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Performance Assessment and Influencing Factors Analysis of Digital Economy Enabling Innovation Capability in Yangtze River Delta (YRD)

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Abstract

This paper focuses on the impact of the digital economy on the innovation capacity of the Yangtze River Delta region and puts forward relevant suggestions. By analyzing the performance evaluation and influencing factors in the Yangtze River Delta region, it is found that the digital economy has a positive impact on the innovation capacity in terms of improving technology, breaking the geographical restriction and promoting the flow of talents. In order to further promote the improvement of innovation capacity and the development of digital economy in the Yangtze River Delta region, the article puts forward suggestions such as strengthening the supervision of the effectiveness of policy implementation, increasing the investment in R&D, accelerating the transformation and application of technology, focusing on the introduction and cultivation of high-level talents, and strengthening regional cooperation.

Keywords

Yangtze River Delta Region; Digital Economy; Innovation Capacity.

1. Introduction

As the global digitization process accelerates, the digital economy has become an important engine to drive the economic development of all countries. China is the world's largest e-commerce market and one of the world's leading digital economy powers. As the most dynamic and promising economic region in China, the Yangtze River Delta region's level of digital economy development plays an important leading role in the development of the national digital economy.

In recent years, the Yangtze River Delta (YRD) region has accelerated the innovation and development of the digital economy and maintained a high rate of growth. However, while the digital economy is developing rapidly, the innovation capacity of the Yangtze River Delta region faces some challenges. Therefore, this study aims to explore how the digital economy empowers the development of innovation capacity in the Yangtze River Delta region, with a view to providing a scientific basis for local governments and enterprises to formulate effective policies and innovation strategies.

This study needs to address the following questions:

(1) What is the relationship between the digital economy and the innovation capacity of the Yangtze River Delta region?

(2) How to construct an evaluation index system for the innovation capacity of the Yangtze River Delta region empowered by the digital economy?

ISSN: 2688-8653

(3) What are the factors influencing the digital economy on the innovation capacity of the Yangtze River Delta region?

(4) What are the performance evaluation and analysis of factors affecting the innovation capacity of the Yangtze River Delta region empowered by the digital economy?

Based on the previous literature review and empirical research, this study will adopt hierarchical analysis, principal component analysis and other methods to explore in-depth the influence mechanism and actual performance of digital economy-enabled innovation capacity in the Yangtze River Delta region. Through the study of this issue, it can not only improve the innovation capacity of the Yangtze River Delta region, but also provide a reference for the innovative development of digital economy in other regions.

2. Literature review

2.1. Literature on the relationship between the digital economy and innovation capabilities

The rapid development of the digital economy over the past decades has had a profound impact on innovation capabilities. Many studies have shown that the development of the digital economy can provide firms and regions with broader markets and resources for innovative activities. The wide application of digital technology enables enterprises to conduct R&D, production and marketing more efficiently and strengthen interaction with customers, thus enhancing their innovation capability. As the most dynamic and promising economic region in China, the level of development of the digital economy in the Yangtze River Delta region has an important leading role to play in promoting innovation capacity.

2.2. Literature on performance evaluation methods

The performance evaluation method for the innovation capacity of the Yangtze River Delta region can be constructed from both qualitative and quantitative aspects. Qualitative indicators can include the assessment of enterprises' innovation achievements, the development trend of innovation capability, innovation culture and atmosphere. These indicators can be collected and analyzed through questionnaires and in-depth interviews. Quantitative indicators can include data on the enterprise's innovation investment, the proportion of R&D expenditure, the number of patent applications, and scientific and technological cooperation for statistics and analysis. In addition, the evaluation index system applicable to the Yangtze River Delta region can be constructed by drawing on the experiences and methods of other regions or countries in innovation performance evaluation and combining them with the actual situation of the region.

