Information Systems and Economics (2024)
Clausius Scientific Press, Canada

DOI: 10.23977/infse.2024.050506
ISSN 2523-6407 Vol. 5 Num. 5

Research on the Influence of Digital Economy Policy on the Innovation and Development of State-owned Enterprises in China

Changyin Huang

Guangdong Eshore Technology Co., Ltd., Guangzhou, 530000, China

Keywords: State-owned Enterprises; Digital Economy Policy; Innovation and Development

Abstract: With the digital economy becoming the key driving force of global economic growth, China government has issued a series of policies to promote industrial upgrading and enterprise innovation. This study analyzes the influence of digital economy policy on the innovation activities of state-owned enterprises through three core mechanisms: policy conduction, innovation incentive and resource allocation. Based on the annual report data of state-owned enterprises from 2015 to 2023, a multiple regression model is constructed for empirical analysis. The results show that the digital economy policy significantly increases the R&D investment of state-owned enterprises, improves the success rate of innovative projects, promotes the adoption of new innovative models, and enhances the ability of enterprises to attract high-quality talents. The research holds that the government should continue to strengthen the implementation of digital economy policy to stimulate the innovation vitality of state-owned enterprises and promote the high-quality economic development.

1. Introduction

Digital economy has become an important engine of economic growth in the world today. Given this context, nations globally are implementing digital economy initiatives to foster industrial evolution and bolster corporate innovation. Among these, China's stance as the world's foremost developing nation renders its digital economic policies' influence on the innovative progression of state-owned enterprises notably intriguing.

In recent years, the Chinese government has issued a series of policy documents, such as the "National Informatization Development Strategy Outline", the "13th Five-Year National Informatization Plan", and the "Digital Economy Development Plan (2020-2025)", which clarify the strategic goals, main tasks, and safeguard measures for the development of the digital economy. Local governments, based on national-level policies and in combination with local realities, have introduced a series of policy measures to support the development of the digital economy, such as Shanghai's "14th Five-Year Plan for Digital Economic Development in Shanghai" and Zhejiang Province's "14th Five-Year Plan for Digital Economic Development in Zhejiang". Various industry authorities, targeting the characteristics of their respective industries, have issued a series of digital

economy policies, such as the Ministry of Industry and Information Technology's "Digital Economy Development Plan for the Industry and Information Technology Sector (2020-2025)" and the National Development and Reform Commission's "Several Opinions on Accelerating the Development of the Digital Economy".

As a pivotal component of China's economic framework, the innovative strides and developmental trajectory of state-owned enterprises are crucial for amplifying the nation's overall competitive edge and facilitating high-caliber economic expansion [1-2]. Yet, throughout their digital metamorphosis, these enterprises grapple with myriad challenges, encompassing rapid technological advancements, intense market rivalry, and inadequate distribution of innovation resources. Consequently, probing into the impact of digital economy policies on the innovative progression and growth of Chinese state-owned enterprises emerges as a topic of substantial theoretical and practical significance. This research aims to meticulously examine the mechanisms and repercussions of digital economy policy on the innovation and evolution of Chinese state-owned enterprises, thereby offering valuable insights for policymakers and corporate executives.

2. Theoretical framework and research hypothesis

2.1. Theoretical framework

In recent years, the innovation investment of China's state-owned enterprises has continued to grow, and the proportion of R&D expenditure in the main business income has increased year by year, which has promoted enterprises to achieve remarkable results in many fields such as technological innovation, management innovation and business model innovation, and has spawned a number of internationally competitive enterprises [3]. At the same time, the performance of state-owned enterprises in the transformation of innovation achievements is becoming more and more prominent, and new products, technologies and formats are constantly emerging, making important contributions to the country's economic and social development [4]. Digital economy policy plays a key role in this process, which not only points out the direction and goal of innovation and development for state-owned enterprises, but also provides substantial support through financial subsidies, tax incentives, financial support and other ways [5-6]. In addition, the digital economy policy also cooperates with other related policies (such as science and technology innovation policy, talent policy and industrial policy) to jointly promote the innovation and development of state-owned enterprises.

