Mechanism Analysis of Digital Finance Empowering ESG Investment Driven by Information Disclosure Improvement and Capital Allocation Efficiency Enhancement

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Abstract. In recent times, environmental, social, and governance (ESG) investment has grown fast because more investors are incorporating sustainability considerations into financial decision-making. This growth is from both regulation and demand for open and responsible money use. Against this background, this article examines how digital finance promotes ESG investment by improving information disclosure, facilitating capital allocation, and enhancing investment decision-making efficiency. This study adopts a structured literature review approach and draws on recent empirical research showing that digital technologies reduce information asymmetry and improve capital allocation. From prior research, digital finance will greatly diminish the occurrence of financial disjunction and increase the use of resources, and improvement of digital finance can also improve the efficiency and risk management of financial institutions. Evidence points to green investors helping reduce ESG rating difference by cutting down info gap between firms and rating companies. In short, digital finance becomes an important enabler infrastructure for expanding ESG investment and developing sustainable finance.

Keywords: Digital Finance, ESG Investment, Information Asymmetry, Fintech, Sustainable Finance.

1 Introduction

ESG investment has gone from being a distinct investment philosophy to a regular part of worldwide financial markets. Institutional investors, asset managers, and individual investors incorporate ESG criteria into portfolio construction as a result of climate risks, regulatory activities, and increasing social demands for corporate accountability. ESG investing reflects a broader transformation in finance that emphasizes environmental and social responsibility alongside financial returns.

Even though it is rapidly growing, ESG investment is still facing structural problems, mainly with information quality and transparency. ESG performance data are typically based on voluntary corporate disclosures and third-party ratings organizations that use various methodologies. Especially, with the support of the firm ESG scores will become

© The Author(s) 2026
L. C. Yoong (ed.), *Proceedings of the 2026 2nd International Conference on Financial Innovation and Marketing Management (FIMM 2026)*, Advances in Economics, Business and Management Research 408,
https://doi.org/10.2991/978-94-6239-801-6_6

different for each ESG rating agency. It will be difficult for investors to get stable impressions from the ESG conditions of the firm. And that makes the information gap bigger and means ESG screening can't give money to the greenest businesses [1].

At the same time, digital finance has become a transformative force that is changing financial markets. Digital finance means using digital things, like lots of data that can be worked out, pretend smart computers, and a special digital chain, to help with money stuff and trying to make money. Colombage stated that financial technologies are getting closer to sustainable finance due to digital innovations altering the landscape of finance which help with the allocation of money to the places that are good for the ecosystem [2]. From empirical evidence comes to prove that the development of digital finance will bring about more operational efficiency and risk management improvement to financial institutions so as to optimize the utilization of financial resource [3].

And recently it shows how the people who buy and sell things on the market also make the environment for telling stories about being green. Green investors, for example, can help lower the amount of ESG rating difference between companies and ESG rating companies by lessening the lack of information between firms and ESG rating companies [4]. And it looks like what technology and people who buy stocks are doing matters for ESG investing to work.

This is written on the top of such a background, and the central problem is raised by this study. Digital finance and its extension on impact of increasing of information disclosure and investments decisions on ESG. The current study looks at the concrete mechanisms of how digital technologies reshape the ESG related investment process instead of treating digital finance and ESG investment as two different trends.

2 Core Concepts and Theoretical Foundations

2.1 Definition of Core Concepts

Digital finance refers to the application of digital technologies to deliver and enhance financial services. Big data finance, blockchain systems, fintech apps, and algorithmic decision tools all fit in this category. To be able to accelerate data and reduce transactions as well as allow more people to gain access to services financially. Sustainable finance environment is digital finance can allow more timely, complete incorporation of non-financial information into investment decision-making process. Importantly, digital finance should not be viewed merely as a technical upgrade of existing financial infrastructure. rather also as structure shifting things like changing the path that information flows, how risks are measured and appraised, and which capital gets allocated to the market.

