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The Role Mechanism of Digital Finance in Enterprise Green Technology Innovation

Xiyuan Bi

Zouping No. 2 Middle School, Shandong, China

Abstract: With the rapid development of China's economy, the traditional extensive economic development model is no longer sufficient to meet current development needs. The concept of green development has become deeply ingrained, balancing economic growth with environmental protection. This concept is key to China's high-quality economic development and serves as the best way to stimulate corporate green innovation and address ecological issues. Green technology surpasses incremental innovation, involving many uncertainties and requiring higher technical standards. Compared to traditional innovation activities, it requires more investment in research and development. However, the lack of a sound financial system and difficulties in financing have constrained enterprises' green technology innovation activities. By applying digital technologies such as big data, artificial intelligence, and 5G to the financial sector, digital finance has emerged. This new form of financial industry offers advantages such as convenience, efficiency, inclusiveness, and innovation. Through fintech, digital finance opens new markets, transforming traditional financial services and stimulating enterprises' green technology innovation capabilities.

Keywords: Digital Finance, Green Technology Innovation, Digital Transformation.

1. Introduction

As the concept of green and sustainable development deepens, China's economy has shifted from high-speed growth to high-quality development. Green development ensures high-quality development, and green technology innovation minimizes environmental damage, utilizing natural resources innovatively while balancing "green" and "innovation." This dual concept has become a new driving force for economic and social sustainability. Technological innovation is highly challenging for modern enterprises, requiring significant initial capital investment with unpredictable outcomes. As an important medium for social capital allocation, the financial industry can support enterprises in innovation activities [1-3]. However, expectations regarding income and risk preferences often suppress the overall growth of green technology innovation within companies. The rapid development of digital technologies such as big data, artificial intelligence, and 5G has led to the rise of digital finance, which possesses green characteristics. Digital finance provides new opportunities for enterprises to achieve green transformation and improve their green innovation capabilities.

2. Overview of Digital Finance

2.1. The Concept of Digital Finance

Amid a new wave of technological revolutions, the strategic integration of information technology with traditional financial services has given rise to digital finance. As research on digital finance continues to grow, it is essential to define the concept accurately. Introduced relatively recently, digital finance is a dynamic and evolving term that lacks a universally accepted definition. Originating in the United States, the term "digital finance" is broader and more neutral than internet finance, which focuses on financial attributes, and fintech, which highlights technological aspects. Digital finance encompasses a wide range of economic entities that leverage modern digital technologies—including the internet, big data, blockchain, cloud computing, and artificial intelligence—integrating these with traditional financial services to drive innovation in financial products, processes, and service models.

This emerging financial ecosystem includes internet finance, fintech, and the digital transformation of traditional financial institutions, with significant implications for the global financial sector. Digital finance extends into areas such as mobile payments, digital currencies, smart contracts, and decentralized finance (DeFi), which are reshaping the global financial landscape. By blending technological and financial attributes, digital finance fosters new business models, improves financial inclusion, reduces transaction costs, and stimulates innovation across various industries. It also offers more responsive, transparent, and efficient financial services that are better aligned with evolving market demands and consumer behavior. In this regard, digital finance is playing a vital role in driving economic growth and transforming traditional financial infrastructures.

2.2. The Impact of Digital Finance

Looking at the development process of digital finance in China, it evolved from non-existence to maturity (Figure 1), with its origins traced back to the launch of Alipay at the end of 2004, laying the foundation for the development of digital finance in China. However, in its early stages, the development of digital finance was not ideal until the emergence of Yu'e Bao in 2013, which triggered explosive growth in China's digital finance sector [5-6]. Today, competition in the digital finance market is fierce. Fintech companies continue to explore innovative digital finance services, and traditional financial institutions are accelerating their digital transformations, ushering the financial industry into a fully digital era. The proliferation of digital platforms, mobile payment systems, and online lending services has revolutionized how individuals and businesses access financial products, leading to more inclusive finance. Digital finance also enhances financial inclusion by reaching previously underserved populations, particularly in rural

areas, and offering them access to affordable financial services. This expansion of digital financial services contributes to providing more business opportunities for enterprises, narrowing the urban-rural income gap, and improving social equity. As a business model developed from the new generation of information technology, digital finance not only boosts economic growth but also plays a critical role in fostering fairness by changing the way economic entities participate in production and access financial services. It democratizes access to capital, helping smaller enterprises and individuals integrate into the broader financial ecosystem.

