers and comprehensive national science centers, creating sources of major original innovations and regional innovation growth poles.
3. **Accelerate the Construction of a Deeply Integrated Military-Civilian Innovation System and Carry Out Military-Civilian Collaborative Innovation.** Following the laws of economic construction and national defense construction, and in accordance with the military-civilian

integration management system of "unified leadership, military-civilian coordination, demand docking, and resource sharing," we should coordinate military and civilian scientific and technological strategic planning, policies, resource conditions, and achievement application to form a new pattern of deep military-civilian scientific and technological integration development with complete elements, multiple fields, and high efficiency.

Strengthening the Strategic Support of Scientific and Technological Innovation for Building a Modern Economic System

Building a bridge between science and technology and industry that deeply integrates them, effectively solving the persistent problem of disconnect between science and technology and the economy, and increasing the contribution of scientific and technological progress to economic development will powerfully support the construction of a modern economic system in the new era.

1. **Vigorously Strengthen Basic Research and Applied Basic Research.** We must aim at the frontiers of world science and technology, strengthen basic research, achieve major breakthroughs in forward-looking basic research and leading original achievements, and enhance original innovation capabilities. Simultaneously, surrounding major national strategic needs, we should strengthen applied basic research, expand the implementation of national major science and technology projects, highlight four types of technological innovation—key generic technologies, frontier leading technologies, modern engineering technologies, and disruptive technologies—and enhance China' s overall level of scientific discovery, technological invention, and product and industrial innovation, strengthening source reserves.
2. **Establish and Improve the Industrial Generic Technology Research and Development System.** Accelerate the deep integration of industrialization and informatization, take digitization, networking, intelligence, and greening as the technological basis for enhancing industrial competitiveness, promote cross-boundary innovation in emerging technologies in various fields, and build a modern industrial technology system that is reasonably structured, advanced and practical, open and compatible, independently controllable, and internationally competitive. Support the development of emerging industrial clusters with group technological breakthroughs, promote innovation in the industrial technology system and industrial quality upgrading, create new development advantages, and support and lead the development of emerging industrial clusters.
3. **Establish and Improve the Innovation and Entrepreneurship Service System.** Increase support for innovation intermediary agencies and entrepreneurship service agencies such as technology transfer and transformation, entrepreneurship guidance, intellectual property, science and technology finance, legal consultation, and human resources, and

enhance professional service capabilities.

Building an Internationally First-Class Innovation Talent Team

"Talent is the source of national strength." Human resources are the primary element of a world power of science and technology and the most active and positive factor in innovation activities. While China leads in the scale of its talent pool, issues regarding level, structure, and institutional environment are key aspects that require focused effort to solidify the foundation of innovation.

1. **Combine Training and Introduction to Establish and Improve an Internationalized Innovation Talent Network.** Scientifically cultivate talent and precisely attract talent, gathering a large number of high-end innovative talents, properly handling the relationship between the "tower top" and "tower base," and transforming the "human sea" tactic into a "human ladder" tactic.
2. **Reform and Improve the Talent Incentive and Evaluation System.** Reform and improve talent programs, optimize the talent growth environment, improve the scientific classification-based innovation evaluation system, further standardize the establishment of distribution policies that are both effectively motivating and fair and reasonable, and realize the full utilization of talents.
3. **Strengthen the Training of Young Scientific and Technological Talents and Innovative Talents.** Strengthen basic education, promote innovation in higher education, reform postgraduate training models, deepen integration between industry and education, promote the coordinated development of education and industry, and train and cultivate a large number of strategic scientific and technological talents, leading scientific and technological talents, young scientific and technological talents, and high-level innovation teams with international standards.

Optimizing the Allocation Methods of Science and Technology Innovation Resources

Resource allocation is an important means to influence and regulate scientific and technological innovation activities. According to the degree of externality of innovation activities from high to low, the role of government in allocating innovation resources should shift from direct to indirect, properly handle the relationship with the market, and make full and flexible use of various policy tools such as direct fiscal support and universal tax benefits.

