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Research on optimizing the layout of new quality productivity on cross-regional synergistic science and technology innovation and economic development

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Abstract

In September 2023, General Secretary Xi Jinping first put forward the new quality of productivity when he visited and researched in Heilongjiang. New quality productivity is "spawned by revolutionary breakthroughs in technology, innovative allocation of production factors, and deep transformation and upgrading of industries". Optimizing the layout of the new quality productivity can provide a new dynamic energy and a new path for promoting the coordinated development of regional economy and realizing the common prosperity of the region. This paper defines the connotation of new productivity and cross-regional collaborative scientific and technological innovation, conducts a deep analysis of the coordinated development of new productivity and cross-regional collaborative scientific and technological innovation in the eastern developed regions, explores the impact mechanism of optimizing the layout of new productive forces on cross-regional collaborative scientific and technological innovation and economic development, and puts forward policy recommendations for the benefit of cross-regional collaborative scientific and technological innovation and the quality of economic development.

Keywords

New quality productivity, cross-regional, science, technology and innovation, economic development.

1. Introduction

Major countries in the world will achieve carbon neutrality by the middle of the 21st century, so it is not difficult to foresee that the green and smart integrated productivity paradigm will be in a period of high fever from now until about 2035, and then enter into a period of unfolding, and reach maturity by the middle of the 21st century. As a developing core country of the world system, China must firmly grasp the historic strategic opportunity of the intertwined synthesis of the sixth productivity paradigm change and innovation-driven development, and vigorously develop new-quality productivity. Therefore, General Secretary Xi Jinping pointed out that the development of new-quality productive forces is the inherent requirement and primary task of high-quality development, and that it is necessary to firmly grasp this requirement and task, develop new-quality productive forces in accordance with local conditions, and promote the accelerated development of new-quality productive forces. The coordinated development of new regions, as the spatial integrated performance of high-quality development in the stage of comprehensively building a socialist modernized country and marching towards the second hundred-year goal, should put the optimization of the layout of new-quality productive forces in the central position. Therefore, this paper will explore the impact of new productivity on cross-regional collaborative scientific and technological innovation and economic development

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and put forward policy recommendations to optimize the layout of new productivity for cross-regional collaborative scientific and technological innovation and economic development.

2. Literature review

In September 2023, Xi Jinping, while presiding over a symposium on promoting the comprehensive revitalization of the Northeast in the new era, emphasized that "we should actively cultivate strategic emerging industries such as new energy, new materials, advanced manufacturing, electronic information, etc., as well as industries of the future, so as to accelerate the formation of new productive forces and enhance the new impetus for development." For the first time, the concept of "new quality productivity" was put forward. As the specific expression of advanced productive forces in the new development stage, the new quality productive forces are the breakthrough results of continuous innovation in science and technology, and the productive forces that meet the requirements of high-quality development, which has its unique characteristics of the times. Li Xiaohua (2023) believes that the new quality productivity not only presents the general characteristics of subversive innovation, new industrial chain, high development quality, etc., but also has the epochal characteristics of digitalization and greening in the context of the new era. The development of new quality productivity is a kind of leaping up of traditional productivity, and Zhou Wen and Xu Lingyun (2024) believe that the formation process of new quality productivity is the process of realizing key technology and subversive technological innovation on the basis of the inheritance of traditional productivity. The development of new quality productivity should correctly recognize the interrelationship between new quality productivity and traditional productivity. For the research on the practical significance of new quality productivity, some scholars believe that the development of new quality productivity is an important driving force to promote high-quality development. Shi Jianxun and Xu Ling (2023) believe that the development of new quality productivity can further enhance the level of science and technology, promote industrial transformation and upgrading, and ultimately realize the high-quality development of the economy. The continuous development of productive forces is the fundamental driving force for the realization of Chinese-style modernization (Zhang Lin, 2024), and from the perspective of the nature of development, the new quality of productive forces and Chinese-style modernization reflect a high degree of internal consistency in terms of the key tasks, values to be followed, development requirements, and practical principles. In the process of the new round of scientific and technological revolution and industrial change, the new quality productive forces gradually become an important force to promote the development of China style modernization (Zhou, Wen, Li, Jiliang, 2024, Zhou, Wen, He, Yuqing, 2024). Jiang Qiping (2024) pointed out that the understanding of the new quality productivity should be based on the perspective of combining the productive forces and production relations, and fully activate the development potential of data elements. Yin Ximing et al. (2024) pointed out that through comprehensively deepening the reform, we should form the production relations that are compatible with the new quality productivity, and fully release the development momentum of the new quality productivity.