ESG investment means using eco, social, govt criteria in money analysis and portfolio management. Environmental factors: Emission, resource usage, etc., social factors: labor practices, stakeholders, etc., governance factors: transparency, accountability, etc. In practical operation, due to the strong dependence on an ESG rating and Disclosure framework for transforming qualitative sustainable performance into quantifiable Investables. At present, with the continuous development of artificial

intelligence technology and an expansion of the environment protection consciousness of everyone at work, over 80 per cent have reacted. Finally, whether the effect of theESI investment needs to depend on the overall quality and consistency as well as transparency in this field.

2.2 Theoretical Foundations

Information asymmetry theory can give people a good way to look at the structure problems that ESG investment has. On the contrary, companies are usually more comprehensive and updated with regards to ESG practices carried out by themselves than the outsiders do. Investors need to do with what has been disclosed, and the third party ESG ratings that will also be incomplete and inconsistent. It causes an adverse selection, capital would flow towards firms with better disclosure strategy instead of truly better ESG performers, hence leading to an inefficient allocation of capital. The divergence of ESG ratings also shows such information gaps, making investors lose trust in the market, and reducing the efficiency of the market [6]. And then, when it comes to digital finance it can fill in the information gap between a company and a investor by providing more data available, combining different types of information, and helping to handle a greater quantity of info from a company.

Technological innovation theory explains how new tech cause firms and markets to change. Digital finance is this change through automated data collection, real time processing, and decentralized platforms. Sort of those sorts of characteristics of technologies allow there to be a possibility that ESG related stuff would be collected, analyzed, looked at and included in models as opposed to thought of in some sense as a type of lesser and less kind of data. Therefore, ESG factors will be incorporated into the assessment of risk, construction of the portfolio, and monitoring of performance. This will increase the quality and uniformity of decisions.

Sustainable development theory claims that people can have growth in economics, protection of the environment, and welfare among people at the same time. From this point of view, enabled financial systems by fintech give different routes for joining up environmental and social aims into financing choices, especially small and medium-size enterprises that are often stuck when it comes to finding money [7]. Improve access to sustainable finance, align capital flow with long-term societal goal, digital finance and ESG investment mutually reinforce each other under a sustainable framework.

3 Core Pathways through Which Digital Finance Enhances ESG Investment

3.1 Digital Finance Optimises ESG Information Disclosure and Analysis

One of the greatest contributions of digital finance to ESG investment is to improve the level of disclosure and analysis of ESG information. Traditional ESG data systems mostly just depend on companies choosing to disclose and report themselves, generally happening at particular intervals, those tend to be somewhat delayed, part of what's given might not be fully true and not fully verified either. Such limits contribute toward

continuous imbalance between information on the part of companies and what investors know, and this is a reduction of the credit of ESG indications in financial markets.

Digital finance technologies enable the integration of ESG-related data from multiple sources into unified analytical frameworks. And then people can also have big data analytics that'll let me go find ESG information, not just in the same places that people all read the report from, but in regulatory filings, environmental monitors, Supply Chain Databases, Publicly Accessible Social Media Data, etc. Comprehensive, all-encompassing ESG assessment based on this more extensive data fusion. Moreover, according to empirical research, green investors can alleviate S&E ratings differentiations through enhanced transparency in firm-organisation relationships with third-party evaluations; Therefore, the need for an open Information Environment has become apparent.

Besides, blockchain also increases the credibility of ESG information through the guarantee of data not being changed and checked. When it comes to ESG relevant data, once it is recorded onto distributed ledgers, then it is resistant to manipulation after the fact, reducing the risk of green washing and selective disclosure [9]. In real life, Ant Group has built a blockchain-based ESG info storage platform that can do real-time on-chain logging of corporate carbon output, environmental indicators, and social responsibility inputs. Making such data hard to tamper with and fully traceable, then the platform greatly raises the level of disclosure transparency and investor trust.

