

Countermeasures and Suggestions for Empowering the Development of the Real Economy in Heilongjiang Province with the Digital Economy

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Abstract: *In recent years, China's digital economy has developed rapidly. The deep integration of the digital economy and the real economy has empowered the development of the real economy, resulting in significant changes in the production methods, management methods, and business models of traditional real economy industries. The digital economy has become a new driving force for the transformation and development of traditional real economy industries. Heilongjiang Province has rich scene resources and huge potential for developing the digital economy. Studying how the digital economy can better empower the development of the real economy in Heilongjiang Province is of great significance for the upgrading of traditional industries and economic development in Heilongjiang Province.*

Keywords: *Digital economy; Real economy; Industrial transformation and upgrading*

1. Introduction

The digital economy is a new economic form, which has developed rapidly in recent years and received great attention. As early as 2016, the G20 Hangzhou Summit put forward the concept of economic development for the first time. Later, in 2017, it was written into the work report of the government for the first time, and repeatedly mentioned Internet plus, intelligent manufacturing, digital economy and other related contents. In the report of the 19th National Congress of the Communist of China, it specifically mentioned "digital economy" and "digital China". The rapid development of digital economy has brought new opportunities to the development of the real economy, gradually becoming the key to promoting the transformation and upgrading of the real economy. In recent years, the Heilongjiang Provincial Government has actively responded to the call for the construction of a digital China, deeply implemented the decisions and deployments of the Party Central Committee and the State Council on the comprehensive and all-round revitalization of Northeast China, accelerated the construction of information infrastructure, actively utilized digital technology, and empowered the digital economy to traditional real economies such as manufacturing, agriculture, and tourism. In terms of policy, the "14th Five Year Plan for the Development of Digital Economy in Heilongjiang Province" was released, and the overall blueprint and action guide for promoting the development of digital economy in the province during the 14th Five Year Plan period were formulated. ^[1]The "Digital Longjiang" development plan was proposed, promoting the digital economy to gradually become a new engine for high-quality economic development in Heilongjiang Province. Empowering the digital economy to the real economy of Heilongjiang has brought new vitality to its development, but there are still many problems in this process. Therefore, this article will start from the three representative real economy industries of manufacturing, agriculture, and tourism in Heilongjiang Province, analyze the current situation and existing problems of digital economy empowering the real economy in Heilongjiang Province, and provide policy suggestions to solve these problems, in order to promote the better empowerment of the digital economy to the development of the real economy in Heilongjiang Province.

2. Current Situation of Digital Economy Development in Heilongjiang Province

Overall, the development of China's digital economy has maintained rapid growth. According to the latest data from the National Bureau of Statistics in 2022, the scale of China's digital economy revenue reached 45 trillion yuan in 2020, accounting for over 40% of GDP. In 2021, the scale of China's digital economy revenue reached 39 trillion yuan, accounting for 38.6% of GDP. The Heilongjiang Provincial Government attaches great importance to the development of the digital economy and has launched a

series of policy measures to promote the development of the digital economy. It has accelerated the construction of digital infrastructure, built the "Digital Longjiang", and created a new driving force for the economic development of Heilongjiang Province. In the released plans related to the digital economy, it aims to achieve the national average level of digital economy development in Heilongjiang Province by 2025, The added value of core industries in the digital economy accounts for 10% of GDP.

2.1. Policy support related to the digital economy

The Heilongjiang Provincial Government has formulated a series of plans and policies to accelerate the construction of the "Digital Longjiang" and empower the high-quality development of the economy in Heilongjiang Province. In 2019, the People's Government of Heilongjiang Province successively issued the "Guiding Opinions on the Construction of" Digital Longjiang "and the" Development Plan of "Digital Longjiang", which proposed to actively promote digital construction in more fields, build a new economic form driven by data, integrated development, and sharing, and regard "Digital Longjiang" as an important path to achieve high-quality economic development in Heilongjiang Province. In 2022, the "14th Five Year Plan for the Development of the Digital Economy in Heilongjiang Province" was launched to promote the acceleration of digital industrialization and industrial digitization in Heilongjiang Province, strengthen, optimize, and expand the digital economy, and create new advantages for the development of the digital economy.