In recent years, among the studies on cross-regional synergistic science, technology and innovation development, theoretical studies on regional differences and the feasibility of synergistic development have predominated. At the beginning of the 21st century, China put forward and implemented the strategies of pioneering development in the east, the rise of central China, the development of western China and the comprehensive revitalization of northeastern China around the four major plates in the east, central, western China and northeastern China, and initially constructed a strategic system of coordinated development of the region, and in recent years, coordinated development of the region in China has achieved

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significant milestones, and has gradually worked out a number of fruitful experiences and practices, with obvious significance of the demonstration. However, the layout of new quality productive forces at the regional level is still constrained by the long-standing rigidity of institutional mechanisms, locked industrial paths, imperfect public service functions and other practical blockages. The development of new-quality productive forces is the inherent requirement and primary task of high-quality development, and it is necessary to firmly grasp this requirement and task, develop new-quality productive forces in accordance with local conditions, and promote the accelerated development of new-quality productive forces. The coordinated development of new regions, as the spatial integrated performance of high-quality development in the stage of comprehensively building a socialist modernized country and marching towards the second hundred-year goal, should put the optimization of the layout of new-quality productive forces in the central position. Zhang Keyun (2024) and Yang Kaizhong (2024) discussed the optimization of the layout of the new quality productivity to accelerate the development of scientific and technological innovation, and the key to promote the new quality spatial integration of the "4D" path spatial cycle consists of division, distance, density, heterogeneity, and heterogeneity. The spatial cycle is determined by the four geographical characteristics of Division, Distance, Density and Diversity (Yang Kaizhong et al., 2022), and the path of promoting new spatial integration with smooth convection lies in the "4Ds". The first is to eliminate the division of system, technology and facilities, and establish and improve the unified system rules based on the free movement of people; the second is to promote the development of compact and interconnected, in order to minimize the distance between the micro, to achieve the maximum optimization of the layout of emerging industries, future industries, new service industry locations, to achieve reasonable separation of jobs and housing, and efficient commuting in the Green Intelligence; the third is to make the best use of the density, and to take the benign interaction of innovation, mobility, and spatial quality as the driving force; the fourth is to manage heterogeneity, based on the green intelligence integrated spatial integration. Managing heterogeneity, optimizing the regional division and classification system based on the change of the Greenwise integrated productivity paradigm, guiding the development of new-quality productivity according to local conditions, maximizing the liberation and development of new-quality productivity, and striving to realize the new-quality co-prosperity of people. Discuss how to realize the development of regional synergistic science and technology innovation from the perspective of system theory.

3. In-depth analysis of the impact of new quality productivity in the developed eastern region on cross-regional collaborative science and technology innovation

In today's era, the new quality productivity is reshaping the economic pattern and the map of science and technology innovation in an unprecedented manner. For the developed regions in the east, by virtue of their profound economic foundation, rich innovation resources and perfect industrial system, they occupy a leading position in the development of new productivity. The vigorous development of new quality productivity in the eastern developed region has had a profound impact on cross-regional collaborative scientific and technological innovation, which is mainly reflected in the following key aspects:

3.1. Promoting cross-regional flows and efficient allocation of innovation factors

New quality productivity is often based on cutting-edge technologies, such as artificial intelligence, big data and cloud computing, etc. The development of these technologies has prompted all kinds of innovation factors, including talents, capital, technology and data, to

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break regional boundaries and realize a freer and more efficient flow. In the eastern developed regions, for example, in the Yangtze River Delta, Shanghai, as an international metropolis, has top scientific research institutes and rich financial resources; Hangzhou has a significant advantage in the field of Internet technology and has gathered a large number of Internet talents; and Suzhou is strong in manufacturing innovation. The new quality of productivity prompts Shanghai's high-end talents to provide technical guidance for Hangzhou's Internet enterprises, Hangzhou's Internet technology can help Suzhou's manufacturing industry to upgrade its intelligence, while financial resources can be flexibly deployed among the three places according to the needs of innovation projects. This cross-regional factor flow and allocation has greatly improved the utilization efficiency of innovation resources and injected a strong impetus for cross-regional collaborative science and technology innovation.

