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EVALUATING DIGITAL FINANCIAL INCLUSION'S ROLE IN SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL CONSERVATION

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ABSTRACT

Purpose: This study aims to investigate the interaction between digital technologies and green finance during financial market transformation.
Design/Methodology/Approach: The methodological basis of the study is content analysis of scientific publications and a comparative analysis of the impact of digitalisation on the development of green investments. The dataset comprised 120 peer-reviewed articles and analytical reports indexed in Scopus, Web of Science, and ScienceDirect, covering the period 2018–2024. Analytical approaches to integrating digital solutions were examined.
Findings: The results indicate a positive correlation between the level of digitalisation and the growth of green financing, pointing to the emergence of a new paradigm of financial management. The integration of digital solutions improves transparency and efficiency, though challenges remain, including cybersecurity risks, greenwashing, and regulatory uncertainty.
Research Limitation: The research is conceptual and based on secondary data, which sets a direction for further empirical validation through quantitative and case-based approaches.
Practical Implication: The findings offer recommendations for implementing digital and green innovations to create a sustainable financial system.
Social Implication: By promoting sustainable investment practices, the integration of digital and green finance supports long-term environmental protection and social well-being.
Originality/Value: The originality of this study lies in synthesising digital transformation tools with green finance instruments and framing them as an integrated analytical model for sustainable financial market transformation.
Keywords: *Digital. economy. environmental. green finance. sustainable development*

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INTRODUCTION

Today's economy is undergoing a complete transformation, driven by two powerful trends: digitalisation and the green movement in the financial market. A fundamental change in the functioning of the financial system is underway due to growing environmental pressures, the need to achieve the Sustainable Development Goals (SDGs), and rapidly advancing digital technologies. New financial instruments are necessary that incorporate environmental responsibility and technological efficiency. Sustainable development has called into question the traditional model of financial growth and the challenges of life, so it must be applied systematically and grounded in sound scientific reasoning.

Over the past few years, several studies have examined the impact of digitalisation on financial markets (Bielialov et al., 2023; Klochan et al., 2021) and the role of green finance in supporting environmental sustainability (Nepal et al., 2024; Meng & Hao, 2024).

Digital technologies can also stimulate green investment, but only if they synchronise with this function (Badareu et al., 2025). Nevertheless, despite substantial scientific interest, the vast majority of studies focus on individual aspects of digitalisation or analyse green financial instruments, ignoring the mechanics of their interactions in the context of the transformation of financial markets. Among the "white spots", there is insufficient work on the nature of practical models for integrating digital technologies into green finance and on their manifestations in financial stability and risk management. Additionally, more research is necessary to determine how to prevent greenwashing, what cybersecurity should cost, and how to develop an effective regulatory framework that supports digital and environmental innovation.

At the same time, this research aims to analyse how digitalisation and ecological initiatives can affect alterations of financial markets according to sustainable development, define key areas of interaction between digital solutions and green finance, justify approaches in analysing the implementation of digital tools in the green financial system, and sketch out key challenges and opportunities towards building up a sustainable financial system.

LITERATURE REVIEW

Active research in contemporary economics focuses on the changes in financial markets driven by digitalisation and the green push. The green financial system is becoming increasingly important as a tool for achieving sustainable development in today's world, which is confronting environmental challenges and technological transformations.

Mohd and Kaushal (2018) defined a green financial system as financial support for environmentally friendly projects to reduce the increase of greenhouse gases and air pollution. This study by Fahad and Bulut (2024) focused on the structural and digital transformation of the financial industry, emphasising the value of digital technologies such as artificial

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intelligence (AI), big data analytics, and the Internet of Things (IoT) in driving financial sector sustainability.

In the systematic literature review by Saeedi and Ashraf (2024), it is suggested that technology plays a crucial role in promoting a green financial system and that innovation in financial technology enhances the positive impact of such a system on sustainable development. Nakhcha and Tlaty (2023) argued, in their theoretical analysis, that digitalisation and the green financial system create complex synergies, including effects on transparency, market efficiency, impact measurement, investment diversification, and innovation. Nevertheless, these synergies bring some headaches along the way, such as data security and regulatory requirements that require responsible treatment.