State-owned enterprises face multiple challenges in the process of promoting innovation, including the lack of strategic coordination, policy coordination, information sharing and supervision efficiency caused by imperfect management and supervision system and mechanism [7]; The scientific research system is too administrative, which leads to the disconnection between the basic research of universities and scientific research institutions and the industrial demand; In R&D investment, the proportion of basic research and applied research is low, which limits the development of key technologies [8]; In addition, there is insufficient open cooperation in the field of scientific research, especially limited cooperation and exchanges at the international level, and the source of scientific research funds is single; Although state-owned enterprises have made some achievements in the output of scientific and technological achievements, the efficiency of the transformation of achievements is low, and many scientific research achievements have not been industrialized.

As an important part of the national innovation system, state-owned enterprises have made remarkable achievements in innovation input, innovation output and innovation environment. However, faced with the challenges of institutional obstacles, R&D investment structure,

insufficient scientific research and open cooperation, and low efficiency of achievement transformation, state-owned enterprises need to further deepen reform, optimize innovation environment and improve innovation efficiency in order to achieve high-quality development.

This study mainly considers how policies affect the innovation activities of enterprises through different mechanisms. Specifically, the following three core mechanisms are proposed:

(1) Policy transmission mechanism

Digital economy policy reduces the risk and cost of enterprise innovation by providing tax incentives, financial support and technical support, thus encouraging enterprises to carry out more R&D investment and innovation activities [9].

(2) Innovation incentive mechanism

The policy protects the innovation achievements of enterprises, improves the expected return of innovation, and further stimulates the innovation motivation of enterprises by setting up innovation incentives and intellectual property protection [10].

(3) Resource allocation mechanism

Digital economy policy guides the flow of resources to the innovation field, including the allocation of key resources such as talents, capital and technology, so as to optimize the innovation environment and enhance the innovation ability of state-owned enterprises [11].

Based on the above three mechanisms, a theoretical framework of the influence of digital economic policies on the innovation and development of state-owned enterprises is constructed, as shown in Figure 1. This framework explains how policies can promote the innovation activities of enterprises through different paths and mechanisms.

