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Research on the Empowerment of Regional Innovation by the Digital Economy

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Abstract: ***This paper explores the impact of the digital economy on regional innovation and its empowering role. Regional innovation faces challenges such as uneven distribution of innovation resources, imperfect ecosystems, and institutional barriers. The digital economy, through technological innovation, optimized resource allocation, construction of innovation ecosystems, and policy optimization, provides new development opportunities for regional innovation. In the future, the digital economy should be leveraged to accelerate technology application, promote knowledge sharing, enhance innovation efficiency, and improve regional innovation levels through the development of digital platforms and infrastructure.***

Keywords: Digital Economy; Regional Innovation; Innovation Ecosystem; Resource Allocation.

1. INTRODUCTION

In recent years, the digital economy has shown vigorous development globally, profoundly impacting the world economy. The Chinese government places high importance on the development of the digital economy, proposing the "Internet Plus" strategy to accelerate the deep integration of the digital economy with the real economy and promote high-quality economic development. The digital economy, driven by data and supported by cutting-edge technologies such as cloud computing, big data, the Internet of Things, and artificial intelligence, has facilitated the digital transformation of traditional industries and spawned numerous new business forms and models. However, regional innovation practices still face many challenges, such as uneven distribution of innovation resources, imperfect innovation ecosystems, and institutional barriers. Meanwhile, the rapid development of the digital economy provides new ideas and tools to address these issues. In this context, exploring the impact of the digital economy on regional innovation is significant for understanding new trends and patterns in regional innovation development in the digital economy era and for formulating corresponding development strategies and policies. Therefore, this paper aims to analyze the main problems faced by regional innovation, explore the impact of the digital economy on regional innovation, and provide theoretical foundations and policy recommendations for promoting regional innovation development.

2. PROBLEMS FACED BY REGIONAL INNOVATION

Regional innovation is a complex ecosystem composed of multiple innovation entities, including enterprises, universities, research institutions, and governments. Within a specific geographical space, the interaction and cooperation among these entities form regional innovation capabilities and activities. The connotation of regional innovation is rich, involving knowledge creation, technology transfer, industrial upgrading, and other aspects, and is an important manifestation of regional competitiveness. Regional innovation is influenced by various factors, including regional economic development level [1], regional innovation resources [2], regional innovation ecosystems [3], and regional policies and institutional environments [4].

Firstly, economically underdeveloped regions often lack sufficient fiscal funds and social capital, leading to inadequate R&D investment and lagging innovation infrastructure. Additionally, these regions struggle to provide high-quality living and working environments, resulting in the outflow of high-quality talent and the formation of talent-deprived areas, lacking support from innovative talent. Secondly, the uneven distribution of innovation resources severely restricts the balanced development of regional innovation capabilities. Innovation activities heavily rely on knowledge resources, and tacit knowledge often has regional stickiness, making it difficult to spread across regions. This results in innovation resources being concentrated in a few areas, while other regions struggle to access and utilize these resources. Furthermore, the imperfect innovation ecosystem hampers the efficiency of regional innovation. In some regions, the establishment of innovation ecosystems is slow, and there is a lack of cooperative awareness. The lack of effective cooperation mechanisms among upstream and downstream of the supply chain, industry, academia, and research leads to low levels of innovation output. At the same time, the innovation service system is incomplete, lacking professional intermediary service institutions, making it

difficult to provide enterprises with comprehensive innovation services such as technology transfer and intellectual property protection, which constrains regional innovation activities. Finally, institutional barriers hinder the coordinated development of regional innovation. Currently, due to administrative barriers, policies in different regions lack effective connection and coordination, leading to the inability to share resources, resulting in waste, and restricting the free flow of innovation elements across regions, thereby limiting the optimal allocation of innovation resources.

3. THE EMPOWERING ROLE OF THE DIGITAL ECONOMY IN REGIONAL INNOVATION

With the rapid development of digital technology, the digital economy has become an important force in promoting regional innovation. This paper analyzes the multidimensional impact of the digital economy on regional innovation, including technological innovation, resource allocation, innovation ecosystems, and policy optimization.