Green and digital economies are discussed in relation to sustainability (Reznikova et al., 2024; Nepal & Rakhmatov, 2024), as well as the role of digital innovation in ensuring financial and state security (Krysovatyy et al., 2024). The scholars also stress financial inclusion and the creation of ecoentrepreneurship in the digital economy (Desyatnyuk et al., 2025a; Abbas & Najam, 2024). Further researchers have also examined the global experience of digitalisation of economic processes (Bielialov et al., 2023; Klochan et al., 2021) and the influence of green entrepreneurship on social change (Mia et al., 2022). Significant contributions were made to studies of innovative approaches for environmental risk management and the use of digital technologies for monitoring ESG indicators (Dhayal et al., 2024; Badareu et al., 2025; Qian & Chen, 2024).

Osabohien et al. (2024), Hordofa (2024), and Nauman et al. (2024) addressed the challenge of ensuring financial stability amid digital transformation and environmental challenges. At the same time, researchers highlight uncertainties regarding regulatory issues, cybersecurity, and greenwashing (Kask & Findsrud, 2025; Muhammad Sibt-e-Ali et al., 2025). Some scientific works focus on the impact of digitalisation on the development of green innovation and decarbonization strategies (Kong & Chen, 2024; Meng & Hao, 2024; Deng et al., 2024; Wan et al., 2025).

Research by Xu and Ullah (2023) and Chen and Wang (2025) analysed the relationship between the digital economy, energy efficiency, and CO_2 emissions reduction. Thus, the scientific discourse emphasises the importance of synergies between digital technologies and green finance for achieving sustainable development goals, while underscoring the need for a comprehensive risk-management approach and for implementing innovative financial strategies. The Ukrainian and international scholarship has also recently added to the discourse on sustainable finance and digitalisation. Yermachenko, Bondarenko, Akimova, Karpa, Akimov, and Kalashnyk (2023) highlight that to enhance the socio-economic development and sustainability-related institutional capacity, smart infrastructure management should be a part of the digital economy. Sumets, Kniaz, Heorhiadi, Skrynkovskyy, and Matsuk (2022), in turn,

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advance methodology by developing a toolkit to measure agricultural enterprise resilience and, thus, connect economic stability with management practices aimed at sustainability.

The AMO theory, which explains how green business initiatives advance the idea of corporate responsibility, identifies ecological entrepreneurship as a driver of social change (Mia, Rizwan, Zayed, Nitsenko, Miroshnyk, Kryshtal, & Ostapenko, 2022). Sokil, Podolchak, Kniaz, Sokil, and Kucher (2022) offered a practical approach to predicting the sustainability of start-ups in Ukraine, highlighting the valuable role of innovation as a long-term growth driver.

In addition, Voronina, Lopushynskyi, Grechanyk, Vahonova, Kondur, and Akimov (2024) examined the trade-off between economic and ecological priorities in sustainable development management, and Sumets, Tyrkalo, Popovych, Poliakova, and Krupin (2022) presented the model of environmental risk management in agroholdings with the emphasis on alignment of risk strategies with sustainable development values. All of these contributions, in aggregate, enhance global perspectives by putting into perspective the interactions among financial stability, environmental risks, and the digital transformation in emerging markets.

In addition, some studies highlight strategies for protecting national interests in the financial sector in the context of globalisation (Desyatnyuk et al., 2024), as well as approaches to risk management in the digital economy (Desyatnyuk et al., 2025a, 2025b). Considerable attention is paid to the bibliometric analysis of the relationship between financial development, digitalisation, and climate change (Badareu et al., 2025).

Researchers Khan and Bounade (2024) and Hu et al. (2024) analysed the role of green investments, digital technologies, and renewable energy in reducing pollution and ensuring green growth. Desyatnyuk et al. (2025b) study financial security issues in the digital economy and consider comprehensive approaches to crisis management and the protection of financial systems from cyber threats arising from digitalisation and technological challenges, which is an essential point given the moderate ‘welded’ of digitalisation into the financial markets.

