Received: 4 Jan. 2025 | Revised: 14 Jan. 2025 | Accepted: 16 Jan. 2025 | Published online: 24 Jan. 2025
RESEARCH ARTICLE

Journal of Global Humanities and Social Sciences
2025,Vol. 6(1)34-39
DOI: 10.61360/BoniGHSS252017460106

The Impact of Digital Finance on Green Investment Pathways to Sustainable Development and Carbon Reduction

Enping Shi[1], **Yaxi Yang**[1], **Yunxing Song**[1,*]
[1] *Henan University of Economics and Law, Zhengzhou City, China*

Abstract: With the introduction of the "dual carbon" goals and the rapid expansion of the digital economy, the role of digital finance in promoting sustainable development has become increasingly significant. This study examines how digital finance promotes sustainable development and carbon reduction, as well as its effects on fostering green investment. The findings reveal that digital finance facilitates carbon reduction and green investment through two primary pathways: (1) leveraging financial instruments such as green bonds and carbon funds to provide financial support for green projects. Additionally, related policies that offer subsidies and tax incentives further stimulate green investment, driving its growth. (2) utilizing blockchain technology to enhance information transparency, which enables companies to track carbon emissions in real time, encourages the disclosure of ESG data, and boosts investor confidence in green projects, thereby attracting more capital to the green investment sector. This study concludes that digital finance, through multidimensional innovation and application, not only promotes sustainable development and carbon reduction but also lays a solid foundation and creates ample opportunities for the growth of green investment.

Keywords: Digital Finance; Green Investment; Sustainable Development; Carbon Reduction

Introduction

With the intensification of global climate change, promoting sustainable development and achieving carbon reduction goals have become core priorities for economic growth worldwide. As a major contributor to global carbon emissions, China has proposed its ambitious "dual carbon" targets, aiming to peak carbon emissions before 2030 and achieve carbon neutrality by 2060. To realize these goals, green investment has emerged as a critical tool to support clean energy, energy conservation, environmental protection, and low-carbon technologies. However, the existing green finance system faces challenges such as inefficient capital allocation and insufficient information transparency, which limit its capacity to effectively drive the growth of green industries. Against this backdrop, the rise of digital finance offers unprecedented opportunities to enhance green investment. By leveraging technologies such as blockchain, big data, and artificial intelligence, digital finance not only optimizes the efficiency of financial services but also provides more precise and accessible financing solutions for green projects. On one hand, under the guidance of supportive policies, digital finance fosters innovation and optimization in green financial instruments, such as green bonds and carbon funds, simplifying issuance processes, reducing financing costs, and making capital more accessible to green initiatives. On the other hand, digital finance enhances transaction transparency and traceability through blockchain technology, alleviating information asymmetry and boosting investor confidence in green projects, which in turn attracts more capital into the green investment sector. By driving financial product innovation, strengthening policy support, and improving information transparency, digital finance directly advances sustainable development while indirectly accelerating green investment, showcasing its immense potential

Corresponding Author: Yunxing Song
Henan University of Economics and Law, Zhengzhou City, China
Email: songyunxing_huel@126.com

and valuing in facilitating green and low-carbon development. This study aims to uncover the mechanisms through which digital finance promotes green investment, supports carbon reduction, and advances sustainable development, providing valuable theoretical insights and practical recommendations for future policy formulation.

1. The Importance of Digital Finance in Promoting Green Investment

1.1. The definition, characteristics, and advantages of digital finance

Digital finance refers to an innovative financial service model that is enabled by technologies such as blockchain, cloud computing, big data, the internet, and artificial intelligence. It is not merely an extension of traditional finance in digital form, but a transformative model that is deeply integrated with advanced technologies (Huang Yiping and Huang Zhuo, 2018).

Firstly, the efficiency of digital finance lies in its ability to significantly optimize the financing processes for green projects. By leveraging blockchain and smart contract technologies, digital finance facilitates efficient capital flows and transparent management, enabling the rapid issuance and allocation of green bonds. The rapid development of digital finance has improved investment efficiency and directed bank capital toward renewable energy enterprises, thereby promoting the growth of green industries and reducing environmental pollution (Yan, 2022). This highly efficient financing approach minimizes intermediary processes, offering more direct financial support to carbon reduction and clean energy projects, thus accelerating green investment.