2.2. Continuously increasing digital infrastructure

Digital infrastructure is crucial for the development of the digital economy and an essential condition for promoting digital construction, including information infrastructure such as 5G, big data centers, and industrial internet. In recent years, Heilongjiang Province has built and opened 19000 5G base stations in 2020, 18000 in 2021, with a total of 37000 base stations. It is expected that 114000 base stations will be built and opened by 2025. The penetration rates of internet and mobile phones in Heilongjiang Province have increased from 29.4% and 58.5% in 2011 to 75.1% and 104%, respectively, reflecting the increasingly perfect digital infrastructure in Heilongjiang Province. It can be seen that Heilongjiang Province actively responds to the development deployment of the national digital economy, strengthens the development of digital infrastructure, and promotes the development of the digital economy in Heilongjiang Province.

3. The Current Situation of Empowering the Development of the Real Economy in Heilongjiang Province with the Digital Economy

Developing the digital economy and empowering traditional physical industries with digital technology have provided strong impetus for the transformation and upgrading of traditional physical industries. With the development of the digital economy, Heilongjiang has empowered the digital economy to the real economy, achieving good results, improving the productivity efficiency of traditional manufacturing, promoting the transformation of traditional agriculture to digital agriculture, and promoting the continuous innovation and development of the transmission tourism industry.

3.1. Continuously improving the productivity efficiency of traditional manufacturing industry

In the digital economy, data can overcome the limitations of traditional production factors, combine data with traditional production factors, optimize the configuration of production factors, and participate in the production and manufacturing process. At the same time, the application of digital technology in production and manufacturing activities has brought tremendous changes to the transmission manufacturing industry, reducing the demand for labor and accurately calculating the proportion of production factors invested. The combined effect of the above two has improved the productivity efficiency of traditional manufacturing industry. Heilongjiang Province is an important old industrial base in China, with a strong industrial foundation and corresponding supporting facilities. It has a group of industrial enterprises known as the "national treasure", as well as typical enterprises such as China First Heavy Industry Corporation, Harbin Electric Power Corporation, Daqing Oilfield, Longmei Group, etc. It has rich industrial data resources and 5G integration application scenarios. The digital and intelligent transformation and upgrading of Heilongjiang have revitalized these traditional manufacturing industries. For example, the earliest power generation equipment research and development base in China, Harbin Electric Power Company, is empowered by the digital economy. In

its intelligent automatic lamination workshop of its motor factory, more than 90% of the stacking workload is completed by robots, and the positioning accuracy deviation is less than 0.05mm. Through intelligent transformation, labor efficiency has increased by three times and accuracy has doubled. A batch of completed digital workshops can generally improve production efficiency by more than 20%, reduce product defect rate by more than 20%, reduce production costs by more than 20%, and reduce energy consumption per unit output value by more than 10%.

3.2. Boosting the transformation from traditional agriculture to digital agriculture

With the development of the digital economy, it has a strong impact on traditional agriculture, integrating with traditional agriculture and promoting the transformation from traditional agriculture to digital agriculture. By quantifying data from various aspects such as production, operation, and sales, time-saving and labor-saving management can be achieved. The use of intelligent and technological means has greatly improved production efficiency in the sowing, growth, and harvesting processes of crops. In terms of agricultural management, cloud computing, big data, etc. are used to formulate management production plans and adjust strategies accurately according to demand. Heilongjiang Province actively applies big data to the agricultural field, builds corresponding platforms, coordinates data from all parties, and achieves outstanding results in the field of digital development. For example, in Qixing's unmanned farm, it is one of the earliest unmanned farms in China. The entire planting process involves unmanned operation, intelligent seedling hard disk production, intelligent temperature and humidity control, intelligent irrigation, intelligent digital harvesting, etc., which shortens the seedling cultivation time by 7-9 days, reduces rice harvest losses by 2-3%, and saves 25 yuan in cost per mu; Wuchang Qiaofu Courtyard Company has built a rice field IoT monitoring and management platform and a high standard agricultural production management system for intelligent rice planting in Wuchang City. This has promoted the intelligence, data-driven management, and information-based management of agricultural production, resulting in an increase of nearly 126 million yuan in income for over 8000 farmers.