Similarly, Mia et al. (2022) examined how green entrepreneurship fosters social change, focusing on the AMO (Ability, Motivation, Opportunity) theory, which explains that a company's ecological attention drives improvements in corporate social responsibility and the development of green economic practices. The use of blockchain technologies, artificial intelligence, and smart contracts to automate environmental financial instruments and increase investment transparency (Deng et al., 2024; Qian & Chen, 2024; Muhammad Sibt-e-Ali et al., 2025) constitutes a distinct area of scientific inquiry. Studies on the same side emphasise the need to align digital solutions with corporate strategies to achieve sustainable development (Nauman et al., 2024; Wan et al., 2025).

The role of green bonds as a funding vehicle for sustainable development is a subject of separate direction in contemporary research. Stojković et al. (2021) noted that green bonds are

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critical to the development of financial markets and the financing of environmentally friendly technologies. In their opinion, the popularity of these instruments is growing because they can deliver strong returns for investors while advancing environmental initiatives. Gök et al. (2025) examined the interdependence between the green bond market and other financial markets across different economic settings. They demonstrated that, in addition to advancing environmental sustainability, green bonds also facilitate financial stability amid market instability.

Although there has been significant scientific progress, the problems of developing a single, effective regulatory framework for digital and green finance, as well as of developing universal mechanisms to prevent greenwashing in the global financial environment, remain unsolved.

METHODS

The research was based on a content analysis of modern scientific publications selected from major scientometric databases, such as Scopus, Web of Science, ScienceDirect, JSTOR, and Google Scholar, to understand the main trends in the campaign for digital technologies and green finance in the context of sustainable development. Purposive sampling was used to select 120 peer-reviewed publications and analytical reports, focusing on the most recent research (2018-2024).

With specific inclusion criteria that include relevance to digital technologies in finance, a relationship with green finance or sustainable development, and empirical or conceptual analysis, publications were selected. The exclusion criteria included non-peer-reviewed articles and those that lacked a clear methodological foundation.

The selected databases were searched for the keywords (digital finance, green finance, sustainable development, FinTech, environmental risk management) to collect the data. The records obtained were sorted and filtered to prevent overlapping and thematic irrelevance.

Content analysis was used to identify conceptual categories and research results on digitalisation and sustainability. The patterns of impact of digitalisation on green investments were evaluated through comparative analysis and synthesised into tables and figures developed by the authors.

RESULTS AND DISCUSSION

The review showed that green finance is steadily growing under the patronage of digital technologies. Over the period 2020-24, the percentage of digitalisation in financial markets increased by 30 percentage points (45 per cent to 75 per cent), and the amount of green investments increased to $680 billion (from $310 billion). The annual growth rate of green investments rose from 19.4% in 2021 to 23.6% in 2024, confirming a direct relationship

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between digital transformation and sustainable financing growth. The current transition of financial markets is justified by the need to adapt to the idea of sustainable development, which is based on economic, environmental, and social aspects.

As for the financial sector, the introduction of such sustainable development principles results in financial flows towards green initiatives, energy efficiency, and environmental innovations (Reznikova et al., 2024). Green finance instruments, socially responsible investment (SRI), and green bonds are important in financial markets for mobilising capital for sustainable development, especially green financial instruments. According to Nepal et al. (2024), green finance is a driver of energy transformation, and digitalisation enhances the efficiency of financial processes, making such investments more transparent and accessible.

This also constitutes an important theoretical aspect: ESG criteria (environmental, social, and corporate governance) are integrated into financial regulation and the latest corporate strategies. ESG 2.0 refers to the use of digital technologies to amplify the sustainability of financial markets. Also, digital transformation creates conditions for the development of financial technologies (FinTech) and encourages the expansion of financial inclusion and support for green startups. Financial inclusion in the digital economy also creates new opportunities for the entrepreneurial ecosystem, an important element of sustainable development strategies (Desyatnyuk et al., 2025a). As a result, the combination of digitalisation and green finance provides the theoretical basis for transforming the financial market toward sustainable development, facilitating a transition to a more sustainable and innovative financial system.

Digitalisation has become one of the key drivers of change in financial markets, defining new rules of the game. Scholars attempt to understand the features of the use of digital technologies, big data, artificial intelligence, and financial platforms, which manifest in greater transparency, efficiency, and accessibility of financial services (Bielialov et al., 2023). Digital innovations reduce transaction costs, speed up financial processing, and promote financial inclusion (Klochan et al., 2021). Further, digitalisation introduces novel possibilities for environmental risk monitoring and green investment support (Dhayal et al., 2024). Table 1 presents the main aspects of the impact of digitalisation on the financial markets.