2.3. Literature on Influence Factor Scores

The influencing factors of the digital economy empowering the innovation capacity of the Yangtze River Delta region include the policy environment, technological innovation and talent cultivation. First, the policy environment is crucial to the development of innovation capacity. Relevant policies and regulations formulated by the government in the field of digital economy, as well as the financial and tax support provided, will directly affect the innovation activities of enterprises. Second, technological innovation is the core driving force of the digital economy to empower innovation capability. The continuous advancement and application of digital technology drives product and service innovation and accelerates the innovation process. As an important growth pole of China's economy, the Yangtze River Delta region is rich in research institutions and higher education resources, providing a solid foundation for technological innovation. Finally, talent cultivation is a key element of the digital economy's ability to empower innovation. The YRD region must cultivate and attract top-notch talents, including

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technical talents and innovation management talents, to promote the enhancement of innovation capability.

To summarize, there is an inextricable relationship between the digital economy and the innovation capacity of the Yangtze River Delta (YRD) region. The rapid development of digital economy provides new opportunities and challenges for the innovation capacity of the Yangtze River Delta region. By establishing a scientific and effective performance evaluation method and accurately analyzing the influencing factors, the mechanism and path of digital economy-enabled innovation capacity can be better understood and provide reference and guidance for the innovative development of the Yangtze River Delta region. In future research, it is necessary to further explore in depth the relationship between digital economy and innovation capacity, and put forward specific policy recommendations and practical measures to promote the continuous improvement of innovation capacity in the Yangtze River Delta region.

3. Construction of the performance evaluation index system

3.1. Classification of indicators

When constructing the performance evaluation index system of innovation capacity in the Yangtze River Delta region, it is necessary to categorize the factors affecting innovation capacity and propose corresponding performance evaluation indexes. The common influencing factors can be categorized into three aspects: policy environment, technological innovation and talent cultivation.

(1) Policy environment: The relevant policies and regulations formulated by the Government in the field of digital economy, as well as the financial and tax support provided, will directly affect the innovative activities of enterprises. The policy environment includes indicators such as policy stability, policy support and policy implementation effectiveness.

(2) Technological innovation: Technological innovation is the core driver of the digital economy's ability to empower innovation. The continuous advancement and application of digital technology drives product and service innovation and accelerates the innovation process. Technological innovation includes indicators such as research and development investment, the number of patent applications and technology applications.

(3) Talent cultivation: The Yangtze River Delta region must cultivate and attract first-rate talents, including technological talents and innovative management talents, to promote the enhancement of innovation capacity. Talent cultivation includes indicators such as the ratio of scientific researchers, the number of high-level talents, and the mobility of talents.

3.2. Allocation of indicator weights

After determining the various types of indicators, it is necessary to assign weights to them. Weight allocation is a very important part of performance evaluation, and can be assigned using hierarchical analysis, principal component analysis and other methods.

(1) Hierarchical analysis

Hierarchical analysis is a multilevel structured analysis method that allows complex problems to be hierarchized so that weights can be assigned. The method requires such steps as determining the hierarchical structure, establishing a judgment matrix, calculating the weight vector and consistency test. Through this method, the weights of the indicators can be determined more accurately.

(2) Principal component analysis

Principal component analysis is a statistical method that reduces the number of indicators and improves their interpretation by transforming multiple correlated indicators into a few unrelated factors. The method requires steps such as standardization of raw data, calculation

ISSN: 2688-8653

of covariance matrix and eigenvalues. Through this method, a few composite indicators can be extracted from multiple indicators and weights can be assigned to each composite indicator.

4. Analysis of influencing factors

4.1. Analysis of the policy environment

The policy environment plays a crucial role in promoting the development of the digital economy and the enhancement of innovation capacity in the Yangtze River Delta region. Relevant policies and regulations formulated by the government have a direct impact on the innovation activities of enterprises. First of all, the stability of policies is of great significance to enterprise decision-making. A stable policy environment helps enterprises form long-term development strategies and provides predictable policy support for innovation. Second, the strength of government policy support also affects firms' innovation activities. For example, fiscal and tax support can encourage firms to increase R&D investment and reduce innovation costs. In addition, the effectiveness of policy implementation is also an important factor, and governments need to strengthen the monitoring and evaluation of policy implementation to ensure that policies are effectively implemented.

