

The Chinese Communists' Centennial Exploration and Enrichment of Marxism's Outlook on Science and Technology

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Abstract: This paper reviews the exploration and enrichment of Marxism's Outlook on Science and Technology by the Chinese Communists in the course of a century. Spanning from the New Democratic Revolution to the new era of socialism with Chinese characteristics, the CPC has consistently regarded science and technology as a pivotal driver for national development, and has continuously advancing the integration of scientific and technological innovation with economic and social development. The article analyzes the strategic decisions and practical achievements of the Chinese Communists in advancing scientific and technological development across different historical stages and their role in bolstering national prosperity and strength, highlights the Chinese Communists' historical accountability and epochal mission of the Chinese Communists in the domain of science and technology in the times.

Keywords: Chinese Communists; Marxism's Outlook on Science and Technology; A Century-long Quest.

1. Marx and Engels on Science & Technology's Socio-Historical Roles

Within the theoretical framework constructed by Marx and Engels, Marx and Engels profoundly recognized science and technology's function in advancing social development and they framing science and technology as the "lever of history", emphasizing that science and technology serves not merely as a critical element in driving productive forces forward, but also an important driving force for the progress of social history. The core of the Marxist view of science and technology lies in the fact that science and technology, as a kind of social practice, is subject to the constraints of specific socio-historical conditions and promotes the change of social relations and social system through innovation. Marx and Engels pointed out that scientific and technological progress can cause qualitative changes and leaps in productive forces, thus promoting changes in social form, and that there is an intrinsic connection and interaction between advancements in science and technology and society's material foundation, the relations of production as well as the superstructure, and that such a viewpoint highlights the revolutionary function of science and technology throughout the course of social history.

2. During the New Democratic Revolution: Empowering Revolutionary Practice with Science and Technology to Build the Foundation of Salvation

During the New Democratic Revolution, the Chinese Communists, with a forward-looking vision and firm belief, closely integrated the Marxist perspective on science and technology with revolutionary practice, and empowered revolutionary practice with science and technology to build the foundation of salvation [1]. During the war years, they devoted themselves to promoting practical technology aimed

at maintaining the steady operation of production chains amid wartime conditions. This effort proved pivotal in sustaining the momentum toward revolutionary triumph.

2.1. Promoting Practical Technologies to Support Wartime Production

During the harsh period of the Red Army's Long March, the Chinese Communists maintained their focus on and their active employment of scientific and technological means in the face of an extremely harsh environment, reflecting the Marxist perspective holding science and technology as a vital component of productive forces. Under the harsh conditions in northern Shaanxi, the Communists personally participated in labor and went into the countryside to guide farmers in improving farming techniques, for example, by promoting agricultural techniques and crop rotation systems suitable for arid areas, measures that effectively guaranteed the food supply of the Red Army and the local population, while at the same time providing a material basis for the revolution's prolonged struggle.

In the arsenals of the liberated areas, the Communists relied on limited resources and rudimentary equipment to exercise creativity, improve production processes, and independently develop weapons and ammunition. Despite the gap between these weapons and ammunition and the advanced level at home and abroad in terms of technology and craftsmanship, they demonstrated their value and reliability in actual combat and made an important contribution to the victory in the triumph of the Chinese War of Resistance Against Japanese Aggression. This process is not only the promotion and application of practical technology, but also a manifestation of the Marxist perspective on science and technology—specifically, the notion of driving the growth of social productive forces through scientific and technological innovation.

Amid the Red Army's Long March, the promotion and application of these practical technologies not only improved productivity, but also furnished a robust material and

theoretical underpinning for the revolution to sustain itself and develop amid the wartime context. This strategy of combining practical and theoretical, science and technology and revolution is a vivid embodiment of the Chinese Communists' adherence to and development of Marxism under difficult conditions.