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Table 1: Key areas of impact of digitalisation on the functioning and development of financial markets

Direction of influence	Characteristics	Expected result
Process automation	Use of algorithms and artificial intelligence for financial transactions	Increased speed and reduced costs
Transparency and security	Introduction of blockchain technologies	Reduced risk of fraud, increased trust
Financial inclusion	Access to financial services via digital platforms	Greater participation of small and medium-sized enterprises (SMEs)
Big data analytics	Use of Big Data to forecast market trends	More accurate financial decisions
Support for sustainable financing	Digital tools for monitoring ESG indicators	Stimulation of green investment
New financial products	Development of FinTech solutions, cryptocurrencies, digital assets	Diversification of financial instruments

Source: created by the author based on Bielialov et al. (2023), Klochan et al. (2021), Dhayal et al. (2024), Desyatnyuk et al. (2025a, 2025b)

These trends show that digitalisation not only improves traditional financial processes but also opens new opportunities for market expansion amid global threats and the successful design of appropriate development. In particular, digital technologies play an important role in strengthening financial stability, enhancing the competitiveness of market participants, and promoting environmentally friendly financial practices.

Nowadays, green initiatives are critical to advancing long-term sustainability and environmental responsibility within financial strategy. At the same time, in corporate and government strategic planning, financial flows are shifting to support environmental projects, energy-efficient technologies, renewable energy sources, and so forth (Nepal et al., 2024).

Green financial instruments such as green bonds, environmental investment funds, and ESG-based loans help achieve environmental progress and stabilise financial markets (Meng & Hao, 2024). Such initiatives give businesses a reason to stick to ecological standards and

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innovations, which positively impact their reputation, investment attractiveness, and long-term value.

An important part is incorporating sustainable development principles in financial and corporate governance. According to Abbas and Najam (2024), green capitalisation of human resources and digital finance are drivers of innovation in green technologies, helping companies become more flexible and sustainable in their financial strategies. In addition, green initiatives reduce financial risk from environmental disasters, climate change, and stricter regulatory requirements.

The use of such strategies reduces the risk of losses by minimising the consequences of underestimating environmental factors and by enhancing the financial system's adaptability to global challenges (Osabohien et al., 2024). Therefore, green initiatives have been integrated into today's financial strategies, maintaining the balance between economic benefits and sustainable responsibility. Because of the significant intensification of the global trend towards decarbonising the economy and achieving sustainable development goals, their role in shaping sustainable financial systems will grow.

Digital technologies, combined with green finance, synergise to achieve sustainable economic growth. Running financial processes digitally optimises resource use, increases transparency in financial decision-making, and opens opportunities to develop new financial instruments to finance the green economy. On the other hand, green finance leverages digital technologies to monitor, assess, and address environmental impacts and ecological risks (Badareu et al., 2025). These interrelationships can be analysed to identify key areas for promoting sustainable development.

To assess the relationship between digital technologies and green finance, the authors used content analysis of recent scientific studies and a comparative analysis of the impact of digitalisation on the growth of green investments in the context of sustainable development. The data were summarised based on the results of studies presented in the scientific literature. In particular, based on the collected information, the graphs in Figure 1 were created to reflect the dynamics of global green finance growth influenced by digital technologies.