4.2. Analysis of technological innovations

Technological innovation is the core driving force behind the development of the digital economy and the enhancement of innovation capacity. The continuous progress and application of digital technology has promoted product and service innovation and accelerated the innovation process. First, R&D investment is an important guarantee for technological innovation. Enterprises need to increase their R&D investment, improve their technological R&D capabilities, and actively carry out research on cutting-edge technologies to promote technological innovation. Secondly, the number of patent applications is an important indicator of technological innovation capability, which reflects the achievements and competitiveness of enterprises in technological innovation. In addition, the application of technology is also an important part. Enterprises need to transform technology into actual products and services to meet market demand and promote economic growth.

4.3. Talent development analysis

Talent is a key factor in promoting the development of the digital economy and the enhancement of innovation capacity. The Yangtze River Delta region must cultivate and attract top-notch talents, including technical talents and innovation management talents, in order to improve its innovation capability. First, the ratio of scientific research personnel is an important indicator of S&T innovation capability. Increasing the ratio of scientific research personnel can enhance the capacity and level of scientific and technological innovation. Secondly, the number of high-level talents is also key. High-level talents have strong innovation ability and leadership, and their joining and cultivation is crucial to the enhancement of innovation ability of enterprises and regions. In addition, talent mobility is also an important factor. Talent mobility can promote technological exchanges and cooperation among different enterprises and promote the enhancement of innovation capacity.

In constructing a performance evaluation index system for innovation capacity in the Yangtze River Delta region, it is necessary to comprehensively consider the influencing factors of the policy environment, technological innovation and talent cultivation. By scientifically and reasonably evaluating and analyzing these factors, targeted policy support and strategic guidance can be provided to the Yangtze River Delta region to further improve its innovation capacity and promote the development of the digital economy.

ISSN: 2688-8653

5. Performance Evaluation and Influencing Factors Analysis of Digital Economy Enabling Innovation Capability in Yangtze River Delta Region

5.1. Performance evaluation analysis

5.1.1. Indicator system

The evaluation indicators of innovation capacity in the Yangtze River Delta region include three aspects: policy environment, technological innovation and talent cultivation. Policy environment includes policy stability, policy support and policy implementation effect; technological innovation includes R&D investment, number of patent applications and technology application; talent cultivation includes the proportion of scientific researchers, number of high-level talents and talent mobility. These indicators can reflect the overall level and evolutionary trend of innovation capacity in the Yangtze River Delta region.

5.1.2. Performance evaluation results

In terms of policy environment, the Yangtze River Delta region has relatively good policy stability, but the effectiveness of policy implementation needs to be improved. In terms of technological innovation, R&D investment and the number of patent applications show a year-on-year increase, but the degree of technology application is not high. In terms of talent cultivation, the proportion of scientific researchers has increased, but the number of high-level talents and the mobility of talents need to be improved urgently. Therefore, the Yangtze River Delta region needs to further strengthen the effectiveness of policy implementation, technology application and talent cultivation in order to improve the overall level of innovation capacity.

5.1.3. Evolutionary trends

The overall level of innovation capacity in the Yangtze River Delta region has shown a year-on-year trend of improvement. Among them, the policy environment needs to strengthen the supervision and evaluation of policy implementation effects to ensure the effective implementation of policies; technological innovation needs to further increase R&D investment, accelerate the transformation and application of technology, and promote economic growth; and talent cultivation needs to focus on the introduction and cultivation of high-level talents, promote the mobility of talents, and increase the proportion of scientific researchers. In the long run, the digital economy will become an important driving force for the improvement of innovation capacity in the Yangtze River Delta region.

5.2. Analysis of influencing factors

5.2.1. Impact of the Digital Economy on Innovation in the Yangtze River Delta Region

The impact of the digital economy on the enhancement of innovation capacity in the Yangtze River Delta region is mainly reflected in the following aspects:

① Improvement of technological level: The digital economy continues to promote technological innovation, enabling enterprises in the Yangtze River Delta region to better apply new technologies and modes to promote product and service upgrading.

② Breaking geographical restrictions: The rapid development of the digital economy allows enterprises in the Yangtze River Delta region to have a broader market and more resources, no longer subject to geographical constraints, which is conducive to innovation and development of enterprises.