Secondly, the inclusiveness of digital finance lowers barriers to accessing financial services through technologies such as the internet and big data. The increasing prevalence of digital transactions globally has, to some extent, incentivized more enterprises to engage in green investments aimed at environmental protection. These investments not only contribute to improving environmental quality but also facilitate a faster transition to more sustainable long-term growth. Furthermore, the digital economy effectively promotes regional green and high-quality development while demonstrating spatial spillover effects (Ma and Zhu, 2022).

Finally, the innovativeness of digital finance has created favorable conditions for the diversification of green financial instruments. With the application of technologies such as blockchain and big data, green financial products have undergone continuous innovation, including crowdfunding, carbon funds, and green bonds, thereby enhancing the financing capabilities of green projects and providing critical financial support (Desalegn, 2022). Additionally, blockchain technology ensures the transparency of green projects, allowing investors to monitor their environmental impacts, thereby increasing the credibility of green investments. This innovativeness not only enriches the variety of green financial products but also attracts more investors to participate in the green financial market, further driving the development of green investments.

1.2. The definition and necessity of green investment

Green investment refers to the allocation of funds to projects that contribute to ecological protection and sustainable development, including investments in energy conservation, pollution control, clean energy, and resource recycling. The core objective of green investment is to reduce carbon emissions, promote environmental protection, and achieve a harmonious balance between economic growth and ecological sustainability. By facilitating the low-carbon transition of businesses and society, green investment drives energy conservation, emissions reduction, and environmental protection, ultimately ensuring the sustainable utilization of resources.

Moreover, green investment is of significant social necessity. As climate change becomes an increasingly urgent issue, controlling carbon emissions has emerged as a critical component for nations worldwide in achieving their sustainable development goals. Specifically, green investment

plays a pivotal role in reducing greenhouse gas emissions and mitigating climate change. By promoting the low-carbon transformation of enterprises and society, it advances energy conservation, emissions reduction, and environmental preservation, thereby fostering the sustainable utilization of resources.

In addition to its environmental benefits, green investment also generates economic benefits by creating new market demands. As a result, it serves as an effective means of driving green GDP growth, providing a dual advantage of both environmental and economic gains.

2. Analysis of the Current Status of Digital Finance in Promoting Green Investment

Since the launch of the national carbon emission trading market in 2021, digital finance has played a pivotal role in carbon trading platforms. By the end of 2023, the cumulative trading volume of China's carbon market had exceeded 500 million tons of carbon dioxide equivalent, with a transaction value surpassing 20 billion yuan. Digital financial technologies, such as blockchain and big data, have been effectively applied in carbon trading, significantly enhancing transaction transparency and traceability while reducing risks of data falsification and market speculation. This transparent and efficient trading environment has further incentivized enterprises to participate in carbon reduction efforts, driving low-carbon transitions and the development of green industries.

As of the end of 2023, the balance of domestic and foreign currency green loans in China reached 30.08 trillion yuan, marking a year-on-year growth of 36.5%, outpacing the growth of total loans by 26.4 percentage points. During the same year, approximately 8.48 trillion yuan in new green loans were issued. Furthermore, in 2023, a total of 481 labeled green bonds were issued domestically, with an issuance scale of 854.854 billion yuan. These figures illustrate the significant role of digital finance in channeling funds toward environmentally friendly projects, such as clean energy and green technologies, thereby providing robust support for carbon reduction and sustainable development.

Despite the promising potential of digital finance in promoting green investment, regional disparities in development remain evident. Developed regions such as Beijing and Shanghai, benefit from well-established digital financial infrastructure and policy support, have achieved notable achievements in green investment. A higher proportion of funds in these areas is directed toward clean energy and green technology innovation. Conversely, in less-developed regions, inadequate digital financial infrastructure has constrained the progress of green investment. Moving forward, it is essential to strengthen the construction of digital financial infrastructure and enhance policy guidance in underdeveloped regions to bridge regional gaps and promote balanced green investment throughout the country.

3. Practical Applications of Digital Finance in Promoting Green Investments

Under the "dual carbon" goals, digital finance has played a crucial role in promoting sustainable development and reducing carbon **emissions** while driving the growth of green investments through various pathways.