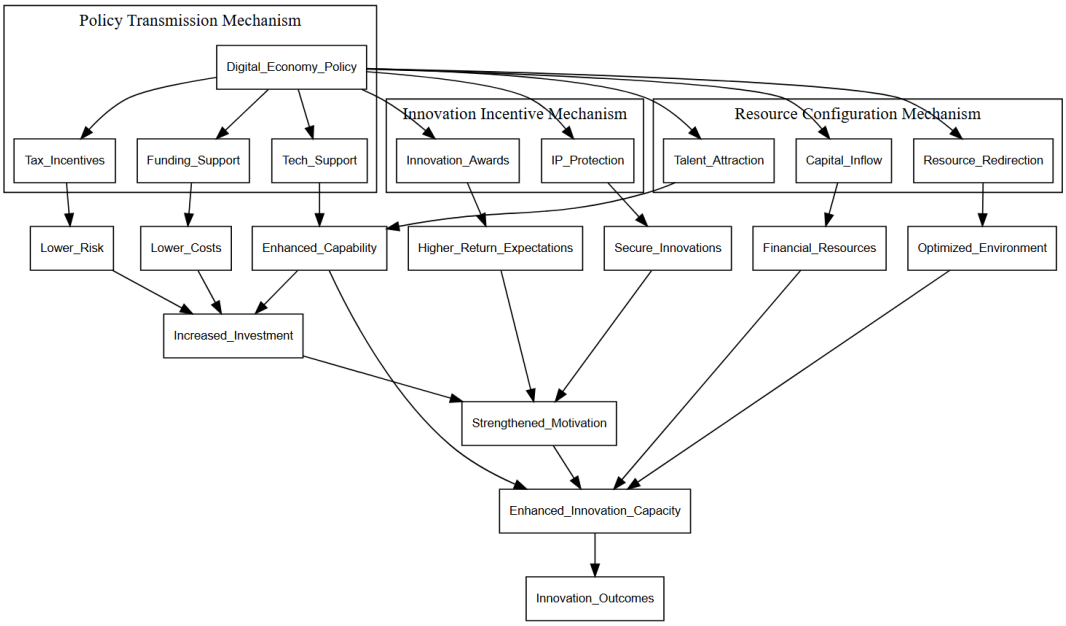

Figure 1: Theoretical framework of digital economic policy affecting the innovation and development of state-owned enterprises

2.2. Research hypothesis

According to the above theoretical framework, the following research hypotheses are put forward to explore the specific impact of digital economic policies on the innovation and development of state-owned enterprises:

H1: The implementation of the digital economy policy will significantly increase the R&D investment of state-owned enterprises, thus improving their innovation ability.

H2: Digital economy policy can effectively reduce the innovation risk of state-owned enterprises by providing tax incentives and financial support, and then improve the success rate of their innovation projects.

H3: Encouraged by the digital economy policy, state-owned enterprises will be more inclined to adopt new innovation modes, such as open innovation and collaborative innovation, so as to improve innovation efficiency.

H4: By optimizing the allocation of resources, the digital economy policy will encourage state-owned enterprises to attract more high-quality talents, thus enhancing their innovation strength.

3. Research methods and data sources

To measure the effect of digital economic policies on the innovation and advancement of state-owned enterprises, this study establishes a multivariate regression model. This model allows for the analysis of how various independent variables affect the dependent variable while simultaneously accounting for other potential factors. The basic structure of the regression model is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_n X_n + \varepsilon$$

Among them, Y represents the innovation and development indicators of state-owned enterprises (such as R&D investment, number of patent applications, etc.), $X_1, X_2, \cdots, X_n$ represents different dimensions or indicators of digital economic policies, β_0 is the intercept term, $\beta_1, \beta_2, \cdots, \beta_n$ is the regression coefficient, representing the influence degree of their respective variables on the dependent variables, and ε is the error term.

Study and collect the annual reports of the target state-owned enterprises during the period from 2015 to 2023, and extract data related to innovation and development such as R&D investment, patent application and new product development. Specifically, by visiting the official websites of these enterprises and the websites of stock exchanges, download all the annual reports released by them during this period. Then carefully read and analyze the relevant parts of each annual report to obtain detailed information about the innovation and development of enterprises. In addition, the research also refers to some third-party databases, such as China Intellectual Property Network and the national enterprise credit information publicity system, to verify and supplement the data extracted from the annual report. In data processing, the collected data are cleaned and sorted, incomplete or inconsistent records are removed, and all indicators are converted into unified units of measurement for subsequent statistical analysis.

4. Empirical analysis and result discussion

In order to quantify the digital economy policy, this study adopts multi-dimensional indicators, including tax incentives, financial support, technical support, etc., and constructs a comprehensive policy index. By comparing and analyzing the changes before and after the implementation of the policy, it is found that the digital economy policy has shown a trend of increasing year by year in recent years.

Figure 2 shows the changing trend of digital economic policy index from 2015 to 2023. It can be clearly seen from the figure that during this period, the digital economic policy index showed an upward trend year by year. This shows that with the passage of years, the government's support for digital economy policy is increasing, and the policy environment is more and more favorable for the development of digital economy. Specifically, the policy index started from a low level in 2015 and

climbed year by year, reaching a relatively high level in 2023, reflecting the continuous improvement of the government's emphasis on the digital economy.