2.2. Founding Scientific and Educational Institutions to Cultivate Technical Talents Needed by the Revolution

In order to support the revolutionary cause in the long run, the Chinese Communists still continued to prioritize the development of scientific and technological talents under difficult war conditions. The establishment and growth of scientific and educational institutions reflected the thoughtfulness and strategic planning of the CPC on the direction of future development. In northern Shaanxi, the CPC established a series of scientific and educational institutions, including the Yan'an Academy of Natural Sciences and the northern Shaanxi Public School, which became important bases for training revolutionary talents. At the Yan'an Academy of Natural Sciences, students gained access to foundational knowledge in natural and social sciences while also receiving instruction in revolutionary ideology, as well as receive education in revolutionary ideology. As one of the institutions of higher learning in the liberated areas at that time, the Yan'an Academy of Natural Sciences cultivated a sizable cohort of scientific and technological professionals, made significant contributions to the nation's post-revolutionary construction.

2.3. Formulating Early S&T Policies to Unite the United Front

Policies and initiatives related to science and technology—much like the revolutionary spark, lit up the hope of national rejuvenation in the dawn, cohesion of united front forces is the early exploration of the Communists in the formulation of science and technology policy. During the New Democratic Revolution, the Chinese Communists used science and technology as a link to unite the forces of the United Front and issued the Decision of the Communist Party of China Central Committee on Science and Technology Work—a document that emphasized the importance and urgency of scientific and technological work. Guided by this central Party decision on the Work of Science and Technology, the Communists during the New Democratic Revolution attracted a sizeable contingent of scientific and technological professionals talents to join the revolutionary team, such as the famous scientists Qian Xuesen and Li Siguang, etc. The Communists utilized their own professional knowledge and skills to make great contributions to the cause of the revolution, making science and technology an indispensable force in the United Front.

3. The Socialist Revolution and Construction Period: Advancing Scientific and Technological Modernization to Lay a Solid Foundation for Nation-Building

During the period of socialist revolution and construction, the Chinese Communists, adhering to the Marxist view of science and technology, regarded the modernization of

science and technology as the foundation of the country [2], and started a movement of scientific and technological self-improvement with self-reliance as the core. Facing the pressure of international blockade and backwardness, the Chinese Communists, guided by self-reliance, systematically explored a new trajectory for scientific and technological development by centralizing scientific research efforts, establishing an independent scientific research system, and promoting the combination of technological research and production practice, etc. This practice was both a practice of the Marxist view of science and technology—namely, that 'science and technology serve national sovereignty and the people's interests'. This practice not only puts into practice the Marxist view of science and technology 'science and technology serves the sovereignty of the country and the interests of the people', but also established institutional and practical groundwork for the subsequent advancement of scientific and technological modernization."

3.1. Upholding Self-Reliance to Get Rid of Backwardness and Defeat

The socialist revolution and construction period was an era of building from scratch, with countless tasks awaiting action, a hundred things had to be done. The Chinese Communists insisted on self-reliance and used science and technology as the pillar to get rid of the passive situation of relying on foreign aid. During the development of the "Two Bombs and One Star", scientists successfully exploded atomic bombs and hydrogen bombs, and successfully launched the first artificial satellite on a penniless basis, thanks to their crude equipment and firm beliefs. The breakthrough achievements of "two bombs and one satellite" not only elevated China's standing on the global stage, but also completely changed international perceptions of China's scientific and technological capabilities.

3.2. Leveraging the National System to Master Cutting-Edge Defense Technologies in national defense

In tackling cutting-edge technologies in national defense, the Chinese Communists relied on the national system to concentrate their efforts on major issues, mobilizing national resources and pooling national wisdom, and eventually made a series of major breakthroughs in the fields of missiles and nuclear submarines. These technological breakthroughs have not only built a solid barrier for China's national defense and security, but also significantly enhanced China's strategic deterrence capability and international discourse, confirming at the practical level the Marxist theoretical logic of 'science and technology, as the primary productive force, has a fundamental supportive role for national sovereignty and security.' " It has provided a solid guarantee and made our country stand up on the international stage.

3.3. Building a Grand Team of Working-Class Intellectuals

Intellectuals serve as a pivotal force in advancing a nation's industrialization drive, and working-class intellectuals, as an important group combining mental and physical labor, are a key force in promoting the country's industrialization.