3.1. Policy support and incentive mechanisms

Following the introduction of the "dual carbon" goals, government and financial regulatory authorities have implemented numerous policies to encourage the use of green bonds, carbon funds, and other financial instruments to support low-carbon and sustainable development projects. These policies often include subsidies, tax incentives, and other measures that lower financing barriers for enterprises engaged in green technological innovation. By leveraging digital platforms to provide diverse financial products, these policies improve funding supply and efficiency, accelerate capital flows, and optimize resource allocation, thereby enhancing corporate productivity and promoting green investments. For instance, the Bank of China introduced the "Carbon Benefit Loan" product,

which connects directly to government carbon performance evaluation systems to automatically collect comprehensive carbon efficiency data from enterprises. Using a scoring model, the product identifies high-quality clients with carbon reduction initiatives. As of June 2023, the "Carbon Benefit Loan" has supported over 500 enterprises with a total of approximately 2.5 billion RMB in loans, primarily directed towards renewable energy and energy conservation projects, achieving substantial carbon reductions. Similarly, the "23 Wuxi GN010" green bond issued by China Ningbo Bank utilized digital yuan for fund collection, with proceeds allocated to photovoltaic projects in Wuxi to support clean energy development. This initiative benefited from a joint policy directive issued by the People's Bank of China and other regulatory bodies to promote the role of green finance in building a "Beautiful China." The use of digital yuan not only enhanced the efficiency of fund collection for green bonds but also reduced transaction costs, enabling more enterprises to access low-cost funding for green projects and thereby stimulating green investments.

3.2. Enhancing information transparency through blockchain technology

Digital finance has played a significant role in enhancing information transparency. By leveraging technologies such as blockchain and big data, digital finance enables real-time tracking of carbon emissions and ESG data, ensuring both transparency and reliability. This improved transparency not only builds investor trust in green projects but also attracts more capital to the green investment sector. For example, Ccarbon Chain has developed a distributed carbon footprint tracking system using blockchain technology. This system records corporate carbon emissions in real time and ensures data immutability. By providing a transparent carbon tracking framework, it guarantees the authenticity of carbon emission data, enhances the credibility of carbon trading, and mitigates risks related to data falsification and information asymmetry. This transparency allows investors to better understand a company's carbon emission status and reduction commitments, thereby increasing confidence in carbon reduction projects and further driving green investment. Additionally, I-REC (International Renewable Energy Certificate) systems developed by Qikun Technology use blockchain to automate and validate renewable energy generation data at scale. This system facilitated the delivery of 100,000 I-RECs on the VeryCleanPlanet platform, representing the largest single transaction of international green certificates in China. These funds have been channeled into renewable energy projects, particularly in wind and solar power. This transparent information management approach not only strengthens companies' positions in the carbon market but also encourages investors to engage in carbon reduction and green projects, promoting the sustained development of green finance.

3.3. Innovation and application of green financial instruments

Innovation in green financial instruments is a vital pathway for digital finance to promote carbon reduction and green investment. Digital finance enables the continuous improvement of green investment methods through the development of innovative tools such as green bonds, carbon funds, and digital ESG evaluation systems. For instance, some cities in China have introduced "Green Loan Connect," "Green Finance Connect," and "Green Credit Connect" to provide financial services, including bank loans, equity financing, and green evaluations, for small and micro-enterprises. These systems use intelligent matching to direct funds to projects that meet low-carbon and environmental standards, significantly improving the efficiency of green credit. As reported, Huzhou's green finance platform has assisted over 13,000 small and micro-enterprises secure bank credit, with total financing exceeding 160 billion RMB. This innovative tool not only reduces financing costs for enterprises but also provides robust financial support for green projects. Another example is the ESG scoring system developed by Harvest Fund, which employs intelligent analytics to systematically evaluate corporate ESG performance, ensuring that

funds are prioritized for carbon reduction and low-carbon technology projects. Harvest Fund's digital ESG scoring system has enhanced the scientific basis and efficiency of investment decisions, further expanding the scale of green investments.

4. Optimization Strategies for Digital Finance in Promoting Green Investment

4.1. Improving the policy support system

To better facilitate green investment and achieve carbon reduction goals, the government should further enhance the policy support system for digital finance and strengthen the connection between financial institutions and environmental projects. On one hand, tax incentives, low-interest loans, and fiscal subsidies can be employed to encourage financial institutions to provide funding for green projects. These measures would reduce the cost of corporate green investment and effectively channel capital into carbon reduction fields such as clean energy, energy conservation, and low-carbon technologies. On the other hand, the government could establish dedicated funds to support the innovative application of digital finance technologies in green investment and carbon emission monitoring. For example, blockchain technology can be used to create transparent records of carbon emission data, thereby enhancing the traceability and authenticity of carbon reduction efforts. Through a combination of policy incentives with digital finance technology safeguards, the government can accelerate the adoption and promotion of low-carbon technologies, thereby driving the growth of green investment and achieving substantial reductions in carbon emission intensity.