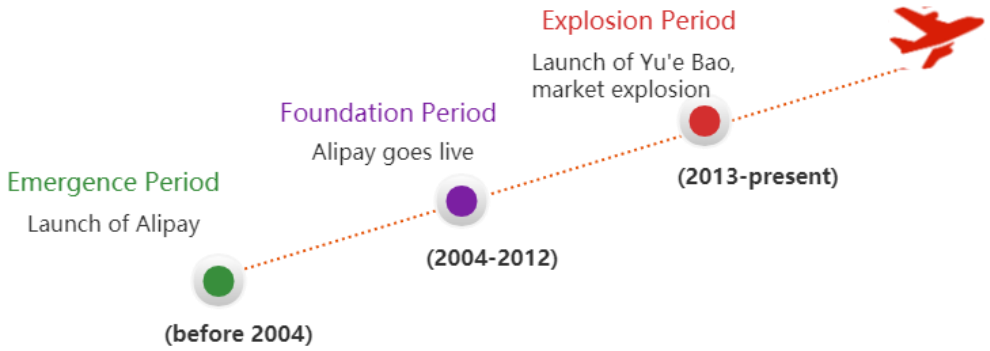


Figure 1. The Development Process of Digital Finance

3. The Impact of Digital Finance on Corporate Green Technology Innovation

3.1. Alleviating Corporate Financing Constraints

In the context of rapidly developing fintech, the corporate financing environment is undergoing new transformations. In traditional financial systems, small and medium-sized enterprises (SMEs) face persistent challenges in obtaining affordable financing, particularly in emerging markets and developing countries. Digital finance alleviates corporate financing constraints in several ways [7-8]. First, digital finance relies on mobile internet, big data, and other technologies, which provide unique advantages in data collection and processing. This allows digital finance to better understand a company's internal information, improving risk identification and compliance in financial regulation. It reduces information asymmetry between borrowers and lenders, increasing the scope and scale of external financing available to companies. Second, using the "80-20 rule," digital finance collects and allocates funds through more channels, pooling small-scale investments into large capital pools. Through the analysis of this information, funds are allocated to companies with external financing needs, expanding funding sources and improving external financing capacity. Third, leveraging modern technology, digital finance enables near-zero-cost data collection and processing, identifying financing projects with long-term investment value and potential for green technology innovation. This optimizes the allocation of social idle funds.

3.2. Reducing Corporate Financing Costs

Amid the rapid development of fintech, reducing corporate financing costs has become key to driving economic growth and enhancing competitiveness. Digital finance greatly reduces financing costs (Table 1) by utilizing modern technology and vast amounts of data, no longer constrained by traditional financial infrastructure or limited by time and space. Companies can easily access various financial products and services through electronic devices like computers and smartphones. Moreover, digital finance uses digital technology to achieve near-zero-cost data mining, quickly and accurately matching capital providers with recipients, lowering information search costs for both parties, improving efficiency, and reducing decision-making costs. The real-time updates of big data also enable dynamic supervision of the funds used by recipients, as well as their operational risks. The "catfish effect" of digital finance has impacted traditional bank-dominated financial systems, reshaping their channel structure and intensifying competition within the banking industry. To maintain competitiveness, banks and financial institutions will undergo digital transformation, enhancing their data collection and analysis capabilities and further reducing corporate financing costs.

