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GREEN FINANCE AND FINANCIAL INNOVATION ON BUSINESS SUSTAINABILITY: THE ROLE OF GREEN INNOVATION

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ABSTRACT: This study examines the influence of green finance and financial innovation on business sustainability, with green innovation positioned as a mediating factor in the banking sector of Yogyakarta. The paper advances innovation studies by demonstrating the asymmetric role of green finance and financial innovation in driving sustainability, highlighting how innovation in finance—not merely funding—becomes a decisive lever for sustainable outcomes. Employing a quantitative approach with path analysis, data from 352 respondents were analyzed using Smart PLS 4.0. Findings reveal that while green finance significantly affects business sustainability, it fails to directly stimulate green innovation. In contrast, financial innovation significantly drives both green innovation and sustainability, with partial mediation evident. These insights challenge conventional assumptions that financing alone catalyzes green innovation, underscoring the need for deeper institutional creativity in financial practices. For managers, the study stresses aligning financial innovation with sustainability strategies to accelerate sustainable development goals.

Keywords: Green Finance; Financial Innovation; Green Innovation; Business Sustainability

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INTRODUCTION

The global landscape is changing rapidly. Attention to sustainability issues is increasing worldwide, both among academics and industry practitioners. Sustainability is not only a global agenda, but has also become a strategic factor in setting goals and formulating effective business strategies (Rasheed et al., 2024; Thanasi Boçe & Hoxha, 2024). The concept of sustainability encompasses three main dimensions, namely economic, social, and environmental, which are interrelated in creating long-term value for companies (Peng et al., 2023). One important instrument that can encourage business sustainability is green finance. Green finance refers to the provision of funds for projects that have a positive impact on the environment such as renewable energy, energy efficiency, and sustainable transportation (Chien et al., 2021; Liu & Wu, 2023). Green finance not only support mobilize capital to support the transition to a low-carbon economy but also provides long-term financing stability for projects that are considered high risk but have a strategic impact on the environment (Dubey et al., 2022; Mishra & Kannaujia, 2023).

In addition, green finance also supports the development of environmentally friendly technologies and products through research and development funding (Belgacem et al., 2023). Through this mechanism, companies are encouraged to be more proactive in adopting environmentally friendly practices. so that green finance contributes directly to increasing business sustainability (Andaru & Hadinugroho, 2024). In addition, financial innovation a crucial role in supporting business sustainability. This innovation includes the development of new financial products and services as well as more inclusive and efficient financing methods (Qiao & Zhao, 2023; Zhao, 2024). Examples of financial innovation include financial technology (fintech), green crowdfunding, and the use of blockchain for environmentally friendly supply chain tracking (Xue et al., 2022). Thus, financial innovation has a positive influence on business sustainability through these innovations. Companies can gain wider and more adaptive access to financing for sustainable development needs (Zameer et al., 2022).

Furthermore, both green finance and financial innovation contribute to the emergence of green innovation, namely the company's efforts to develop new products, processes or technologies that are oriented towards reducing environmental impacts (Xia et al., 2022). Green innovation is important when conventional technology fails to address environmental challenges and climate change (Rahman & Hossain, 2025). Green financing support and advances in financial innovation provide incentives and convenience for companies to implement environmentally friendly technologies that can increase energy efficiency and reduce carbon emissions (Ahmad et al., 2024; Jain et al., 2024). Thus, green innovation acts as an important link that strengthens the influence of green finance and financial innovation on business sustainability (Xue et al., 2022).

In the context of the financial sector, green innovation includes not only the development of environmentally friendly products and services, but also the transformation of internal systems and policies towards more sustainable practices. Examples include the adoption of digital banking that supports green investment and the application of sustainable banking principles (Kwilinski et al., 2025). Previous research has shown that the combination of financial innovation and green innovation can improve corporate competitiveness and environmental performance, which ultimately strengthens business sustainability (Zheng & Fatema, 2021; Liu & Wu, 2023).

Indonesia as a developing country faces challenges in terms of financial inclusion. Around 51% of the adult population is still classified as unbanked or does not have access to formal financial services (Rozalinda et al., 2023). In response to this, the Financial Services Authority through the 2021–2025 Financial Services Sector Master Plan is encouraging digital transformation of the financial sector. One of which is through strengthening the digital ecosystem and developing Neo-Bank (Master Plan Sektor Jasa Keuangan Indonesia 2021-2025, 2021). Neo-Bank as a digital banking entity without physical branches, presents innovative solutions with lower operational costs, faster service processes and integrated digital features (Kusnawi et al., 2023). More importantly, these initiatives also contribute to green innovation by reducing paper-based transactions, minimizing energy consumption in physical branches, and enabling environmentally friendly financial products such as green lending platforms or digital green bonds. However, the success of Neo-Bank in encouraging financial inclusion and

sustainability also depends on the readiness of digital infrastructure, data security and public financial literacy (Rahman & Hossain, 2025).

