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Chinese New System for Mobilizing Resources Nationwide: Background Study, Theoretical Transmutation and Process Analysis

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Abstract

The establishment of a new national system focused on breakthroughs in core technologies is a crucial step in perfecting the scientific and technological innovation system and enhancing the overall effectiveness of the national innovation system. This study systematically examines the new national system, delving into its theoretical characteristics, historical evolution, and global perspectives. It provides insights into the contemporary context, theoretical transformations, and historical experiences surrounding this system, highlighting its significance and implications for national development.

Keywords

Chinese New System; Scientific and Technological Innovation; New National System; Breakthrough in Key Technologies.

1. Background of the New National System

The world today is facing profound changes unseen in a century, with the deepening development of a new round of technological revolution and the profound reshaping of the global governance system. Currently, there are two global trends:

On one hand, traditional Western developed countries represented by the United States and Britain are accelerating their decline, while emerging developing countries represented by China and India are also accelerating their rise. China has become the world's second-largest economy, leaping to the forefront of the world in infrastructure construction, manufacturing, 5G, and mobile payments, and its influence on global economic growth is increasing.[1]

On the other hand, the fourth technological and industrial revolution is accelerating globally, focusing on industries such as artificial intelligence, virtual reality, quantum communication, and biotechnology. This provides a valuable opportunity for late-developing countries represented by China to catch up with developed countries led by Europe and the United States.

Under these two converging trends, whether China can seize the limited window period, occupy the commanding heights of the new industrial revolution, change the current situation where China is "bottlenecked" by Western developed countries in key core technology areas, achieve a leap in the country's overall scientific and technological strength, enhance its soft power, grasp international discourse, and promote a more just and reasonable direction for the global governance system has become a key point determining China's future and destiny.[2]

Therefore, it is an objective requirement to improve the new national system for tackling key technological cores, innovate the national system, and adapt to the needs of the Fourth Industrial Revolution, in order to conform to the trend of the times, actively participate in global governance, and effectively respond to great power competition. The study of the new national system is crucial for China's development as it enables the country to enhance its technological

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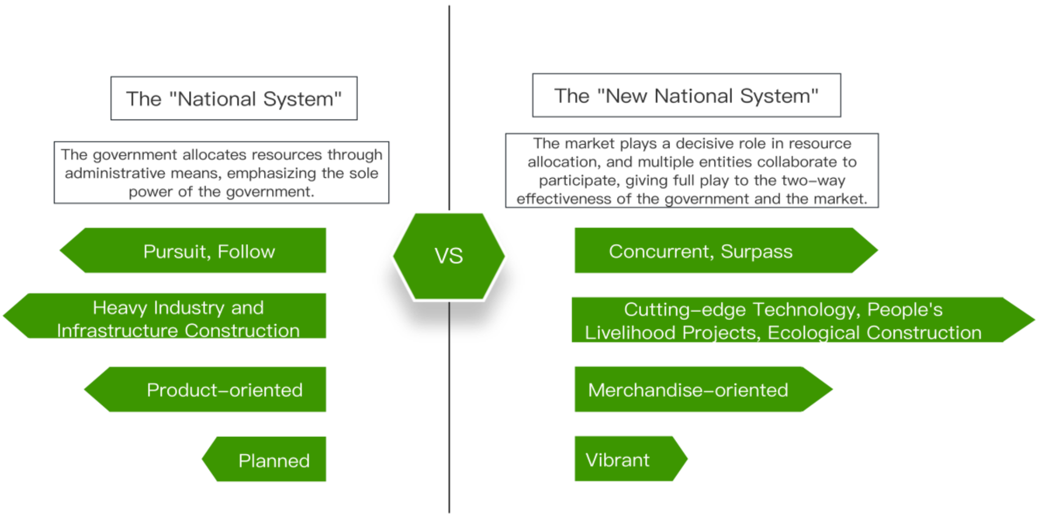
capabilities, strengthen its international competitiveness, and secure a leading position in the global technological landscape. Furthermore, this research holds significance for world development, as China's advancements in key technologies can contribute to global technological progress and innovation, ultimately driving economic growth and societal progress worldwide.