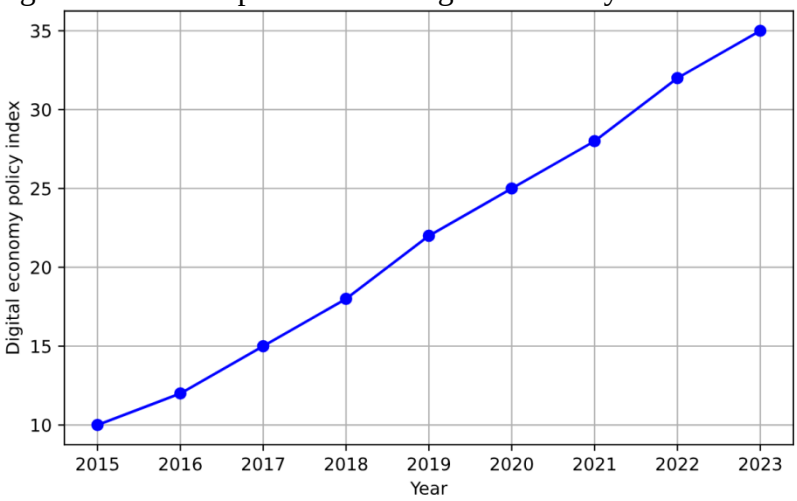

Figure 2: Trend of Digital Economy Policy Index (2015-2023)

In order to test the research hypothesis, a multiple regression model is constructed, and the data is empirically analyzed by statistical software. The independent variables in the model include digital economic policy index, enterprise scale, enterprise age and other control variables, while the dependent variables are indicators such as R&D investment of state-owned enterprises, success rate of innovative projects, adoption of innovative models and talent attraction.

The empirical results show that there is a significant positive correlation between digital economic policy index and R&D investment of state-owned enterprises, which supports hypothesis H1. At the same time, the policy index is positively correlated with the success rate of innovation projects, which verifies the hypothesis H2. In addition, it is found that under the incentive of digital economy policy, state-owned enterprises are more inclined to adopt new innovation models, such as open innovation and collaborative innovation, which is consistent with hypothesis H3. Finally, the data also shows that the implementation of digital economy policy will help state-owned enterprises attract more high-quality talents, thus enhancing their innovation strength and supporting hypothesis H4. See Table 1 for details.

Table 1: Multiple regression analysis results

variable	R&D investment	Success rate of innovative projects	Adoption of innovative mode	Talent attraction
Digital economy policy index	0.436**	0.341**	0.287**	0.379**
Scale	0.224*	0.109	0.158*	0.201*
Enterprise age	-0.128	-0.065	-0.092	-0.110
constant term	1.597	2.381	1.890	2.103
R^2	0.638	0.593	0.612	0.690
Adjust R^2	0.694	0.510	0.583	0.665
F value	23.436	17.850	20.117	25.684
significant level	0.000	0.001	0.000	0.000

Note: * means significant at the level of 0.05; * * means significant at the level of 0.01.

The empirical analysis demonstrates that digital economy policies significantly boost the innovation and development of state-owned enterprises in four key areas: firstly, through the

provision of tax incentives and financial backing, the costs and risks associated with innovation are diminished, encouraging state-owned enterprises to augment their R&D investments and strengthen their innovative capabilities. Secondly, policy support not only brings material help to enterprises, but also conveys the government's support attitude towards innovation, enhances the confidence of enterprises and improves the success rate of innovative projects; Furthermore, the policy has promoted the transformation of state-owned enterprises to new modes such as open innovation and collaborative innovation, which is helpful to integrate external resources and improve innovation efficiency; Finally, the policy optimizes the innovation environment, enhances the ability of state-owned enterprises to attract high-quality talents, and provides a solid talent base for the sustainable innovation and development of enterprises.

In summary, the digital economy policy has fostered innovation and development within state-owned enterprises through diverse mechanisms. Looking ahead, it is imperative for the government to persist in reinforcing the execution of this policy, thereby further invigorating the innovative vigor of state-owned entities and propelling the sustained and robust growth of the economy.