Artificial Intelligence (AI) to strengthen the ability of ESG analysis to uncover some hidden risk tendencies over many different types of data. AI models can handle massive volumes of disordered data, like text disclosures and behavioral data, to find early signs of trouble that old assessment ways might miss, making the ESG judgment outcomes more steady and solid [10].

3.2 Digital Finance Expands ESG Capital Mobilisation Channels

Beyond information disclosure, digital finance helps broaden the channels for ESG capital mobilization. Traditional ESG investment product targets mainly the large institution investors, thus has very high entry gate, which cut out lots of individuals and small markets. Fintech platforms cut down these obstacles through their digital, modular, and low-barrier ESG investment products, which let more people take part in sustainable finance.

Digital platforms enabled a part of the investment, allowed people to automatically allocate the portfolio, and manage transactions at once at the same time, so that it is easy to join the market. Therefore, ESG investment is no longer only in large institutional portfolio, but increasingly embedded in daily investment behavior. Empirical research shows that digital finance significantly reduces financial mismatches by easing financing constraints and improving information flows in capital markets [11].

And also changes to how capital gets allocated as a result of alterations to the method by which credit is done out works apart from it. Digital Finance lowers information opaqueness and improves more intensified contests among financial intermediaries, hence curtails rent seeking and aligns capital flows with firm quote financing

requirements [12]. These effects matter a lot for ESG oriented companies, because such companies will need to spend more on the disclosure and their investments have much longer horizon. In this way, digital finance gets money to more eco-friendly economic activities indirectly.

3.3 Digital Finance Enhances ESG Investment Decision-Making and Management

Digital finance makes it possible to make ESG investment decision-making and handle investments after they are made by including ESG aspects in the algorithms and real-time management system. Intelligent investment tools such as robo-advisory systems integrate ESG performance metric with the investor's risk tolerance and expectation return to achieve customized as well as sustainability-oriented portfolio.

Recently, artificial intelligence and compliance systems were changing the way that investment decisions evaluate energy efficiency and sustainability, and this is becoming a bigger role of AI in sustainable finance [13]. When ESG indicators are embedded in algorithms models, those technologies would decrease the degree of subjectivity and improve the consistency of ESG ratings. In the actual situation, Vanguard makes use of AI-driven quantitative model which holds ESG ratings, financials and public opinion all at the same time to continuously make changes to its portfolio's structure to balance both income goals and environmental goals.

In addition, the digital monitoring system can also carry out real-time ESG performance monitoring of the entire process of investment. And it can respond to any new environment and social risks arising from any new occurrence in real time. Financial markets give more evidence that fintech- and AI-related stocks are much the same as sustainable finance, which shows investors believe technology can make their money grow better through the ESG investing [14].

4 Digital Finance-Enabled ESG Investment: Supporting Measures

4.1 Policy-Level Measures

Policy wise, the effective yet conformable to the usage ESG disclosure criteria needed to be created. Different countries' different structural differences on disclosure with different industry group regulatory organizations have now become an important constraint on ESG investment. Indicators and reporting format variations decrease data comparability and make it harder for digital tools to be automated. They hinder automated analysis and assessment. Therefore, policy makers need to put priority in aligning up the ESG statement needs. A feasible approach is to use a two-tier framework where the basic layer includes indicators like basic indicators such as carbon emissions and employees, etc., and then there is also a sector-specific layer, which could include indicators such as energy intensity for a high-energy industry. These sorts of standards could be made by securities regulators in tandem with industry groups and rolled out as trial projects, then gradually expanded, and periodically refreshed. This

kind of progression framework would make better data comparison while keeping enough flexibility for digital ESG. If they do not want to just draw the line on the policies and see how digital finance is used in terms of ESG investing. Encourage digital financial infrastructures like credit evaluation systems, investment platforms, and public information databases to include ESG indicators. When ESG performance turns into a part of digital financial decisions, corporations get a stronger incentive to develop good sustainability habits on their own instead of simply doing an ESG disclosure as if it was a job to do.