The Chinese Communists, in the period of socialist revolution and construction, attached substantial importance to nurturing the working class into intellectual forces.

Leveraging through "technical schools for workers" and "on-the-job education", they improved the technical quality and cultural level of workers, making the working class not only the main force of production, but also building up a large team of intellectuals.

4. The New Era of Reform, Opening-Up and Socialist Modernization

The New Era of Reform, Opening-Up and Socialist Modernization, the Chinese Communists came to a profound understanding that science and technology constitutes the primary productive force, and guided by the Marxist perspective on science and technology, profoundly explained the theoretical connotation of 'science and technology is the first productive force', and started the practical process of science and technology leading the development of the country [3]. Through the reform of the science and technology system in 1985 (bridging the gap between science and technology on the one hand and the economy on the other), the implementation of the '863 Program' (which focused on developing key high-tech domains), and the promotion of collaborative innovation among industries, universities and research institutes, the linkage mechanism of 'science and technology - economy' and 'national development' has been gradually constructed. - national development', laying the institutional and practical foundation for the subsequent construction of a strong scientific and technological country. This endeavor not only embodies the Marxist theory in practice—specifically, the idea that "science and technology propels the development of social productive forces", but also stands as a significant manifestation of Marxism's adaptation to the Chinese context within the realm of science and technology.

4.1. Significantly Enhancing the Capacity for Independent Innovation

The Chinese Communists have dramatically enhanced their independent innovation capabilities and enshrining scientific and technological innovation as a core strategy for national advancement. Amid the new phase of socialist modernization, Huawei's independently developed 5G technology has not only taken the lead in the domestic market, but also demonstrated the strong competitiveness of Chinese science and technology on the international stage. In the new period of socialist modernization, China has also made remarkable accomplishments in domains such as high-speed rail, e-commerce, mobile payment, etc. These achievements have not only pushed forward the leapfrog growth of social productive forces, but also confirmed the objective law that Chinese Marxist political parties can steer scientific and technological advancement and contribute to socialist modernization drive through top-level planning.

4.2. Driving the Deep Convergence of Science, Technology, and Economic Activity

In the new period of reform and opening up and socialist modernization, the CPC actively promotes the close integration of science and technology with the economy to realize industrial upgrading and economic transformation. Via the execution of the "Internet Plus" program, Alibaba, Tencent and other Internet giants have promoted the deep convergence of traditional industries with Internet technology, stimulated new economic growth points, and rapidly emerged

as an vital engines powering China's economic expansion.

4.3. Continuously Deepen Reforms in the Science and Technology System

To dismantle institutional barriers hindering scientific and technological development and Ignite the creative momentum of scientific and technological innovation, the Chinese Communists, guided by the Marxist tenet that 'production relations must adapt to the development of productive forces, have steadily deepened reforms in the science and technology system during the socialist modernization drive, which essentially aims to adapt to and promote scientific and technological adjust production relations within the scientific and technological realm (encompassing systems, mechanisms, and policies) to align with and boost the growth of scientific and technological productive forces, to adapt to and promote the development of the productive forces thereby furnishing institutional safeguards for advancing socialist modernization.

The CPC has put in place policies that spur the conversion of scientific and technological achievements, motivating researchers to turn their innovations into practical productive forces. At the same time, a number of high-tech industrial hubs, such as Zhongguancun Science and Technology Park, were established, which evolving into key hubs for technological innovation. These practices not only stimulate the innovation vitality of market players and researchers, but also confirm the Marxist principle of "the adjustment of production relations promotes the development of productive forces" at the institutional level, which is a concrete embodiment of the Chineseization of Marxism in the realm of science and technology system reforms.

5. The New Era of Socialism with Chinese Characteristics: Forging a Powerful Nation Through High-Level Sci-Tech Self-Reliance and Self-Strengthening

In the New Era of Socialism with Chinese Characteristics, the Communist Party of China has elevated the Marxist perspective on science and technology to new heights, laying the groundwork for national strength through high-level sci-tech self-reliance and self-strengthening. In this era, sci-tech innovation has emerged as the core component of new-quality productive forces [4] - much like the heart's vital role in sustaining the human body - supplying a steady driving force for the nation's economic and social advancement.