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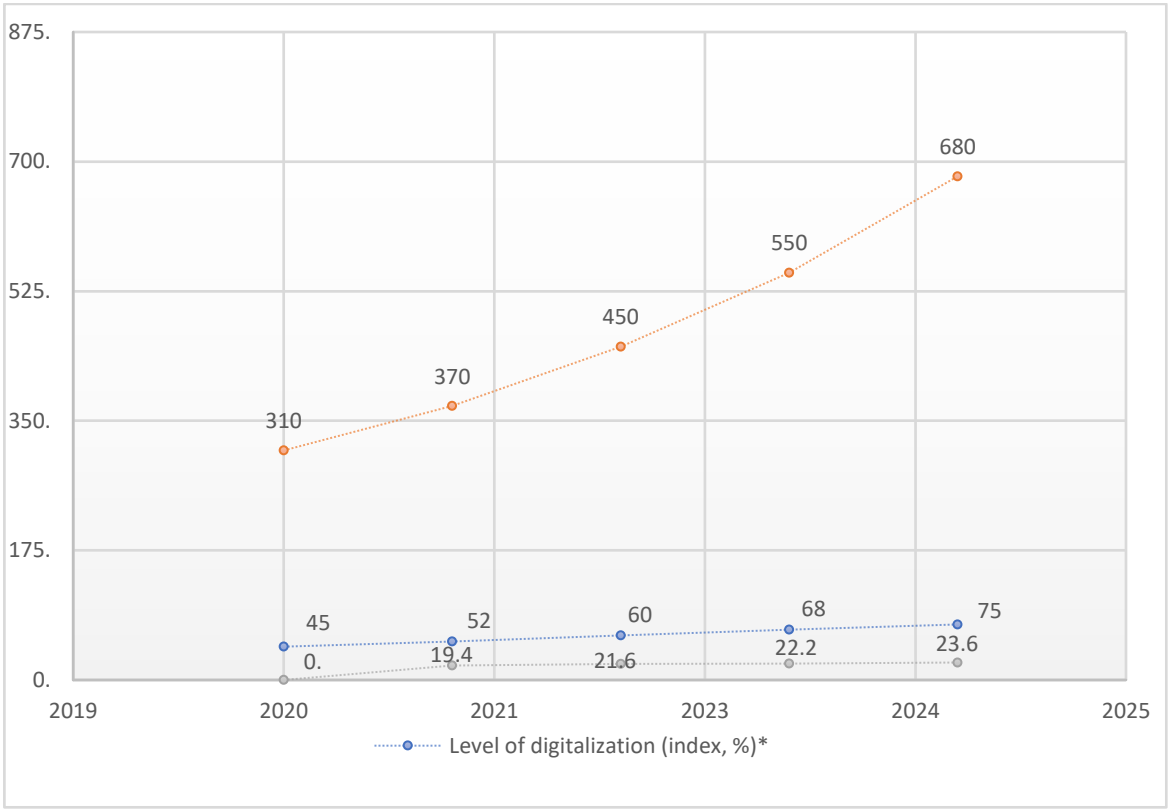

Figure 1: Growth dynamics of green finance under the influence of digital technologies on a global scale
Source: created by the author based on Meng and Hao (2024), Abbas and Najam (2024), Wan et al. (2025), Badareu et al. (2025)

The analysis of the data presented demonstrates a steady, positive growth trend in both the level of digitalisation and the volume of green investments from 2020 to 2024. Over five years, the level of digitalisation increased by 30 percentage points, from 45% in 2020 to 75% in 2024, indicating the active introduction of digital technologies in the financial sector. At the same time, green investment has increased significantly: from $310 billion in 2020 to $680 billion in 2024, an increase of $370 billion, or more than 119% of the initial level. The annual growth rate of green investments shows a trend towards gradual acceleration – from 19.4% in 2021 to 23.6% in 2024. Thus, digitisation increases not only the magnitude but also the rate of investment growth. It verifies that digital technology promotes the development of green finance by making financial flows for green projects more transparent, accessible, and efficient.

The resilience of financial markets and their alignment with sustainable development challenges and tasks are enabled by the integration of technologies and environmental innovations. In a synergetic combination, these components provide a basis for creating new

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financial instruments, improving environmental risk management, and optimising decision-making processes (Kong & Chen, 2024). Against the backdrop of the digital transformation of the economy, there is a need to develop analytical solutions to integrate digital solutions with green financial practice (Deng et al., 2024).

The best practices for the effective integration of digital technologies into green finance can be illustrated, in particular, by the utilisation of blockchain technology in the issuance and substitution of green bonds at the Bank of China. As demonstrated by Li (2023), this practice not only enabled more transparent, traceable investment but also led to a significant reduction in transaction costs and processing time. As a result of implementing digital solutions, the monitoring of the use of the attracted funds in line with environmental standards has been automated, serving as an example of the synergy between financial innovations and sustainable development (Li, 2023).