2. Theoretical Transmutation from the "National System" to the "New National System"for mobilizing resources nationwide

The "nationwide system" refers to marshaling the entire nation's resources to tackle difficult problems in a specific key area. The new nationwide system inherits the spiritual core of the traditional nationwide system, which is to "concentrate efforts to accomplish major tasks," as well as the leadership of the Communist Party of China. However, it also develops unique connotations and denotations that are not present in the traditional system. What makes the "new nationwide system" "new"? By summarizing academic viewpoints (Zheng Su and Li Li, 2021; Huangfeng Tang, 2022; Ruifeng Yan , 2022) and employing a comparative study between the new and traditional nationwide systems, the author explores its inherent logic from theoretical characteristics and historical logic, forming the following comparison (fig 1).

Fig 1: the new and traditional nationwide systems



The image presents a conceptual framework of the "New National System," which appears to be a comprehensive approach to economic and social development. The central element is a green cube labeled "New National System," suggesting a solid and multidimensional structure. This cube is surrounded by several blocks, each representing different aspects of the system.

At the top of the cube, there are two blocks: one indicating that the government allocates resources through administrative means, emphasizing its sole authority, while the other suggests that the market plays a decisive role in resource allocation, with multiple entities collaborating to ensure both government and market effectiveness. [3]These blocks imply a balance between government control and market forces, highlighting a shift from a solely government-driven model to one that incorporates market dynamics.

The image compares two distinct systems of resource allocation within a governmental context, namely, the "National System" and the "New National System." The National System is characterized by a top-down approach, emphasizing the government's role in allocating resources through administrative means. This system appears to prioritize heavy industry and infrastructure construction, reflecting a traditional focus on state-led economic development. The text "follow and oriented," "Planned," and "Vibrant" suggest a degree of predictability and control in resource allocation, with a focus on achieving set targets and maintaining stability. In contrast, the New National System adopts a more bottom-up approach, where the market plays a decisive role in resource allocation. This shift is marked by the emphasis on collaboration between multiple entities and the full utilization of the two-way effectiveness of both the government and the market. The categories "Concurrent, Surpass," "Cutting-edge Tech," and "Lifelong Projects, Eco" indicate a move towards innovation, sustainability, and people-centered development. The transition from the National System to the New National System reflects a shift from a planned economy to a more market-oriented one. This shift is not only economic but also ideological, as it involves a change in the role and perception of the government in resource allocation. The move away from a "Pursuit, Follow" strategy towards a "Concurrent, Surpass" approach suggests a greater emphasis on competitiveness and innovation.

Overall, The new national system for mobilizing resources nationwide in China is characterized by three fundamental features. First, it upholds the centralized and unified leadership of the Party, which is not only the fundamental characteristic but also the unique advantage of the new national system. Without the centralized and unified leadership of the Party, the new national system would not be able to operate. Second, it insists on the decisive role of the market in resource allocation. The most significant difference between the old and new national systems lies in the marketization of resource allocation and the diversification of participating entities, emphasizing a mechanism where government investment is the main source, supplemented by multi-channel social investment, and stressing the organic integration of government, market, and society for joint participation. Third, it focuses on major issues related to national development and security.[4] With modern major innovative projects as strategic leverage, the new national system has distinct political, collaborative, and strategic advantages, conducive to coordinating the construction and capability enhancement of the national security system, ensuring the safety of people's lives, and improving the level of national defense modernization. In the process of building a new development pattern with domestic circulation as the main body and dual circulation of domestic and international economies promoting each other, the new national system is conducive to achieving breakthroughs in key core technology fields, promoting the resolution of a batch of "bottleneck" technological issues such as chip manufacturing and photolithography, achieving technological self-reliance and strength, and playing a crucial role in strengthening China's economic, technological, and military security.

3. The Process Analysis of the Experience of Chinese New System

Globally, apart from China, many countries have adopted and implemented projects and policies similar to the new type of nationwide system. This type of system, led by the state and mobilizing multi-party resources, strives to achieve breakthroughs in key areas such as technological innovation, industrial upgrading, or social development. Practice has proven that these measures have largely achieved the desired effects.