Table 1. Methods for Reducing Corporate Financing Costs

Method	The role of digital financial
Digital Financial platform	Reduce time and space constraints, and improve the availability of financial services
Data mining	To reduce information search cost and improve the matching efficiency
Update data in real time	To enhance transparency, reduce the regulatory costs, and improve the financing security
Optimize credit evaluation	Improve the accuracy of credit assessment, reduce financing costs rise caused by information asymmetry

3.3. Changing Corporate Capital Allocation

With the rapid development and widespread application of digital technology, the deep integration of digitalization and the green economy has become a new driving force for economic transformation and upgrading. Digital manufacturing enhances production efficiency and generates an important resource—"redundant resources"—which is crucial for green economic development. Redundant resources, as flexibly deployable reserves within an organization, are vital for green technology innovation and sustainable growth. When resources are abundant, companies are more inclined to invest in long-term sustainable development. Conversely, when resources are scarce, companies may prioritize short-term profit-driven investments, ignoring environmental impact. Green technology innovation, as the core driver of total factor productivity, requires significant capital investment and takes time to deliver returns. Under the traditional financial system,

with severe financing constraints and high financing costs, companies are less motivated to invest in technology and may reduce innovation spending. The development of digital finance broadens corporate financing channels, lowers financing costs, and improves capital efficiency by precisely matching capital supply and demand, injecting new vitality into the green economy.

4. Mechanisms for Promoting Corporate Green Technology Innovation through Digital Finance

4.1. Building Data Financial Infrastructure

As a product of the deep integration of finance and digital technology, digital finance reshapes financial services to provide strong capital support and efficient service systems for green technology innovation. Green technology innovation, a key force for sustainable development and carbon neutrality, often involves high risks, long cycles, and significant investments [9]. Traditional financial systems are limited in their support for green technology innovation. Building and improving data financial infrastructure is crucial for solving this problem and enhancing financial support for green technology innovation. By perfecting infrastructure such as internet credit systems and data-sharing platforms, the innovation potential of data resources can be unlocked, meeting the digital transformation needs of financial institutions and enterprises' green transitions. Building foundational systems reduces technical barriers, eases data access, and lowers market entry thresholds, creating a secure, efficient, and convenient digital financial ecosystem that supports green technology innovation.

4.2. Improving Corporate Governance Levels

The quality of corporate governance directly affects a company's stable development and ability to fulfill social responsibilities. As global environmental pressures increase, green innovation becomes an important pathway for corporate transformation and sustainable development. However, internal factors like short-termism in corporate management are major barriers to green innovation. Management's pursuit of short-term profits often leads to neglect of green technology investments, undermining long-term competitiveness. Companies should therefore improve their governance mechanisms and structures by optimizing ownership structures, increasing the proportion of independent directors, and implementing executive stock incentives. These steps will enhance governance levels, effectively supervising and motivating management to focus on long-term development, which boosts green innovation capabilities. Additionally, improving governance increases financial accuracy and transparency, helping stakeholders understand a company's financial and operational status, enhancing financial stability, and promoting green innovation activities.

4.3. Creating a Favorable Business Environment

To reduce the impact of economic uncertainty on corporate green technology innovation, government departments should play a guiding role by strengthening research and forecasting macroeconomic trends. Comprehensive analysis of domestic and international economic conditions and market dynamics will help preemptively mitigate risks. Government departments should also regularly conduct social surveys to gather feedback from businesses and the market, ensuring that economic policies are more practical and targeted, thus creating a relatively stable external environment for green innovation [10-11]. This will reduce the negative impact of external uncertainties on companies (Figure 2). Moreover, businesses themselves should make rational predictions about their macroeconomic environments, adjust their strategies based on internal conditions, seize opportunities, and increase investment in green innovation projects to enhance their core competitiveness and sustainable development capabilities.