Moreover, Li (2023) noted that the digitisation of the issuance and circulation of green financial instruments has enhanced investor confidence, which is crucial for the international scaling up of such initiatives. By taking this example as a reference, it can be seen that not only technological introduction but also a strategic perspective in data management, in compliance with environmental standards, are important. At the same time, as Li (2023) notes, even with a high level of digitalisation, the issue of regulatory support and international harmonisation of green finance standards remains key to ensuring the stable development of digital environmental financial instruments.

This case demonstrates the practical potential of using blockchain and smart contracts in green finance, as reflected in the analytical approaches presented in Table 2.

Table 2: Analytical approaches to integrating digital technologies and environmental innovations into financial markets

Analytical approach	**Content of the approach**	**Expected effect**
ESG analytics based on Big Data	Using big data to assess environmental, social, and governance performance	Accuracy of risk assessment and investment decisions
Blockchain for green finance	Ensuring transparency and traceability of environmental investments	Increased investor confidence and minimisation of "greenwashing"
AI algorithms for risk assessment	Using artificial intelligence to predict environmental and financial risks	Preventive risk management

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Digital platforms for green bonds	Automating the issuance, circulation, and monitoring of green financial instruments	Reduced transaction costs, simplified market access
Smart contracts for eco-investments	Using smart contracts to enforce the terms of environmental projects automatically	Improved efficiency of investment flow management
Integrated dashboards	Visualising environmental and financial indicators in real time	Rapid decision-making and monitoring of ESG strategy implementation

Source: created by the author based on Kong and Chen (2024), Deng et al. (2024), Muhammad Sibt-e-Ali et al. (2025), Qian and Chen (2024), Kask and Findsrud (2025)

As shown in Table 2, analytical approaches combine modern digital technologies with environmental sustainability goals. The use of Big Data and AI improves the quality of environmental risk analytics, while blockchain and smart contracts ensure transparency and automation of financial transactions. From a technological point of view, there is a continuous availability of green financial instruments supported by digital platforms and integrated dashboards, and the implementation and control of the environmental project is improved. To this end, the implementation of these approaches facilitates the integration of environmental innovations into financial markets and enables them to contribute to achieving sustainable development goals.

New technologies, digitalisation, and green initiatives drive a multifaceted transformation of financial markets. This process is not only accompanied by new opportunities but also by a few challenges, requiring appropriate adaptation of financial strategies, regulatory mechanisms, and business models (Hordofa, 2024). The main challenges are cybersecurity, regulatory uncertainty, greenwashing risks and market participants' lack of awareness of digital and green tools (Kask & Findsrud, 2025). Nevertheless, there are opportunities, including the emergence of financial technologies (FinTech), growing demand for ESG investments, improved transparency mechanisms, and heightened cross-border cooperation on sustainable finance (Nauman et al., 2024). In Figure 2, the main challenges and opportunities in transforming financial markets are summarised.