Taking South Korea as an example, its "National R&D Program" is a typical nationwide system project. This project, led by the government, integrates the R&D strengths of scientific research institutions, universities, and enterprises, focusing on centralized research in key technological areas for national development. [5]Through long-term investment and effort, South Korea has made significant progress in areas such as semiconductors and display technology, effectively enhancing its national competitiveness.

Furthermore, the United States' "Apollo Program" is another successful example of a nationwide system. This program, with the goal of landing on the moon, mobilized national resources and technological forces, ultimately achieving the feat of the first human landing on the moon.[6] It not only demonstrated the country's technological prowess but also greatly promoted the development of related technologies and industries.

These projects and policies, similar to the new type of nationwide system, effectively promote technological innovation and social progress through a centralized approach. They not only enhance the comprehensive strength of the country but also bring long-term economic benefits and social benefits to participating countries. These successful cases demonstrate that resource integration and strategic planning at the national level are effective ways to promote rapid development in key areas. Meanwhile, these experiences provide valuable references for other countries, proving the important role of the nationwide system in promoting national development.

Details can be found in the following Table 1:

Table 1. Six main program comparing

Name	Country	Year	Operational Content
Manhattan Project	United States	1940s	Wartime mobilization of national efforts for scientific and technological research in aerospace.
Apollo Program	United States	1960s-1970s	Ditto
VLSI Program	Japan	1970s	Japanese government collaborating with corporate R&D teams in the field to tackle key challenges.
Eureka Program	Europe	1980s-21st Century	Bottom-up proposals from European research institutions and enterprises, jointly funded by national governments.
EUV Lithography System	United States	1990s-21st Century	Originated in Japan in the 1980s, the US organized "EUV LCC" to accelerate R&D, signing contracts with virtual national laboratories to promote technological development.
US Future Industry Institute (lot Fls)	United States	Started in 2021	Proposed by the President's Council of Advisors on Science and Technology (PCAST), established in 2021, the government organizes a nationwide collaborative manufacturing innovation network to address the transformation and application of basic research results.

Manhattan Project (United States, 1940s)

A top-secret research and development program aimed at developing nuclear weapons during World War II. It involved thousands of scientists and engineers working across multiple sites. This program successfully developed two types of nuclear weapons, which significantly impacted the war and post-war global politics. It also led to advancements in physics and engineering. The project raised ethical concerns due to its military application. It also led to a nuclear arms race between nations.

Apollo Program (United States, 1960s-1970s)

A spaceflight program that successfully landed humans on the Moon and returned them to Earth. It was a remarkable achievement in space exploration, boosting technological advancements and inspiring future generations. But the program was expensive and resource-intensive, with limited long-term scientific benefits compared to its costs.

VLSI Program (Japan, 1970s)

Focused on the research and development of Very Large Scale Integration (VLSI) circuits, aiming to improve the performance and reliability of electronic devices. It enhanced Japan's electronics industry, leading to more efficient and powerful computing devices. Otherwise, the rapid pace of technological advancement made it difficult to keep up with the latest innovations, and the program might have been too narrowly focused.[7]

Eureka Program (Europe, 1980s-21st Century)

A pan-European research initiative focusing on high-tech industries, involving multiple countries and research institutions. It fostered collaboration and technology transfer among European countries, leading to innovations in various fields. While coordinating such a large-scale project across multiple countries can be complex and bureaucratic, leading to inefficiencies.

EUV Lithography System (United States, Early 1990s-21st Century)

This program was the development of Extreme Ultra-Violet (EUV) lithography technology for semiconductor manufacturing. EUV lithography offers higher resolution and precision in chip manufacturing, enabling smaller and more powerful electronic devices. But the technology is complex and expensive, with significant research and development costs.

US Future Industry Institute (lot Fls) (United States, Started in 2021)

A recent initiative to create a nationwide manufacturing innovation network, focusing on the transformation and application of basic research results. It promotes collaboration and technology transfer between academia, industry, and government, potentially leading to faster and more efficient technological advancements. As a new initiative, its long-term impact and effectiveness are still uncertain, and it may face challenges in coordinating different stakeholders.