And fiscal and financial incentives are also very important. The government can provide targeted tax incentives, interest rate subsidies, or public-private joint investment mechanisms to make it such that digital finance organizations wish to make ESG products. These should be designed carefully to not distort the market, but to incentivize reductions in the cost of initial development and innovation in ESG data services, digital verification tools, and green investment platforms. In this way, policy intervention plays a catalytic rather than a substitute role in market-based ESG investment.

4.2 Market-Level Measures

On the market level, the promotion effect of digital finance to ESG investment is based on the ESG literacy of the market players. Companies can be taught how to find and compile their ESG information, Investors can learn how to read and understand the scores better, Banks, lenders, financial companies can all learn to make these kinds of green products and use them at the same time.

Market confidence in ESG investment is also very closely related to governance quality and rating credibility. As for the governance structures and socially responsible ratings greatly changing investors' views towards default risk and long run return [15]. When ESG ratings lack transparency or uniformity, digital finance could spread more misinformation rather than less. To resolve the dilemma, market participants must work to make their own ESG rating methodologies more open, talk more with ratings agencies, firms, and investors.

Digital finance institutions working with ESG investment actors is yet another market level mechanism. Fintech enterprise knows how to do tech things on data and platforms, while ESG funds know how to do know about sustainability evaluation and result estimation. These actors could have a closer cooperation to enhance the design of ESG investment products, to make data integration more efficient, and to lower the information silo. And such collaboration will make commercial motives consistent with sustainable motives so that the ESG investments are not only economically beneficial but also beneficial to society.

4.3 Regulatory-Level Measures

Regulatory oversight is important for managing the risks of digital finance + ESG investment convergence. Digital finance, though making things more effective and convenient, creates new troubles regarding data management, algorithm bias, and

whole system weakness. Regulators have to be balanced and supportive of new ideas at the same time that they keep markets honest.

One solution is to use Regtech for ESG investment regulation. RegTech tools are automated ESG disclosure verification system as well as intelligent greenwashing monitoring platforms jointly adopted by central banks and securities regulators. These systems apply data analysis and automated screening all the time for evaluating the quality of disclosure, finding discrepancies, and spotting false ecological claims right away.

As well as fintech driven sustainable finance would need for being coordinated overviews frameworks, such that are technological improvements can be made in system risks, [6]. ESG investments usually belong to more than one regulatory domain. Such regulation could involve finance, environment, corporate governance etc. If people break supervision, they might end up having some gaps in your management and things not turning out as well. And it needs a cross-departmental and cross-jurisdictional effort so that scholars know where digital ESG investment takes place in the world, under a certain kind of governance.

Finally, regulators need to be aware of the social aspects of digital finance-enabled ESG investment. While digital platforms extend access, it can also exclude participants who do not have digital literacy or technological infrastructure. Inclusive regulatory design, plus some specific building projects, could help make sure the good parts of digital finance and ESG investments spread out more fairly among lots of different groups and places.

5 Conclusion

This paper looks at how digital finance helps ESG investment by making it better for showing information, getting more places to get money, and making choices about investments. Based on a synthesis of recent empirical and theoretical studies, this paper finds that digital finance can serve as an important enabler in addressing key structural challenges facing ESG investment, digital finance can potentially be an enabler on addressing some of the major structural issues facing ESG investment such as information asymmetry and capital allocation issue.

Find that digital finance raises ESG info transparency and faith as well as timeliness by means of such as big data, blockchain and AI tech. To help reduce ESG rating inconsistency and greenwashing risk from data traceability and analytical consistency improvement. And at the same time, it lowers the entry barrier for ESG investment in digital finance, improving the efficiency of capital allocation and making more people involved in sustainable finance. The studies before show that digital finance could lessen financial discrepancies and further assist resource assignments, which would be beneficial to the ESG directional firms and programs.