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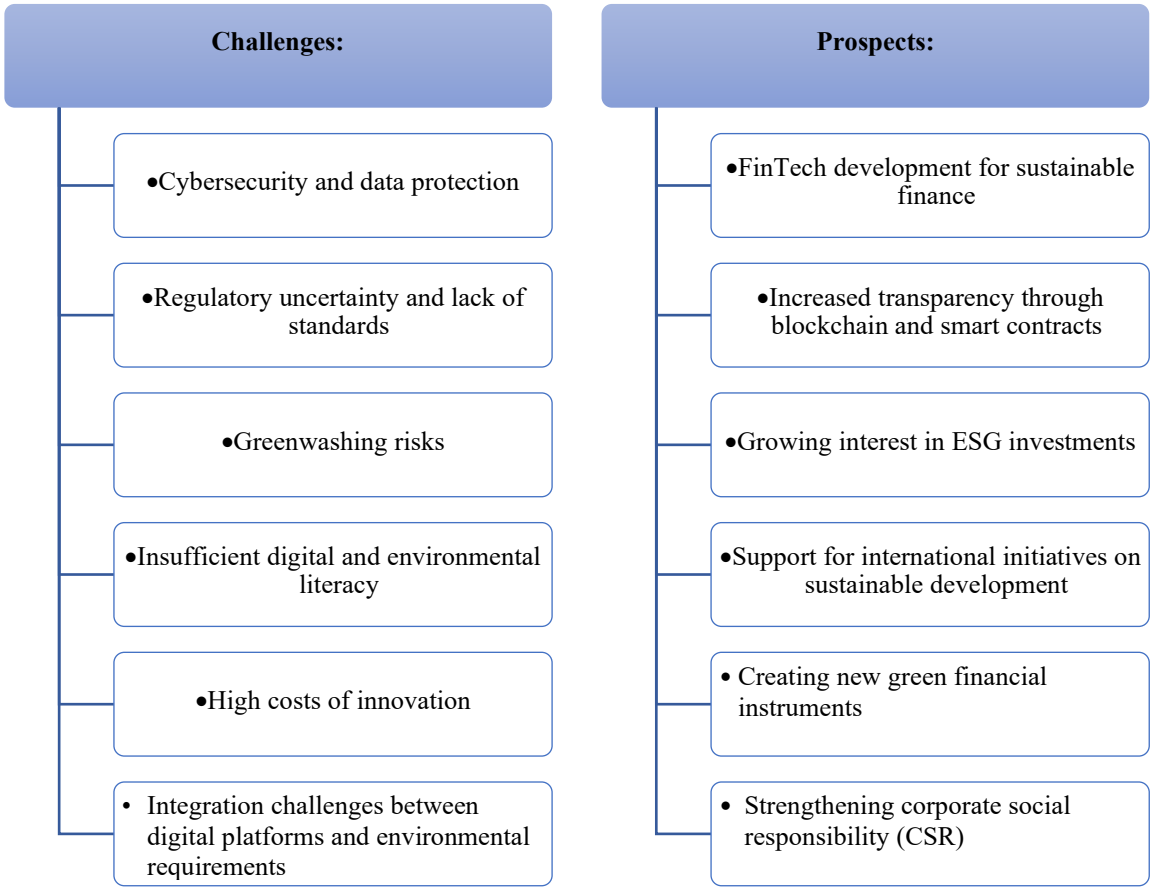

Figure 2:Key challenges and prospects for the transformation of financial markets under the influence of digitalisation and green initiatives
Source: created by the author based on Hordofa (2024), Kask and Findsrud (2025), Nauman et al. (2024), Muhammad Sibt-e-Ali et al. (2025), Wan et al. (2025)

As shown in Figure 2, the transformation of financial markets is accompanied by both objective challenges and significant development potential. These challenges can be overcome by improving the regulatory framework, introducing modern security technologies, raising market participants' awareness, and developing innovative financial products. The outlook indicates that the integration of digitalisation and green initiatives will lay the foundation for a more sustainable, transparent, and responsible global financial system.

In the current environment, achieving sustainable development goals is impossible without the active integration of digital technologies and green financial instruments into the activities of financial market participants. The challenges of the global economy, stricter environmental standards, and the rapid development of financial technologies necessitate a rethink of

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investment, risk management, and corporate strategy. Thus, the practical guidelines for the correct use of digitalisation and green technologies in the financial sector should be designed.

Taking ESG criteria into account at all levels of financial analysis and decision-making. Systematically addressing Environmental, Social, and Governance factors in investment projects and the eventual financial strategies should also be carried out by market participants. Such actions will reduce long-term risks and make financing more attractive for investment oriented toward sustainable financing preferences.

It is essential to automate green finance management through digital platforms. FinTech solutions or blockchain technologies and smart contracts should be implemented to ensure transparency and efficiency in environmental investments, and also to have an element of control over it. It would also reduce transaction costs and increase trust among institutional and private investors.

To foster internal digital and environmental competence among staff. There is a need to train employees on the application of digital tools and sustainable development principles at the workplace. Much more effective innovation and compliance with modern market requirements will be achieved by raising awareness and improving professional skills.

To activate cooperation with international initiatives and sustainable development funds. The extra resources that companies will attract to green projects will come from participation in global programs, partnerships with environmental funds, and the use of international standards; moreover, this will help improve companies' reputations in the global financial markets.

These recommendations will help transform financial markets efficiently toward sustainable development. In this context, market participants will be able to respond to current environmental and technological challenges and create value-added, thanks to new ways to finance, manage risk, and improve competitiveness at the global level, leveraging digital technologies combined with green financial instruments.