Figure 2. The Importance of Creating a Favorable Business Environment

4.4. Promoting Corporate Green Transformation

As new digital technologies such as big data, cloud computing, and artificial intelligence develop at unprecedented speeds, they are deeply integrating with traditional industries, driving intelligent and green transformations across sectors. Digital transformation improves production efficiency, optimizes resource allocation, and creates new growth points and competitive advantages for companies, particularly in green technology innovation [12-13]. Therefore, China should embrace digital transformation trends, refine top-level design, and formulate fiscal policies that support corporate digital transformation activities. Companies should focus on building talent pools, accelerating the recruitment and training of professionals with the skills and knowledge needed for digital transformation. This ensures that enterprises have the capabilities required for digital transformation, facilitates information exchange with external stakeholders, and improves resource utilization rates, aiding companies in green innovation activities and contributing to ecological civilization and sustainable development goals.

5. Conclusion

Amid growing global resource and environmental pressures, corporate green technology innovation has emerged as a crucial driver of sustainable economic growth.

Digital finance, as an innovative financial model, offers significant support for green technology innovation through its advantages in convenience, efficiency, inclusivity, and creativity. A thorough analysis of how digital finance influences green technology innovation—by easing financing constraints, lowering costs, and improving capital allocation—reveals its pivotal role in advancing these innovations. Looking ahead, efforts to enhance corporate governance, foster supportive business environments, and guide urban green transitions will further strengthen the integration of digital finance with corporate green technology innovation.

References

[1] J. Li and B. Li, "Digital inclusive finance and urban innovation: evidence from China," Review of Development Economics, vol. 26, no. 2, pp. 1010–1034, 2022.

[2] H. Qian, Y. Tao, S. Cao, and Y. Cao, "Theoretical and empirical analysis on the development of digital finance and economic growth in China," The Journal of Quantitative & Technical Economics, vol. 37, no. 6, pp. 26–46, 2020.

[3] Y. Su, Z. Li, and C. Yang, "Spatial interaction spillover effects between digital financial technology and urban ecological efficiency in China: an empirical study based on spatial simultaneous equations," International Journal of Environmental Research and Public Health, vol. 18, no. 16, p. 8535, 2021.

[4] X. Wang, X. Wang, X. Ren, and F. Wen, "Can digital financial inclusion affect CO2 emissions of China at the prefecture level? Evidence from a spatial econometric approach," Energy Economics, vol. 109, article 105966, 2022.

[5] H. Zhao, Y. Yang, N. Li, D. Liu, and H. Li, "How does digital finance affect carbon emissions? Evidence from an emerging market," Sustainability, vol. 13, no. 21, p. 12303, 2021.

[6] X. Jia, B. Liu, Y. Cui, and L. Peng, "Has financial development improved carbon emission efficiency? An analysis based on super efficiency undesirable-SBM model and multinational panel data," Environmental Engineering & Management Journal (EEMJ), vol. 20, no. 11, 2021.

[7] L. Xing, X. Yi, and Y. Zhang, "Will the development of the financial industry cause environmental pollution?" Management of Environmental Quality: An International Journal, vol. 32, no. 6, pp. 1298–1316, 2021.

[8] S. Chen and H. Zhang, "Does digital finance promote manufacturing servitization: micro evidence from China," International Review of Economics & Finance, vol. 76, pp. 856–869, 2021.

[9] H. Han and X. Gu, "Linkage between inclusive digital finance and high-tech enterprise innovation performance: role of debt and equity financing," Frontiers in Psychology, vol. 12, article 814408, 2021.

[10] W. Fan, H. Wu, and Y. Liu, "Does digital finance induce improved financing for green technological innovation in China?" Discrete Dynamics in Nature and Society, vol. 2022, Article ID 6138422, 12 pages, 2022.

[11] P. K. Ozili, "Banking stability determinants in Africa," International Journal of Managerial Finance, vol. 14, no. 4, pp. 462–483, 2018.

[12] Q. Deng, S. Zhou, and F. Peng, "Measuring green innovation efficiency for China's high-tech manufacturing industry: a network DEA approach," Mathematical Problems in Engineering, vol. 2020, Article ID 8902416, 13 pages, 2020.

[13] H. Sun, B. K. Edziah, C. Sun, and A. K. Kporsu, "Institutional quality, green innovation and energy efficiency," Energy Policy, vol. 135, article 111002, 2019.