The digital economy accelerates regional innovation by promoting the application and development of new technologies. According to research by Gao and Li (2024), the development of the digital economy significantly enhances urban entrepreneurial activity, including the level of technological innovation [5]. Liu and Zhang (2024) point out that the digital economy has a significant positive impact on the green innovation efficiency of enterprises, showing a nonlinear “U”-shaped threshold effect at different development stages. This indicates that the digital economy may initially inhibit innovation efficiency, but with the improvement of digital infrastructure and the deepening application of digital technology, it will significantly enhance the green innovation capabilities of industries [6]. Research by Cui and Yang (2023) shows that the digital economy positively improves regional entrepreneurial quality by promoting entrepreneurial economic benefits and technological innovation levels [7]. Digital technologies such as cloud computing, artificial intelligence, and big data provide entrepreneurs with rich technical resources and tools, lowering the threshold and cost of technological innovation, thereby stimulating regional innovation vitality. Additionally, the digital economy drives the digital transformation of traditional industries by introducing digital technologies to transform and upgrade production processes, management methods, and business models, improving the intelligence and automation levels of industries, thereby enhancing their innovation capabilities.

The rise of digital platforms facilitates the centralized display and trading of innovation resources, promoting the marketization and capitalization of innovation elements. Today, data resources are increasingly becoming indispensable core elements, and the massive information they contain is reorganized and optimized through the deep integration of internet platforms and digital technologies. Li and Li (2022) believe that in this process, the development of the digital economy promotes the widespread application of information technology, accelerates the dissemination and sharing of knowledge, and this technological spillover effect promotes the exchange and collision of innovative ideas, stimulating innovation inspiration [8]. Chen et al. (2022) pointed out that the rise of the digital economy has significantly improved the efficiency of the flow of innovation factors. With the open nature, cross regional dissemination, and sharing advantages of data, it effectively eliminates the temporal and spatial barriers in innovation activities and expands the coverage and depth of innovation layout [9]. This transformation provides favorable conditions for breakthroughs in core and cutting-edge technologies, accelerating the transformation speed of innovative achievements. Liu (2025) believes that the flourishing of the digital economy can effectively narrow the information gap, reduce information asymmetry among trading entities, and optimize the efficiency of market resource allocation. By promoting the marketization process of technology and labor factors, the digital economy weakens the segmentation of the technology and labor factor markets, providing strong support for the widespread dissemination of technological innovation [10].

The innovation ecosystem integrates multiple entities, optimizes resource allocation, promotes knowledge flow and collaborative cooperation, providing continuous momentum for regional innovation, driving technological breakthroughs and industrial upgrading, enhancing regional competitiveness, and serving as an important support for achieving high-quality regional economic development. Research by Jiang et al. (2025) shows that digital transformation enhances the efficiency of regional innovation ecosystems through the transformation of innovation entities, networks, and paradigms, with specific mechanisms including multi-entity collaboration, diversified production, multi-dimensional openness, multi-behavior control, multi-process incentives, and multi-track evolution, thereby optimizing the overall efficiency of the system [11]. Rong et al. (2023) believe that the booming development of the digital economy is profoundly changing the pattern of innovation ecology. As a new engine of economic growth, the digital economy accelerates the flow and integration of innovation resources

through technological empowerment and data-driven approaches, injecting new vitality into the innovation ecosystem. Against this backdrop, enterprise organizations are gradually transforming towards platformization and ecologicalization, and innovation activities are shifting from being dominated by a single entity to diverse collaboration, forming an innovation ecosystem centered around platforms [12]. This ecosystem breaks the boundaries of traditional innovation models, promotes cross domain and cross regional collaboration, and significantly improves innovation efficiency. At the same time, the widespread application of digital technology has reduced innovation costs, promoted technology diffusion and achievement transformation, and provided a solid foundation for the sustainable development of the innovation ecosystem. Shao and Yang (2023) emphasized that the rapid development of the digital economy has promoted the transformation of enterprise innovation networks towards openness and collaboration, breaking the limitations of traditional closed innovation models, changing the situation of isolated innovation by enterprises, and promoting their integration into the innovation collaboration system [13].