Discussion

The study's findings have demonstrated that integrating digital technologies and green initiatives plays a pivotal role in transforming financial markets towards sustainable development. A positive correlation has been established between the level of digitalisation and the growth of green investments, indicating the formation of a new paradigm of financial management focused on environmental sustainability. Some authors (Kong & Chen, 2024; Wan et al., 2025) emphasise that digitalisation is the primary driver of green finance, as it ensures transparency, efficiency, and accessibility of financial transactions. They believe that without the active implementation of digital platforms and blockchain technologies, it will be impossible to achieve significant progress in financing environmental projects.

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It is worth noting that the Bank of China's experience demonstrates the potential to scale up such digital solutions not only in green bonds but also across a wider range of environmentally oriented financial products. The use of blockchain technologies ensures not only transparency but also automated control over the targeted use of funds, minimising the risks of greenwashing and increasing issuers' accountability to investors and regulators. At the same time, the introduction of such technologies is accompanied by challenges related to cybersecurity, personal data protection, and the need to unify international digital standards. The digitalisation of green finance involves not only technical innovation but also sound regulatory decisions and active cooperation among financial institutions, government agencies, and other international organisations to build a robust, secure green finance ecosystem, as shown in the case of the Bank of China.

Meanwhile, other researchers (Kask & Findsrud, 2025; Hordofa, 2024) worry about the excessive reliance of financial markets on digital solutions, as there are risks of cybersecurity breaches, regulatory uncertainty, and the possibility of social problems arising from the process of digital transformation. In presenting digitalisation as an inevitable process, they highlight the dangers arising from disregarding adequate controls over its improper use and the lack of moral standards. As our findings corroborate, a balanced approach is optimal, implying that digital technologies are supportive tools for green finance. However, all of this should be coupled with the development of a regulatory framework, digital literacy, and cybersecurity. Our findings also align with those of Muhammad Sibt-e-Ali et al. (2025), who emphasise the need for a comprehensive approach to integrating digital and environmental solutions to achieve sustainable development goals.

At the same time, it should be acknowledged that the study has certain limitations, including insufficient empirical data on the long-term impact of digitalisation on green financial markets and the dynamic nature of regulatory changes. Given the contradictions identified in scientific approaches and the limitations of the analysis, further research should focus on a deeper study of the mechanisms of interaction between digital technologies and green finance, the development of effective risk management models, and the assessment of the impact of digitalisation on the stability of financial systems in a global context. This will allow for the formulation of more informed recommendations for practical application in the context of sustainable development.

CONCLUSION

The paper demonstrated that the interaction between digital solutions and green programs is emerging as a significant engine of financial market reform toward sustainable growth. The analysis also named many new drivers that influence this change: (a) a rapid increase in green investment due to the direct connection with digitalisation, (b) the introduction of ESG 2.0 requirements with digital tools as a sustainability strategy alignment framework, and (c) the development of blockchain-based monitoring systems that reduce the risks of greenwashing

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and enhance accountability. These aspects provide a new understanding of how digitalisation and green finance interact to strengthen financial stability and environmental accountability.

The novelty of the study is the possibility of creating an analytical model that interrelates digital transformation instruments (artificial intelligence, big data analytics, blockchain, smart contracts, and digital platforms) with green financial instruments. The model is superior to the current body of research in that it shows how these synergies can simultaneously enhance transparency, efficiency, and risk management in financial markets.

Some of the practical implications are as follows: developing actionable policies for financial institutions and policymakers, enhancing transparency of financial flows in green investments, automating ESG compliance monitoring, and promoting digital platforms for sustainable financing. Social implications further highlight the extended role of digital-green synergies in protecting the environment, social welfare and inclusive economic development.

Simultaneously, the research also acknowledges many issues, such as the dynamism of regulatory frameworks, a shortage of long-term data on the effects of digitalisation, and a reliance on secondary sources. The study of the future should also include predictive modelling of digital-green interactions, a more thorough empirical analysis of resilience in financial systems, and the evaluation of ethical processes to reduce cybersecurity risks and greenwashing.

The results may serve as the basis for formulating diverse adaptive strategies and quality policies that integrate digital and green financial instruments to achieve the objectives of sustainable development.

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