3.3. Promote the continuous development and innovation of traditional tourism industry

With the development of the digital economy, digital technology has also empowered the tourism industry, promoting innovation in the business model of the tourism industry, which is crucial for the development of tourism enterprises. Tourism enterprises can win the recognition of consumers with higher quality services. There are mainly several aspects that have driven innovation in the business model of the tourism industry. Firstly, it has changed the management mode of the traditional tourism industry.^[2]The second is the application of digital technology, which will also change the business model of tourism enterprises. By using digital technology, useful information can be extracted from massive data, target customers can be identified, customer needs can be accurately analyzed, and the production and sales of related tourism products can be optimized, improving the efficiency and profits of tourism enterprises.

In order to implement the work requirements of the Heilongjiang Provincial Party Committee to accelerate the construction of digital Longjiang and develop smart tourism, and to build a "network" of smart tourism in the province, the Heilongjiang Provincial Department of Culture and Tourism has built a center, three platforms, and fifteen systems to create the Heilongjiang smart tourism ecosystem. Heilongjiang Tourism Investment Group has established the "Qulong River" industry and comprehensive service platform, relying on six core capabilities to provide online services throughout the entire industry chain for the tourism industry in the province, improving the level of tourism facilitation and industrial operation efficiency, and driving and promoting the vigorous development of Heilongjiang's tourism economy. From this, it can be seen that the development of the digital economy has brought enormous benefits to the real economy, as well as the enormous potential for further empowering the real economy.

4. The problems in empowering the development of the real economy in Heilongjiang Province with the digital economy

The digital economy empowers the development of the real economy in Heilongjiang, providing new opportunities and impetus for the high-quality development of the real economy in Heilongjiang. With the continuous deepening of the application of digital technology in industries such as manufacturing, agriculture, and tourism in Heilongjiang Province, the productivity efficiency of

traditional manufacturing has been improved, promoting the transformation of traditional agriculture to digital agriculture, and continuously promoting the development and innovation of traditional tourism. Although the application of digital economy in these real economy industries continues to deepen, there are some problems in empowering the development of the digital economy in Heilongjiang Province, as it is still in its early stages. Further empowering the digital economy has brought challenges to the real economy of Heilongjiang.

4.1. Low digital production capacity in the manufacturing industry

The digital level that empowers the development of traditional manufacturing in Heilongjiang Province with the digital economy is still in its infancy. Although the application of some digital technologies has brought new impetus to some traditional manufacturing enterprises, production models such as intelligent manufacturing, network collaboration, and personalized customization have not yet been fully realized. ^[3]And currently, the scope and depth of the application of digital economy in traditional manufacturing in Heilongjiang Province are not extensive enough. The digital production capacity still needs further improvement.

At present, some large manufacturing enterprises have taken the lead in digital transformation, and most small and medium-sized enterprises have not yet achieved digital transformation. Large leading enterprises possess advanced technology and strong funds, which can dominate the development of the digital economy. Small and medium-sized enterprises are facing difficulties in terms of lack of funds, talent, and technology. The development of the digital economy is relatively backward, and they are unable to participate in the digital economy. Digital equipment and intelligent manufacturing workshops have not been realized, resulting in lower overall digital production capacity in the manufacturing industry. ^[4]At the same time, lacking advanced leading enterprises, leading enterprises can lead more small and medium-sized enterprises to participate in the digital process, pilot new models of advanced digital technology, improve the overall digital level of the industry, and thereby enhance digital production capacity.