5. Conclusions and suggestions

Through the construction of a multivariate regression model and empirical analysis, this paper delves into the impact of digital economic policies on the innovation and development of state-owned enterprises in China. The findings indicate that such policies substantially increase R&D investment by state-owned enterprises through the provision of tax incentives, financial support and technical support, reduces the innovation risk, improves the success rate of innovation projects, and encourages enterprises to adopt new innovation models such as open innovation and collaborative innovation. In addition, the policy also promotes the attraction of high-quality talents, thus enhancing the innovation strength of enterprises.

Based on the above findings, this study suggests:

(1) The government should continue to strengthen the implementation of digital economy policies, especially in tax incentives, financial support and technical support, in order to further stimulate the innovation vitality of state-owned enterprises.

(2) Encourage state-owned enterprises to strengthen cooperation with universities and scientific research institutions, promote the industrial application of basic research results, strengthen international scientific research cooperation, and broaden access to innovative resources.

(3) Optimize the internal innovation incentive mechanism of state-owned enterprises, protect intellectual property rights, improve the expected return of innovation results, and further enhance the innovation ability and market competitiveness of enterprises.

(4) Strengthen the supervision and evaluation of innovation activities of state-owned enterprises, ensure the maximum effect of policies, and adjust and improve relevant policies in time to adapt to the rapid changes in the development of digital economy.

References

[1] Wu, W. H., Qin, Z., Zhang, A. M., & Liu, Y. (2024). Research on the Synergistic Impact Mechanism of Corporate Digital Transformation and Government Digital Governance on Innovation Quality Improvement and Quantity Increase. Journal of Guangxi Normal University (Philosophy and Social Sciences Edition), 60(2), 42-58.

[2] Yu, W. T., Du, B. H., & Wang, Y. Y. (2024). Study on the Impact of Digital Economy Policies on Collaborative Innovation among Universities, Research Institutes, and Enterprises. Soft Science, 38(1), 83-91.

[3] Ma, L., Liu, S., & Zheng, M. N. (2024). Corporate Digital Transformation, Green Innovation, and Carbon Performance - The Moderating Role of Carbon Emission Trading Policy and Public Environmental Concern. Research and Development Management, 36(2), 63-73.

[4] Tao, F., Zhu, P., Qiu, C. Z., & Wang, X. R. (2023). Study on the Impact of Digital Technology Innovation on Corporate Market Value. Quantitative & Technical Economics, 40(5), 68-91.
[5] Yu, J., Bai, Y. T., Meng, Q. S., & Chen, F. (2024). Research on the Impact of Digital Transformation Strategy on Corporate Digital Innovation Performance. Science Research Management, 45(4), 1-11.
[6] Li, X. J., & Xie, Y. Q. (2022). Study on Tax Policies to Promote the Development of China's Digital Economy. Jiangxi Social Sciences, 42(10), 54-63.
[7] Liang, R. X., & Li, Y. K. (2023). Study on the Incentive Effect of Government Innovation Policies on Digital Enterprise Technology Innovation. Statistical Research, 40(11), 40-52.
[8] Wang, X. H., & Li, N. (2022). Digital Technology Development, University-Industry-Research Cooperation, and Corporate Innovation Ability - Analysis Based on National Big Data Comprehensive Experimental Zones. Science and Technology Management Research, 42(17), 1-8.
[9] Wang, R. R., & Li, Z. B. (2024). Study on the Impact of Digital Economy on the High-Quality Development of High-End Equipment Manufacturing in the Yangtze River Delta Region - Based on Moderated Mediation Analysis. Enterprise Economics, 43(3), 103-113.
[10] Fang, L. T., Zhang, G. L., & Li, K. M. (2023). The Impact of Digital Development on Corporate Green Innovation - Empirical Evidence from Chinese A-Share Listed Companies. Chinese Journal of Management Science, 31(12), 350-360.
[11] Luo, P., Wang, J., & Chen, Y. G. (2023). Study on the Mechanism of Economic Policy Uncertainty in Promoting Corporate Digital Transformation. Enterprise Economics, 42(9), 25-37.