(iii) Facilitating the mobility of talents: the development of the digital economy will also facilitate the mobility of talents, making it easier for innovative talents in the Yangtze River Delta region to move between different regions, and facilitating the exchange of experience and technology.

ISSN: 2688-8653

5.2.2. Mechanisms of the Digital Economy's Impact on Innovation in the Yangtze River Delta Region

The enhancement of the innovation capacity of the Yangtze River Delta region by the digital economy is mainly realized through the following mechanisms:

① Technological innovation mechanism: the rapid development of the digital economy has led to a new round of technological revolution, enabling enterprises in the Yangtze River Delta region to keep abreast of new technologies and ideas, and improve their technological level and competitiveness.

② Innovation ecological mechanism: the development of digital economy promotes the upgrading and transformation of industries, and establishes a more complete innovation ecosystem, including technological innovation, capital innovation, industrial innovation, etc. These innovation ecosystems are favorable to the innovation activities of enterprises.

(iii) Talent mobility mechanism: the rapid development of the digital economy promotes the mobility of talents, which enables enterprises in the Yangtze River Delta region to have more talent resources, and can attract more excellent innovative talents to flow into the region and promote the enhancement of innovation capacity.

In conclusion, the digital economy is an important factor in promoting the enhancement of innovation capacity in the Yangtze River Delta region. The government should strengthen its support and guidance for the digital economy, and enterprises should strengthen their technological research and development and innovation activities as a way to promote the development of the digital economy and the enhancement of innovation capacity in the Yangtze River Delta region.

6. Conclusions and recommendations

As one of the most dynamic and innovative economic regions in China, the Yangtze River Delta (YRD) region, the digital economy has played an important role in promoting its innovation capacity. By analyzing the performance evaluation and influencing factors of the Yangtze River Delta region, the following conclusions can be drawn: first, there are certain gaps and challenges in the Yangtze River Delta region in terms of policy environment, technological innovation and talent cultivation. Second, the digital economy has a positive impact on the enhancement of the innovation capacity of the Yangtze River Delta region, including improving the level of technology, breaking the geographical constraints and promoting the mobility of talents. Third, the YRD region should strengthen the monitoring of the effectiveness of policy implementation, increase investment in R&D, accelerate the transformation and application of technology, focus on the introduction and cultivation of high-level talents, and enhance intra- and cross-regional cooperation.

In order to further enhance the innovation capacity and promote the development of digital economy in the Yangtze River Delta region, this paper puts forward the following recommendations:

(1) Strengthening the supervision of the effects of policy implementation: the Government should strengthen the supervision and evaluation of the effects of policy implementation to ensure the effective implementation of policies and solve the problem of difficulties in landing.

(2) Increase investment in research and development: The Government and enterprises should increase investment in research and development, encourage enterprises to increase expenditure on scientific and technological innovation, and improve their technological research and development capabilities.

(3) Accelerating the transformation and application of technology: Governments and enterprises should strengthen the transformation and application aspects of technology and

ISSN: 2688-8653

promote the transformation of scientific and technological achievements into actual productivity.

(4) Focus on the introduction and cultivation of high-level talents: The Yangtze River Delta region should intensify its efforts to introduce and cultivate high-level talents and attract more outstanding talents to participate in innovative activities.

(5) Strengthening regional cooperation: Cities and enterprises in the Yangtze River Delta region should strengthen cooperation and form synergies to jointly promote the enhancement of innovation capacity. Cooperation platforms such as science and technology alliances and innovation bases should be established to promote the sharing of resources and experience.

(6) Establishment of a digital economy innovation ecosystem: The Yangtze River Delta region should establish a sound digital economy innovation ecosystem, encourage cooperation among industries, universities and research institutes, strengthen technological exchanges and cooperation, and realize the organic combination of innovation factors.

In conclusion, the Yangtze River Delta (YRD) region should give full play to the positive role of the digital economy in the enhancement of innovation capacity, strengthen policy support, technological innovation and talent cultivation, and work together to promote the development of the digital economy and the enhancement of innovation capacity in the YRD region through intra-regional and cross-regional cooperation to realize high-quality economic growth.

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