Digital finance changes the governance logic of ESG investment beyond efficiency. Embedding ESG indicators within digital financial infrastructures and decision-making processes so that sustainability becomes integral rather than peripheral to how

investments behave throughout their lifecycle. This integration is also the establishment of long-term credit and effectiveness of ESG investment strategy.

Harmonize ESG disclosure standards, improve ESG literacy, and coordinate regulatory oversight. Digital finance is really sustainable, not just a symbol of compliance. Without such safeguards, digital tools will intensify the current market distortions rather than correct them.

Due to the lack of empirical evidence, this paper proposes that future research adopt firm-level or international comparison data sources to examine whether different regulatory environments or levels of digital-finance development affect ESG investment performance differently. In addition to exploring how inclusive and distributed impacts of digital finance-empowered ESG investment can contribute to the development of sustainable finance.

References

1. Xiang, X., He, X., Han, Y.: Digital finance and IPO underpricing: Evidence from China. International Review of Economics and Finance **105**, 104889 (2026)
2. Toumi Sayari, K., Jalagat, R., Al Batayneh, R.: Utilizing green finance for sustainable development. IGI Global Scientific Publishing (2025)
3. Chen, Y., Liu, Y., Wang, C.: ESG rating divergence, investor responses, and managerial myopic behavior. Finance Research Letters **86**, 108587 (2025)
4. Ben Arfa, N., Chebbi, K., Ammari, A.: From waste to wealth: How sustainable supply chain management shapes the link between waste management and investment efficiency. Journal of Environmental Management **395**, 127684 (2025)
5. Ammar, Y., Cloarec, J., Valiorgue, B.: When green isn't enough: How AI and compliance reframe energy efficiency for sustainable investment. Technovation 150, 103378 (2026)
6. Colombage, S.: Editorial: Financial technology (FinTech) and sustainable financing. Journal of Risk and Financial Management **18**(10), 553 (2025)
7. Xu, A., Huang, L., Xu, J., Yu, H., Lu, T.: Driving ESG investment through green finance for SMEs in the digital era. The Singapore Economic Review Advance online publication (2025)
8. Aborujilah, A.: Towards sustainable vertical farming: A systematic review of energy return on investment efficiency and optimization strategies. Sustainability **17**(18), 8142 (2025)
9. Park, M.: Enhancing ESG risk assessment with litigation signals: A legal-AI hybrid approach for detecting latent risks. Systems **13**(9), 783 (2025)
10. Fernando, T., Ranaweera, P., Droohithya, T., Kuruppu, G., Dushyantha, N., Dassanayake, S., Ilankoon, I. M. S. K.: Deep-sea mining finance: Balancing investment risks, environmental responsibility and financial opportunities for sustainable technology and impacts. Sustainable Development **34**(S1), 248–263 (2025)
11. Ge, Y., Zhang, R., Zhu, H.: Green investors and ESG ratings divergence. Scientific Reports **15**(1), 20410 (2025)
12. Olteanu Burcă, A. L.: Examining the connection between audit, ESG, and the impact on investment efficiency: A bibliometric analysis. Proceedings of the International Conference on Business Excellence **19**(1), 153–166 (2025)
13. Yin, L., Wang, Z.: How does digital finance affect financial mismatch? Applied Economics **57**(22), 2869–2886 (2025)

14. Xiong, W., Liu, W., Wen, F.: Digital finance and corporate credit rent-seeking: The role of financing constraints and bank competition. Pacific-Basin Finance Journal **92**, 102778 (2025)
15. Trinh, V. Q., Nguyen, N., Le, P., Nguyen, T. N.: Unraveling the "green-default paradox": Assessing the influence of gender-diverse boards and socially responsible ratings. International Review of Financial Analysis **102**, 104011 (2025)

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