5.1. Sci-Tech Innovation as the Core Component of New-Quality Productive Forces

The important perspectives on science and technology in the new era of socialism with Chinese characteristics underscore that sci-tech innovation serves as the core component of new-quality productive forces [5]. In the report to the 20th National Congress of the Communist Party of China, the strategic arrangement of integrating education, science and technology, and talents is explicitly outlined—a trinity that positions science and technology at the heart of the overall national development agenda. It is pointed out in the report that sci-tech innovation constitutes the fundamental driver of economic growth and the linchpin for boosting national competitiveness. This perspective reflects a profound

grasp of how sci-tech innovation functions in advancing productive forces, while emphasizing the need to foster new economic growth engines through such innovation to achieve a qualitative leap in productive forces [6].

The rapid advancement of frontier technologies—including artificial intelligence, quantum information, and biotechnology—is reshaping the landscape of traditional industries in profound ways [7]. By reconfiguring production factors (e.g., data emerging as a new-type production factor), optimizing production processes (e.g., intelligent algorithms enhancing efficiency), and spawning new business models (e.g., the integration of the digital economy with traditional sectors), these cutting-edge technologies drive the digital and intelligent transformation of traditional industries. This process stands as the core impetus behind the emergence of new-quality productive forces, and essentially represents the practical deepening of Marxism's tenet that "science and technology, as the primary productive force, propels the qualitative leap of productive forces" in the new era. The achievements of China's space programs such as Tianwen-1 and Chang'e-5 have not only secured breakthroughs in space technologies—including Mars rover exploration and lunar sample analysis—but also elevated industrial productivity through space-enabled empowerment: satellite navigation boosting agricultural efficiency and aerospace materials being applied in high-end manufacturing, for instance. Such civilian-oriented transformation of space technologies, which drives industrial productivity upgrades, has become a paradigmatic practice in advancing new-quality productive forces. These technological breakthroughs and their applications have not only strengthened China's global sci-tech competitiveness but also provided impetus for industrial optimization and high-quality economic development, thereby validating, in practical terms, Marxism's law that "scientific and technological progress enhances social productive forces and overall national strength.

5.2. Effectively Mastering Key Core Technologies in Our Own Hands

Our country's leaders have emphasized the importance of effectively mastering key core technologies in one's own hands. In his report, he pointed out that it is necessary to strengthen the construction of the scientific and technological innovation system, advance reforms in the science and technology system and expedite the conversion and practical application of scientific and technological achievements, and ensure that the country is not restricted by others in the field of key core technologies [8]. The Chinese Communist Party is well aware that effectively mastering key core technologies in one's own hands is the cornerstone of national security. From the Marxist point of view, key core technology is "the core element of productivity development", its independent control is related to national sovereignty and industrial security, can avoid the risk of international supply chain, to avoid the core industry to be restrained by others, the essence of Marxism "Productive forces determine production relations, and production relations ensure the advancement of productive forces". This is essentially the practice of Marxism's core proposition that "productive forces dictate production relations, while production relations safeguard the advancement of productive forces" in the scientific and technological domain. In the field of chips, in the face of international competition and blockade, Chinese enterprises such as Huawei (with an average annual R&D expenditure of

more than 15%) and Ziguang Group have achieved key breakthroughs in the fields of chip design (Hesi Kirin chips) and storage chips (Ziguang Changjiang storage). Their breakthroughs in key technologies not only break the international monopoly, but also furnish robust support for the growth of China's high-tech sector [9].