1. **Establish Resource Allocation Methods that Conform to the Laws of Science, Technology, and Innovation.** In scientific value creation activities, the government should play a leading role in resource allocation, bearing the risks of scientific activities. In technological value creation activities, the government should play an important role in resource

allocation, leading major technology development activities oriented toward national goals, sharing the risks of enterprise technology development activities, and guiding and encouraging society to increase investment in technology development. In economic value creation activities such as technology commercialization, the government should play a guiding role in resource allocation, promoting the development of venture investment and emerging industry funds, supporting innovation and entrepreneurship of small and medium-sized enterprises, and protecting intellectual property rights and maintaining fair market competition. In large-scale commercialization and other economic activities, the government should mainly play a regulatory role in market access, property rights protection, and other market environment aspects, allocating fiscal resources mainly through universal methods such as taxation.

2. **Continuously Optimize Public Fiscal Science and Technology Funding Support Methods.** Reform central fiscal science and technology plans and fund management, continuously optimize the fiscal science and technology plan system, and improve fund use efficiency. We must focus on continuously increasing the government' s stable support for basic, strategic, and public welfare research, improve the mechanism that coordinates stable support and competitive support, and increase support for disruptive technologies.

3. **Gradually Increase the Proportion of Universal Tax Policy Support.** Improve universal policies that incentivize enterprise research and development, explore diversified support methods such as research and development expense tax credits and post-subsidies, and guide enterprises to become the main investors in technological innovation. Simultaneously, research and improve financial policies that support science, technology, and innovation development, and accelerate the establishment and improvement of financing channels and platforms for science and technology enterprises.

Consolidating the Material and Technological Foundation of a World Power of Science and Technology

In response to the trend that scientific and technological innovation increasingly demands large-scale complex research facilities and advanced information infrastructure as material and technological foundations, we must do a good job in top-level design for major science and technology infrastructure and information infrastructure, properly handle the relationship between central and local investment, centralized and decentralized layout, construction and operation, and application output, and give full play to the innovative cornerstone role of "great national assets."

1. **Plan and Build a Batch of Major Science and Technology Infrastructure and Platforms at a High Level and Starting Point.**

Adapting to the characteristics of innovation activities in the era of big science, focusing on solving the most cutting-edge scientific problems and enhancing original innovation capabilities, we should build a batch of platform-type science and technology infrastructure that are open to the world and represent the nation in high-level international scientific and technological competition and cooperation. Focusing on national strategic needs for long-term and overall development, we should build a batch of strategy-oriented science and technology infrastructure that break through key technological bottlenecks. Aiming at development challenges related to national economy and people' s livelihood, we should layout and build a batch of application-oriented science and technology infrastructure. Simultaneously, we should focus on promoting the opening and sharing of national major scientific research infrastructure and science and technology basic condition platforms.

2. **Strengthen the Fundamental Supporting Role of Information Infrastructure for Scientific and Technological Innovation.** Build major information infrastructure that is strategic, basic, and universal in supporting China' s scientific and technological innovation development, develop integrated scientific computing and scientific big data environments, focus on promoting cloud infrastructure construction in data-intensive fields such as biology, medicine, new materials, and new-generation transportation, and enhance the ability to support science and technology and industrial development.

Creating an Innovation Model with Chinese Characteristics

"To grow tall trees, one must strengthen their roots; to make water flow far, one must deepen its source." We must create an innovation model full of innovation energy and high innovation spirit based on China' s national conditions.

1. **Give Full Play to the Advantage of "Concentrating Forces to Accomplish Major Tasks."** We must give full play to the advantages of China' s new national system under socialist market economy conditions, concentrate forces, conduct collaborative research, make continuous efforts, and achieve long-term success. We must accelerate breakthroughs in major core technologies and development of major strategic products, and achieve leapfrog development in science and technology in national strategic priority areas.

2. **Create a Favorable Environment for Scientific and Technological Innovation.** Strengthen the construction of scientific culture and institutional and systemic innovation with ideological liberation and academic freedom as the main connotations, properly handle the relationship between incentivizing innovation and tolerating failure, knowledge sharing and intellectual property protection, and niche innovation and mass innovation. Starting from the aspects of legal system, policy, culture, and

environment, we should encourage originality and advocate collaboration, foster a strong sense of innovation confidence in catching up with, surpassing, and leading the world, and cultivate soil that dares to innovate, facilitates innovation, and enjoys innovation.

Deeply Participating in Global Innovation Governance and Comprehensively Promoting Open Innovation

In today' s era of economic and trade globalization, scientific and technological cooperation is becoming increasingly close. China should actively participate in the construction of the global scientific and technological innovation governance system, speak with a stronger Chinese voice, propose Chinese solutions, and contribute Chinese wisdom.