4.2. The corresponding infrastructure of agriculture is relatively backward

Real time digital agriculture related technologies require corresponding sound infrastructure, and if the corresponding infrastructure in the region is backward, it will inevitably hinder the development speed of digital agriculture. According to a survey of the total ownership of agricultural machinery in Heilongjiang Province from 2017 to 2019, it was found that the number of water-saving irrigation equipment and water pumps has decreased, from 40088 units and 480000 units in 2017 to 38023 units and 381000 units, respectively. Although there has been an increase in agricultural tractors, the increase is relatively small. Mechanical equipment is crucial in the process of agricultural development and serves as the foundation for large-scale production. Therefore, its quantity and popularity directly reflect the level of agricultural modernization and informatization in Heilongjiang Province. The weak coverage of digital agriculture infrastructure directly leads to a limited number of areas for digital agriculture production, which also makes it difficult to popularize modern intelligent production. And ultimately, the process of empowering the real economy with the digital economy is hindered.

4.3. The problem of data silos in the tourism industry is relatively serious

Data silos refer to the inability to share data information between different organizations, industries, and platforms, and the inability to connect and interact with each other. Data silos are the product of zero sum games in the data trading market, which can hinder the process of industrial digitization and increase the cost of economic operation. The premise for the digital economy to empower the high-quality development of the tourism industry is the free circulation of various types of data, allowing them to unleash their true value. At present, the problem of data silos in the tourism industry of Heilongjiang Province is relatively serious, mainly manifested in the different levels of development in different regions, leading to differences in the development level of tourism informatization, and the lack of a collaborative mechanism for data circulation and sharing. Various tourism operators use data monopoly positions to pursue maximum self-interest, believe that data is the core competitiveness, and are unwilling to share tourism data sharing. And this behavior will inevitably slow down the process of digital transformation in the tourism industry, hindering the development of the tourism industry in Heilongjiang Province empowered by the digital economy.

4.4. Lack of talents related to the digital economy

With the rapid development of the digital economy, there is a greater shortage of talents related to the digital economy. In the four years from 2015 to 2019 alone, the demand for big data and AI technology in Heilongjiang Province increased 11 times, and the talent gap in the digital economy was 1.5 million people. The growth rate of the demand for digital talent has always been higher than the growth rate. The empowerment of the real economy by the digital economy requires a large number of data related talents. Currently, the shortage of digital talents in Heilongjiang Province is mainly reflected in the insufficient cultivation of talents in universities. Although universities have increased the cultivation of digital talents, the demand for digital talents is large and high, making it difficult to balance supply and demand in a short period of time; The internal talent cultivation of relevant enterprises is insufficient, and the digital transformation of the real economy is relatively slow. There is a lack of training plans and mechanisms for digital talents within the enterprise, resulting in a limited number of talents cultivated internally; The construction of digital management teams is relatively backward, and the strategic direction for team digital transformation is unclear; The digital economy in Harbin Province is not strong, the development foundation of the digital economy is relatively weak, and the attractiveness to relevant digital talents is not strong.

5. Policy Suggestions on Empowering the Development of the Real Economy in Heilongjiang Province with the Digital Economy

With the development and growth of the digital economy, the innovation of digital technology empowers the real economy and deeply integrates with it, thereby driving the transformation and development of the real economy. Heilongjiang Province attaches great importance to the development of the digital economy, but in the process of promoting the empowerment of the real economy by the digital economy, it faces many problems. This chapter focuses on the problems that exist in the high-quality development of manufacturing, agriculture, and tourism industries empowered by the digital economy, and proposes corresponding countermeasures and suggestions in turn.

5.1. To build a manufacturing industry cluster dominated by leading enterprises

First of all, we need to continue to vigorously support the digital and intelligent transformation of leading manufacturing enterprises, cultivate and strengthen leading backbone enterprises such as Harbin Electric Group and Hafei Group, and continue to encourage these leading enterprises to actively introduce advanced digital technology and apply it to practice, playing a leading and exemplary role for small and medium-sized enterprises, relying on the advantages of the industrial cluster, driving the digital transformation of small and medium-sized enterprises within the cluster. Leading backbone enterprises should actively cooperate with higher education institutions and research institutes to innovate new achievements in digital technology. In order to further enhance the digitalization level of small and medium-sized enterprises, the government should issue relevant policies to support them in carrying out digital and intelligent technological transformation, and increase their concentration to cultivate leading enterprises in the manufacturing industry.^[5] Secondly, the foundation for the development of the internet in Heilongjiang Province is relatively weak, and it is a province lacking large internet enterprises. It is necessary to actively introduce leading internet enterprises to drive the development of internet enterprises in Heilongjiang Province, in order to better assist the digital economy in empowering the real economy and building a manufacturing industry cluster dominated by leading enterprises, thereby improving the efficiency of digital production capacity in the manufacturing industry.