5.3. Accelerating the Modernization of Science and Technology with a Global Vision

The Chinese leadership advocates advancing the modernization of sci-tech from a global perspective. He stressed the importance of actively engaging in global sci-tech governance, expanding open sci-tech cooperation, and promoting the sharing of sci-tech outcomes—while also emphasizing the need to introduce advanced foreign sci-tech achievements, then adapt, absorb, and re-innovate them in line with China's domestic realities. Approaching sci-tech development with a global outlook is analogous to drafting a comprehensive world map: it closely links China's sci-tech initiatives to the global community, jointly crafting a magnificent chapter in humanity's sci-tech advancement. Along the journey of socialism with Chinese characteristics in the new era, China has proactively participated in international scientific research programs. For instance, the construction of the Square Kilometer Array (SKA) radio telescope has significantly elevated China's research capabilities in astronomy while boosting international sci-tech exchanges and collaboration. Additionally, collaborative initiatives between domestic universities, research institutions, and global partners—such as the joint research efforts of Tsinghua University and the Massachusetts Institute of Technology (MIT)—have continued to propel the modernization of China's sci-tech sector. In the new era of socialism with Chinese characteristics, by advancing sci-tech modernization from a global perspective, the Communist Party of China has promoted open sci-tech cooperation, drawing on global expertise to fuel domestic sci-tech progress.

6. Conclusion

Over a century of unremitting exploration and enrichment, the Communist Party of China (CPC) has gained profound insights into and put into practice the Marxist perspective on science and technology, identifying sci-tech innovation as a crucial driver and strategic pillar for national advancement. From leveraging science and technology to empower revolutionary efforts during the New Democratic Revolution, to advancing sci-tech modernization to lay the groundwork for national development in the socialist revolution and construction period, to embracing science and technology as the primary productive force to pursue national prosperity in the new era of reform, opening-up and socialist modernization, and further to forging the foundation of a powerful nation through high-level sci-tech self-reliance and self-strengthening in the New Era of Socialism with Chinese Characteristics—the CPC has consistently kept pace with the times, continuously deepening the integration of science, technology, and national development. In this course of development, sci-tech innovation has emerged as the core component of new-quality productive forces, independent mastery of key core technologies has become a robust guarantee for national security, and sci-tech modernization from a global perspective has provided a solid underpinning for China's ascent on the world's sci-tech stage. It can be

argued that the CPC's century-long exploration and enrichment of the Marxist perspective on science and technology have not only significantly boosted the growth of China's sci-tech sector but also infused an inexhaustible driving force into the nation's pursuit of prosperity and strength. This underscores the historical responsibility and mission of the CPC—to always put the people at the center, and constantly strive for the sci-tech advancement and innovative development of the times.

References

- [1] Li, J. J. (2022). Research on the Thought of Building China into a Science and Technology Power by the Communist Party of China in the New Era. Doctoral dissertation of South China University of Technology.
- [2] Zhang, X. N. (2021). The Communist Party of China's Century-Long Exploration and Contributions to Marxist Theories on Science, Technology, and the Economy. *Studies on Marxism*, (11), 68-78.
- [3] Xie, H. J. (2019). Research on the Development and Evolution of the Marxist Outlook on Science and Technology. Doctoral dissertation of Lanzhou University.
- [4] Zhao, W. L. (2017). Research on the Theories and Practices of Scientific and Technological Modernization by the Communist Party of China. Doctoral dissertation of Northwest University.
- [5] Ma, Y., & Hou, B. (2024). Theoretical Traits and Contemporary Values of the Outlook on Science and Technology. *Social Sciences in Guangdong*, 1-10.
- [6] Ma, Y., & Hou, B. (2024). Theoretical Connotations and Contemporary Values of the Outlook on Science and Technology. *Social Sciences in Guangdong*, (06), 5-14.
- [7] Xiao, X. L. (2024). The Main Content and Significance of the Important Expositions on Artificial Intelligence. *Studies on Mao Zedong Thought*, 41(03), 18-26.
- [8] Dong, Z. F. (2024). Research on the Important Expositions on Artificial Intelligence. Doctoral dissertation of Shenyang Jianzhu University.
- [9] Li, J. Y., & Ning, D. B. (2024). Research on the Scientific and Technological Innovation Strategy of the Guangdong - Hong Kong - Macao Greater Bay Area under the Guidance of the Outlook on Science and Technology. *Modern Business Trade Industry*, (23), 1-3.