3.2. Promoting industrial upgrading and cross-regional industrial co-innovation

The new quality of productivity in the developed eastern region has driven the transformation of traditional industries to high-end, intelligent and green, and at the same time given rise to a series of new industries. In the process of industrial upgrading, cross-regional industrial collaborative innovation has become an inevitable trend. For example, in the Pearl River Delta (PRD) region, Shenzhen has leading R&D capabilities in the fields of electronic information and artificial intelligence, while Dongguan has a strong industrial base in electronics manufacturing. The new quality of productivity makes Shenzhen's R&D results can be quickly industrialized production in Dongguan, Dongguan in the production process of the feedback can prompt Shenzhen to further optimize the R & D. At the same time, this industrial co-innovation also extends to the development of the industry. At the same time, this industrial co-innovation also extends to neighboring cities, forming a complete industrial chain co-innovation system from R&D, design, production to sales, and enhancing the competitiveness of the whole region in the global industrial chain.

3.3. Creating a favorable innovation environment and co-construction of cross-regional innovation ecosystems

The development of new-quality productive forces requires a compatible innovation environment, including policy support, intellectual property protection and a culture of innovation. Developed regions in the east are actively exploring this area, and have attracted a large number of innovation bodies to gather by formulating a series of policies to encourage innovation, such as tax incentives and research subsidies. At the same time, they have strengthened the protection of intellectual property rights, provided solid protection for innovation achievements, and created a strong atmosphere of innovation culture. In cross-regional collaborative science and technology innovation, this favorable innovation environment has a strong spillover effect. In the Beijing-Tianjin-Hebei region, Beijing's innovation policies and cultural atmosphere can radiate to Tianjin and Hebei, driving the optimization of the innovation environment in the two places. The three places are working together to build a cross-regional innovation ecosystem through the joint construction of innovation parks and platforms for the transformation of scientific and technological achievements, so as to realize the sharing of innovation resources and the synergistic development of innovation activities.

3.4. Enhancing regional innovation capacity and efficiency of cross-regional innovation synergies

The development of new productive forces has prompted the eastern developed regions to continuously improve their own innovation capacity and make breakthroughs in key core technology areas. The enhancement of this innovation capacity has provided strong support for

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cross-regional collaborative scientific and technological innovation. Taking the Shandong Peninsula City Cluster as an example, Qingdao has outstanding innovation capacity in the field of marine science and technology, and Yantai is strong in high-end equipment manufacturing. The new quality productivity promotes Qingdao and Yantai to strengthen cooperation in related fields, share scientific research facilities, scientific research data and other resources, and jointly carry out scientific research. Through cross-regional innovation synergy, it not only improves the efficiency of innovation and shortens the innovation cycle, but also integrates the advantages of all parties, realizes innovation breakthroughs at a higher level, and enhances the innovation status of the whole region in the country and even globally.

4. Policy recommendations for facilitating cross-regional synergies in the quality of science, technology and innovation and economic development

At a time of economic globalization and rapid development of science and technology, the developed regions in the east, as an important engine of China's economic growth, realize cross-regional synergistic scientific and technological innovation, which is crucial to improving the quality of economic development. By formulating reasonable and effective policies, we can further integrate regional resources, stimulate innovation vitality, and promote sustainable and high-quality economic development. The following policy recommendations are made from a number of key aspects.

4.1. Improve regional coordination mechanisms and break down administrative barriers

Establishing a high-level cross-regional coordinating body, with the participation of key leaders from eastern provinces and cities, responsible for coordinating and planning major matters related to regional synergistic science, technology and innovation and economic development. This body holds regular meetings to discuss cooperation projects, coordinate the distribution of benefits, and resolve policy conflicts. For example, in the Yangtze River Delta (YRD) region, the YRD Regional Integration and Development Leading Group was set up to carry out top-level design and decision-making on the collaborative development of transportation, science and technology, and industry in the region. At the same time, a regularized communication and consultation mechanism is constructed to encourage multi-level exchanges among government departments, scientific research institutions, enterprises and other subjects across the region. A platform for online and offline exchanges, such as the regular organization of regional innovation and development forums, will be set up to promote information sharing and experience exchange, solve problems arising in the process of synergism in a timely manner, and ensure that regional synergistic work is carried out smoothly.

4.2. Increase innovation investment and strengthen the innovation support system

Setting up a special fund for cross-regional collaborative innovation in developed regions in the east, to be jointly funded by the central and local governments, with a focus on supporting major scientific and technological research projects, the construction of innovation platforms and the transformation of innovation results. For example, financial support will be given to scientific research projects in key areas such as integrated circuits and biomedicine, which are jointly carried out in the Yangtze River Delta and the Pearl River Delta. At the same time, financial institutions will be guided to increase their support for scientific and technological innovation, and banks will be encouraged to develop financial products targeting innovative enterprises, such as loans for intellectual property pledges and special loans for the transformation of scientific and technological achievements. In addition, improve the risk investment mechanism,

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attract social capital to participate in investment in science and technology innovation, and provide diversified financing channels for innovative enterprises, so as to solve the problem of financial bottlenecks in innovative activities.