4.2. Optimizing regulatory mechanisms

The transparency and traceability of digital finance not only enhance trust and transparency in the green finance market but also play a significant role in carbon reduction efforts. Regulatory authorities should strengthen oversight of digital finance platforms and promote the application of big data, blockchain, and artificial intelligence in monitoring carbon emissions and evaluating green projects. This includes technical innovations in carbon footprint recording and emission reduction monitoring. By establishing a standardized, nationwide green finance information-sharing platform, the government can enable end-to-end tracking and monitoring of green projects. This system would not only reduce information asymmetry and increase market transparency but also accurately identify and verify enterprises' carbon reduction achievements. Moreover, it would effectively prevent fraudulent green projects from leveraging digital finance platforms for funding, ensuring that resources are genuinely allocated to low-carbon and environmental protection projects. Such measures would further advance the realization of broader carbon reduction goals.

4.3. Innovating green financial instruments

Digital finance offers a variety of financial tools and innovative application scenarios, and the government should support and promote the development of green financial instruments, such as green bonds, carbon funds, and carbon quota trading, to meet the diverse financing needs of green projects. For example, policies could encourage enterprises to issue green bonds, leveraging digital currencies such as the digital yuan to enhance fund flow efficiency. Simultaneously, the carbon emissions trading market should be further developed to provide enterprises more flexible mechanisms for carbon reduction transactions, thereby increasing financial support for green projects.

4.4. Accelerating infrastructure development

Accelerating green financial infrastructure is crucial for balanced regional development and sustainable growth. Digital financial infrastructure can advance green projects, especially in underdeveloped regions like central and western China. Governments should prioritize deploying intelligent infrastructure to support local green industries, enabling precise carbon monitoring and reduction. Establishing regional green finance hubs can attract green capital, enhance funding for green projects, and foster low-carbon economic growth.

This approach helps narrow regional disparities in green investment and carbon reduction efforts.

Conclusion

This study examines the impact of digital finance on green investment. Utilizing technologies like big data and artificial intelligence, digital finance has driven green financial innovation, improved carbon emission monitoring, and enhanced transparency, providing efficient channels for green project financing. Tools such as green bonds and carbon funds, supported by tax incentives and subsidies, have further boosted corporate green investment. Blockchain technology has enabled transparent carbon data tracking, fostering standardized carbon trading markets and strengthening investor confidence. While this study focuses on the pathways of sustainable development and carbon reduction, future research could explore additional influencing factors and pathways to uncover the broader mechanisms of digital finance in promoting green investment and sustainable growth.

Conflict of Interest

The authors declare that they have no conflicts of interest to this work.

Acknowledgement

This research was funded by:
Henan University of Economics and Law (Grant No. 24HNCDZT18) and the Key Scientific Research Projects of Colleges and Universities in Henan Province (Grant No. 23A790017).

References

Desalegn, G., & Tang, L. (2022). Developing countries in the lead: A bibliometric approach to green finance. *Energies, 15*(12).

Wu, X. (2014). Deep reform of China's finance and Internet finance. Finance & Trade Economics,(1), 14-23.

Huang, Y., & Huang, Z. (2018). Development of digital finance in China: Present and future. *China Economic Quarterly, 17*(4), 1489-1502.

Yan, B., Wang, F., Chen, T., et al. (2022). Digital finance, environmental regulation and emission reduction in manufacturing industry: New evidence incorporating dynamic spatial temporal correlation and competition. *International Review of Economics & Finance, 83*, 750-763.

Luc, E., Benedict, C., & Abdoul, W. (2013). Green investment: Trends and determinants. *Energy Policy, 60*.

Luluk, W. (2020). A systematic literature review of socially responsible investment and environmental social governance metrics. *Business Strategy and the Environment, 29*(2).

Ma, D., & Zhu, Q. (2022). Innovation in emerging economies: Research on the digital economy driving high-quality green development. *Journal of Business Research, 145, 801-813.*

How to Cite: Shi, E., Yang, Y. & Song, Y. (2025). The Impact of Digital Finance on Green Investment: Pathways to Sustainable Development and Carbon Reduction. *Journal of Global Humanities and Social Sciences*, *6*(1), 34-39.
https://doi.org/ 10.61360/BoniGHSS252017460106