The digital economy provides new possibilities for breaking through institutional barriers in regional innovation. Digital technology has promoted data sharing and business collaboration between regions, helping to break down administrative barriers and promote regional integration development. Technologies such as big data and artificial intelligence provide scientific basis for policy formulation and evaluation, which helps to strengthen inter regional policy coordination and improve policy implementation effectiveness. Meanwhile, the application of digital technology provides technical support for establishing a more scientific and comprehensive innovation evaluation system, which helps guide regional innovation towards high-quality and sustainable development. The study by Zhao and Yi (2022) emphasizes the role of the government in accelerating the process of urban digital construction, and proposes that the government should take the construction of new infrastructure and business environment as important measures. This indicates that the government's policy orientation is crucial for stimulating the potential of digital economy for regional innovation [14]. Zhao et al. Research has found that the digital economy has significantly improved the governance capacity of local governments, and this improvement effect is more pronounced in areas with higher levels of informatization or better technological innovation atmosphere [15].

By citing the above research, we can conclude that the digital economy is an important driving force for regional innovation. Its development not only promotes the application of new technologies and industrial upgrading but also strengthens knowledge sharing and cooperation, creating a favorable innovation atmosphere. At the same time, government policy support and optimization can help it achieve its maximum potential for innovation.

4. CONCLUSION

The digital economy provides new development opportunities for regional innovation, effectively addressing the main problems faced by regional innovation by stimulating the entrepreneurial and innovative vitality of regional enterprises, promoting the flow and sharing of innovation resources, optimizing innovation ecosystems, and enhancing government governance capabilities.

In the future, we should further promote the deep integration of digital economy and regional innovation, fully leverage the empowering role of digital economy, and promote high-quality development of regional economy. Firstly, we should strengthen the construction of digital infrastructure. Prioritize investing in digital infrastructure such as 5G networks, cloud computing platforms, and big data centers to support the flow and sharing of innovative resources. Secondly, promote the balanced allocation of innovative resources. To address the issue of uneven distribution of innovation resources, digital platforms should be used to promote the cross regional flow of knowledge resources and break geographical limitations. For example, establishing innovation resource sharing platforms between regions, promoting the dissemination and utilization of tacit knowledge, and narrowing the innovation gap between developed and underdeveloped areas. Once again, build a collaborative innovation ecosystem. We should encourage collaborative cooperation among diverse entities such as enterprises, universities, research institutions, and governments to promote deep integration of industry, academia, and research. By establishing an open and shared innovation platform, promoting cooperation between upstream and downstream of the supply chain, and improving the efficiency of transforming innovative achievements. At the same time, we will improve the innovation service system, introduce professional intermediary agencies, and provide services such as technology transfer and intellectual property protection. In addition, optimize the policy environment and governance capacity. The government should break down administrative barriers through digital technology and promote policy coordination and resource sharing between regions. Utilizing big data and artificial intelligence technology to formulate scientific and precise innovation policies, enhance policy implementation effectiveness, and create a favorable institutional environment for regional innovation. Finally, stimulate the innovation vitality

of enterprises. Enterprises should be encouraged to use digital technology for digital transformation, promoting the upgrading of production processes, management methods, and business models. By providing policy support and financial incentives, we aim to help businesses lower their innovation barriers, enhance their green innovation capabilities, and improve their market competitiveness.

In short, managers should fully utilize the empowering role of the digital economy, build an open, shared, and efficient innovation ecosystem through the synergy of technology, resources, and policies, promote the comprehensive improvement of regional innovation capabilities, and achieve high-quality development of the regional economy.

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