4.3. Optimize industrial layout and promote industrial collaborative innovation

Formulating regional industrial collaborative development plans and clarifying the industrial positioning and development direction of each region. For example, in the Beijing-Tianjin-Hebei region, Beijing focuses on the development of scientific and technological innovation and high-end service industries, Tianjin focuses on advanced manufacturing and modern shipping, and Hebei focuses on the transformation and upgrading of traditional industries and the acceptance of industrial transfers. Through industrial division of labor and collaboration, the region can avoid homogeneous industrial competition and achieve complementary advantages. Encourage the construction of cross-regional industrial alliances, led by industry leading enterprises, combined with upstream and downstream enterprises, scientific research institutions, universities and other organizations to form industrial innovation alliances, and jointly carry out technological research and development, standard-setting, market development and other activities. For example, the Electronic Information Industry Alliance in the Pearl River Delta has integrated the resources of enterprises in the region and achieved remarkable results in the research and development and application of 5G communication technology, which has enhanced the global competitiveness of the entire regional industry.

4.4. Strengthening talent training and mobility to build a talent plateau

The implementation of a cross-regional talent joint training program encourages cooperation between universities and research institutions in the eastern region and enterprises to jointly cultivate composite talents adapted to the needs of regional collaborative innovation. For example, universities in the Yangtze River Delta region have allied to carry out cross-college elective courses, joint training of postgraduate students and other programs to broaden talent training channels. At the same time, the establishment of a flexible mobility mechanism for talents, breaking the restrictions on household registration and establishment, and allowing talents to move freely within the region on a part-time basis. For talents who have made outstanding contributions in cross-regional collaborative innovation, incentives and policy preferences will be given, such as housing subsidies and school enrollment facilities for children, so as to attract more outstanding talents to devote themselves to the cause of regional collaborative innovation.

4.5. Promote the sharing and transformation of innovation results to enhance the benefits of economic development

A regionally unified trading platform for scientific and technological achievements has been constructed, integrating scientific and technological achievement resources from developed regions in the east and realizing the interconnection of information on achievements. The platform provides one-stop services such as fruit display, trading, evaluation and legal counseling to reduce the cost of fruit trading and improve the efficiency of fruit transformation. Improve the incentive mechanism for the transformation of scientific and technological achievements, and provide tax incentives, financial subsidies and other rewards to scientific researchers and enterprises that have made important contributions in the process of transforming achievements. For example, enterprises that have successfully transformed scientific and technological achievements into actual productivity will be given tax breaks for a certain period of time, so as to stimulate the enthusiasm of all parties to participate in the transformation of achievements, promote the transformation of innovative achievements into

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actual productivity as soon as possible, and facilitate the improvement of the quality of regional economic development.

5. Conclusion

With their economic, resource and industrial advantages, developed regions in the east are leading in the development of new quality productivity, which has a profound impact on cross-regional collaborative science and technology innovation. Relying on cutting-edge technologies, the new quality productivity promotes the efficient cross-regional flow and allocation of innovation factors, such as in the Yangtze River Delta region, where Shanghai's talents and finances help Hangzhou's Internet and Suzhou's manufacturing industry to become intelligent. At the same time, to promote industrial upgrading and cross-regional industrial co-innovation, the Pearl River Delta region, Shenzhen R & D and Dongguan manufacturing synergies, the formation of a complete industrial chain innovation system to enhance global competitiveness. Also create a favorable innovation environment, Beijing-Tianjin-Hebei region, Beijing innovation radiation Tianjin-Hebei, to build a common innovation ecosystem. And enhance regional innovation capacity and synergy efficiency, Shandong Peninsula city cluster Qingdao, Yantai cooperation to achieve innovation breakthroughs.

In order to further enhance the quality of cross-regional synergistic science and technology innovation and economic development in the developed eastern region, the policy suggests a multifaceted approach. Improve the regional coordination mechanism, set up a high-level coordination body, build a regular communication and consultation mechanism, and break down administrative barriers. Increase investment in innovation, set up special funds, guide the support of financial institutions, and improve the risk investment mechanism. Optimize industrial layout, formulate plans for collaborative development of industries, and encourage the construction of industrial alliances. Strengthen talent training and mobility, implement joint training programs, and establish a flexible mobility mechanism. Promote the sharing and transformation of innovation achievements, build a unified trading platform, and improve the incentive mechanism. Through the synergy of these policies and impacts, the eastern region will be helped to occupy a favorable position in the global competition in science and technology innovation and promote high-quality economic development.

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