1. **Initiate and Participate in International Major Science and Technology Programs and Big Science Projects.** Seize the opportunity of accelerated global innovation resource flow, face world science and technology frontiers and global challenges, focus on key areas of China' s science and technology planning deployment, actively initiate, lead, and organize participation in international major science and technology programs and big science projects, actively participate in the formulation of major international science and technology cooperation rules, and improve the openness of national science and technology plans and China' s ability to allocate global innovation resources.
2. **Strengthen In-Depth Scientific and Technological Innovation Cooperation with Countries Along the "Belt and Road."** Focus on implementing the "Belt and Road"development initiative and the Asia-Pacific connectivity blueprint, cooperate to build scientific and technological innovation bases facing countries along the route, and create a technology transfer network connecting domestic and foreign innovation resources.
3. **Support Enterprises in Taking the Path of Internationalized Innovation Development and Establish and Improve an Open Innovation System That Is Internationally Compatible.** Encourage and support enterprises to layout innovation networks globally, enhance the overseas intellectual property operation capabilities, innovation capabilities, and international competitiveness of industry-leading enterprises. Focus on satellites, high-speed rail, nuclear energy, supercomputers, etc., to promote China' s advanced technologies and equipment to go global, accelerate the cultivation of export-oriented new advantages based on technology, brand, quality, and service. Encourage multinational companies to establish research and development centers in China to achieve the combination of attracting investment, intelligence, and technology.

The new era has entrusted new missions, and the new journey calls for new achievements. At this new historical starting point, we must follow the "Three Steps" strategy for building a world power of science and technology determined

by the Party Central Committee, vigorously promote the value concept of innovative science and technology, serving the country, and benefiting the people, remain true to our original aspiration, keep our mission firmly in mind, plan innovation scientifically and forward-looking, concentrate on innovation, and devote ourselves wholeheartedly to innovation. Let scientific and technological innovation stimulate more abundant vitality and burst forth with more surging power, continuously making new contributions and creating new brilliance for China' s comprehensive building of a modern socialist strong country, accelerating the realization of the "Two Centenary" goals, and realizing the Chinese Dream of the great rejuvenation of the Chinese nation.

References

1. 习近平. 决胜全面建成小康社会夺取新时代中国特色社会主义伟大胜利——在中国共产党第十九次全国代表大会上的报告. [2017-10-27]. http://www.xinhuanet.com/politics/19cpcnc/2017-10/27/c_1121867529.htm.
2. 陈须隆. 不惧风雨勇向前. 人民日报, 2018-04-15(5).
3. 万钢. 为决胜全面建成小康社会、建设世界科技强国、实现"两个一百年"奋斗目标作出新的更大贡献. 中国科技产业, 2018(1): 8-11.
4. 李克强. 在全国科技工作会议上的讲话: 以改革创新为动力加快建设世界科技强国朝着更高质量方向发展. [2017-01-22]. http://www.gov.cn/xinwen/2017-01/22/content_5162360.htm.
5. 国务院. 国务院关于全面加强基础科学研究的若干意见. [2018-01-31]. http://www.gov.cn/zhengce/content/2018-01/31/content_5262539.htm.
6. 中共中央, 国务院. 国家创新驱动发展战略纲要. [2016-05-19]. http://www.gov.cn/gongbao/content/2016/content_
7. 中国科学院. 科技强国建设之路: 中国与世界. 北京: 科学出版社, 2018: 236-239.
8. 穆荣平, 樊永刚, 文皓. 中国创新发展: 迈向世界科技强国之路. 中国科学院院刊, 2017, 32(5): 512-520.

Accurately Grasp and Thoroughly Understand the Basic Connotations of the "Three Steps" Strategy for Building a World Power of Science and Technology

Abstract: The "Three Steps" strategy for building a world power of science and technology serves as the action guideline for China' s scientific and technological innovation and development in the new era. This research proposes that we must accurately grasp and thoroughly understand the core essence of this major strategic deployment from the perspectives of the international development environment, the overarching trends of world scientific and technological development, and national innovation requirements. On this basis, the paper elucidates the basic connotations of the "Three Steps" strategy from the developmental perspective of moving from strong talent and strong science and

technology to strong industries and a strong economy, and then to fully supporting a strong nation. It also proposes several strategic initiatives for accelerating the construction of a world power of science and technology from the aspects of top-level design, innovation system, innovation resources, and innovation models.

Keywords: world power of science and technology, "Three Steps" strategy, strategic connotation, initiative suggestions

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