5.2. Improve the construction speed of agricultural related infrastructure

Firstly, it is necessary to strengthen the construction of application systems, fully utilize the advantages of digital technology, and strengthen the existing agricultural system to create a modern digital agricultural system with automatic control, scientific management, and precise operation. Secondly, utilizing advanced agricultural equipment and technological means to continuously improve the development speed of agriculture. In the process of developing agriculture, automated and intelligent machinery is constantly used to assist in agricultural production, integrating information and breaking through the bottleneck of corresponding mechanization. We should pay attention to the development of the entire region, especially in remote areas, and improve the construction of

infrastructure to ensure the coverage of the network in the area. A sound infrastructure can provide a better foundation for empowering the development of the real economy through the digital economy.

5.3. Actively promoting compliant and open sharing of tourism data

So far, Heilongjiang Province lacks a legal system for open and shared tourism data, which is not conducive to the mining and sharing of data by tourism enterprises, and is not conducive to the development of smart tourism. [6]Therefore, it is necessary to establish a compliant data open and shared system to avoid the occurrence of data silos. Firstly, it is necessary to establish and improve institutional rules for the flow of data elements related to the tourism industry, and standardize the standards for data flow and interconnection between various institutions, industries, and platforms. Secondly, it is necessary to establish technical standards for equipment related to data circulation and sharing, in order to better facilitate data sharing and achieve the goal of interconnectivity. [7]We need to vigorously promote the digital transformation of tourism, promote the interconnection and mutual sharing of tourism big data, and focus on solving the problem of tourism data silos. The establishment of a shared data system can further promote the digital economy and empower the development of the tourism industry.

5.4. Strengthening the construction of talent teams related to the digital economy

Firstly, the Heilongjiang Provincial Government should vigorously cultivate local talents, actively implement the "Heilongjiang Province's" Head Wild Goose "Action Plan, and strongly support the construction of the "Digital Talent Special Zone "pilot zone in Heilongjiang Province. The Heilongjiang Provincial Government should launch corresponding policies and actively implement them, strengthen the construction of the "Longjiang Scholars" talent project, encourage major universities to establish majors such as the Internet of Things, big data, and AI, encourage universities such as Harbin Institute of Technology and Harbin Engineering to improve their innovative talent training system, cultivate talents in the digital economy, strengthen cooperation between universities such as Harbin Institute of Technology and real economy related enterprises, provide relevant platforms for enterprises, and provide relevant training courses for universities, To jointly cultivate digital talents with diverse development. Secondly, Heilongjiang Province should learn from the talent introduction policies of provinces that attract more talents, provide a superior working environment and opportunities for high-end digital talents, as well as more preferential policies, and provide higher financial treatment to solve related problems such as children's education and spouse work, and further retain high-end talents in the relevant digital field. These preferential policies can solve the problem of talent shortage in the digital field, empower the development of the real economy with the digital economy, and provide better talent protection

6. Conclusion

In addition to the problems encountered by the digital economy in empowering the development of the real economy in Heilongjiang Province, as analyzed earlier, there are also issues such as weak digital infrastructure and the lack of a complete digital technology innovation platform in Heilongjiang Province, which hinder the empowerment of the real economy by the digital economy. If we can continue to increase investment in the digital economy, build digital infrastructure and industrial internet layout, and create a perfect digital technology innovation platform, it will not only help empower the real economy development of Heilongjiang Province with the digital economy, but also bring huge benefits to the economic development of Heilongjiang Province.

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