4. Summary

In the evolving and improving process of the new nationwide system, we need to need to learn from the experience of the predecessors, especially focus on the following aspects:

Firstly, we must deeply understand the challenging and complex nature of key core technology innovation. Such technologies often involve high investment, high risk, and long research and development cycles, making it difficult for pure market mechanisms to drive breakthroughs. Therefore, the government's leading role is crucial. We must fully utilize the institutional advantages of socialism in concentrating efforts to accomplish major tasks, build a new nationwide system to centralize resources and optimize the innovation environment, thereby providing solid support for breakthroughs in key core technologies.

Secondly, when promoting technological innovation, the new nationwide system needs to properly handle multiple relationships. This includes balancing independent innovation and opening up to the outside world, ensuring autonomous control in key areas while actively participating in international scientific and technological cooperation and exchanges. [8]It also involves coordinating basic research and applied development, increasing investment in basic research to enhance original innovative capabilities, and promoting the transformation and application of scientific and technological achievements. Additionally, it requires managing the relationship between institutional innovation and technological innovation so that they complement each other. Moreover, balancing short-term goals and long-term planning to ensure the sustainability of technological development is essential. Lastly, it necessitates striking a balance between the dedication of scientific researchers and material incentives, advocating scientific spirit while reasonably protecting the interests of scientific researchers.

Furthermore, upholding the innovative subject status of enterprises is crucial. Enterprises should become the main force of scientific and technological innovation, independently participating in market economy operations and fully tapping their innovative potential to promote the sustainable development of the market economy.

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Additionally, institutions of higher learning and scientific research institutes play an important role in this process. Due to the characteristics of basic research, enterprises may invest less in certain areas, making it difficult to achieve breakthroughs through the market. Therefore, institutions of higher learning and scientific research institutes should provide impetus for key core technology research in basic research and talent guarantee for implementing the new nationwide system.

Finally, it is essential to clarify and improve the institutional framework of the new nationwide system. Starting from the macro and micro levels, we should optimize the top-level design of scientific research management, improve the innovation ecology, promote the deep integration of industry, education, and research, and form a collaborative innovation pattern involving the government, enterprises, scientific research institutions, and other parties. Through the implementation of these comprehensive measures, we are confident that we can effectively promote breakthroughs in key core technologies, laying a solid foundation for achieving scientific and technological self-reliance and building a world scientific and technological power.

References

[1] Zeng Xiankui. Research on Constructing a New Type of Nationwide System for Tackling Key and Core Technologies in China [J]. Hubei Social Sciences, 2020(03): 26-33.

[2] Chen Jin, Yang Zhen, Zhu Ziqin. Solving the "Neck-Sticking" Technology During the "14th Five-Year Plan" Period: Identification Framework, Strategic Shift and Breakthrough Path [J]. Reform, 2020(12): 5-15.

[3] Tang Huangfeng, Xu Zhi. Scientific Connotation, Unique Advantages, and Operational Mechanism Optimization of the New Type of Nationwide System [J/OL]. Journal of Xinjiang Normal University (Philosophy and Social Sciences Edition): 1-11 [2022-11-27].

[4] Zhang Yu, Zheng Chonghui, Jiang Yanbin. Implementation Path of the New Type of Nationwide System in Scientific and Technological Innovation [J/OL]. World Science and Technology Research and Development: 1-7 [2022-11-27].

[5] Korea Institute of S&T Evaluation and Planning. Report of Investigation and Deep Analysis of Long-Term Science and Technology Plan of the 2016 Years. Seoul city: Korea Institute of S&T Evaluation and Planning, 2016.

[6] Apollo program office. NASA–Apollo program managemen[EB/OL]. National Technical Information Service, 1967.

[7] Tetsuya I .Japan Chapter Holds VLSI Symposium on Circuits Technical Seminar and Distinguished Lecturer Program [Chapters][J]. IEEE Solid-State Circuits Magazine, 2017, 9(4): 118-118.

[8] Nambisan S, Lyytinen K, Majchrzak A, et al. Digital Innovation Management: Reinventing Innovation Management Research in a Digital World[J]. MIS Quarterly, 2017, 41(1): 223-238.