Yogyakarta city as one of the centers of economy and education in Indonesia has experienced rapid growth in the banking sector and digitalization of financial services. This development creates a great opportunity for financial institutions in Yogyakarta to integrate sustainability principles through the implementation of green finance, financial innovation and green innovation (Bayu, 2021; Sudarmanto et al., 2024). This initiative is in line with the direction of national policy in strengthening the green economy and expanding technology based financial inclusion (Master Plan Sektor Jasa Keuangan Indonesia 2021-2025, 2021). However. the extent to which the relationship between the three aspects has been implemented and has an impact on business sustainability in the Yogyakarta financial sector still needs to be studied further empirically. considering the limited local research that highlights this dynamic in the context of regional financial institutions (Wibowo et al., 2023; Al-Afeef et al., 2024). Thus, this study aims to examine in depth the relationship between green finance and financial innovation on business sustainability with green innovation as a mediating variable.

THEORETICAL REVIEW

The approach to business sustainability in this study can also be explained through the perspective of stakeholder theory, which emphasizes the importance of companies in meeting the expectations and needs of stakeholders, not just shareholders (Freeman, 1984). In this context, the adoption of green finance and financial innovation is a form of corporate responsibility towards environmental and social demands coming from various stakeholder groups such as customers, government, investors and the general public (Zhang & Wei, 2021). For example, investors are now paying increasing attention to environmental, social and governance criteria, while governments and communities demand transparency and a real commitment to environmental preservation (Khababa et al., 2023).

Green innovation serves as a responsive mechanism for companies to address these expectations through the creation of environmentally friendly and resource-efficient solutions (Xia et al., 2022). Thus, the relationship between green finance, financial innovation, and green innovation in driving business sustainability reflects how companies adjust their strategies and operations to create shared value for all stakeholders (Ayesha Afzal et al., 2022). This approach suggests that business sustainability is not only an economic strategy, but also a moral and social obligation in the context of stakeholder management (Freeman, 1984; Jatoi et al., 2023).

Green Finance and Business Sustainability

Stakeholder theory explain that green finance can be considered as an instrument that encourages companies to meet the needs of relevant stakeholders including governments, communities, and customers who are increasingly concerned about environmental sustainability (Freeman, 1984; Liu & Wu, 2023). Green Finance is the provision of financial resources to support projects and initiatives that are oriented towards environmental sustainability such as the development of renewable energy, energy efficiency and sustainable transportation (Kusnawi et al., 2023). Green Finance a strategic role in mobilizing capital to support the transition to a low carbon economy and financing various projects that promote environmental sustainability (Nisa et al., 2022). The need for green finance arises from the limitations of conventional funding systems which are considered inadequate to finance large investments in the transition to a green economy (Ayesha Afzal et al., 2022). In addition, many sustainable projects are considered high risk due to their innovative nature and lack of a strong track record. Therefore, green finance serves as a risk mitigation solution by providing long- term and flexible funding (Dubey et al., 2022). The hypothesis is proposed.

H1: green finance has a positive effect on business sustainability

Green Finance and Green Innovation

Stakeholder theory by Freeman (1984), explains that company obliged not only for satisfying interest holder shares, but also pay attention to needs and expectations of

stakeholder's interest others, including local communities, regulators and consumers are increasingly care to issue environment. In terms of green finance and green innovation a role crucial in push achievement sustainability term long as well as in respond global challenges such as change climate and degradation environment (Miroshnichenko & Brand, 2021; Umeair Shahzad et al., 2021). Green finance refers to the mechanisms directed financing for support projects that have impact positive to environment including development technology friendly environment, efficiency energy and energy renewable (Khan, 2022). Support funding the capable reduce risk project green which is generally rated own uncertainty high, so that increase investor confidence and expand opportunity adoption of green innovation in the sector industry (Ting Liang et al., 2022). With green innovation through green finance support, company show not quite enough answer environment in line with stakeholder interests, as well as strengthen reputation. power competitiveness and sustainability business (Bananuka et al., 2019; Feng et al., 2023), as compiled for this hypothesis.
H2: Green finance has a positive effect on green innovation

Financial Innovation and Business Sustainability

Stakeholder theory to expose that financial innovation encourages companies to be more responsive to the needs of wider stakeholders including society, customers and government, thereby strengthening the company's reputation and supporting long-term sustainability (Freeman, 1984). The emergence of information and communication technology developments has driven digital transformation in the financial industry, which in turn creates more inclusive and innovative financial services and supports environmental sustainability (Hong & Xiao, 2024).

Nejad (2022) found a positive relationship between financial innovation and business sustainability where financial innovation opens opportunities for companies to reach new markets, attract potential customers, and offer superior and value-oriented services. This indirectly increases competitiveness, business resilience, and supports the achievement of long-term sustainability goals (Carrión-Bósquez et al., 2024). Thus, financial innovation has encouraged companies to access new sources of financing, optimize operations, and create more socially and environmentally sustainable solutions (Nejad, 2022; Cai & Hong, 2024; Carrión-Bósquez et al., 2024). They pave the way for this hypothesis.
H3: financial innovation has an effect positive towards business sustainability

Financial Innovation and Green Innovation

Stakeholder theory by Freeman (1984), concludes that company sued for responsible answer to various the party that has interest on activity they including consumers, government, community local and investors are increasingly aware will issue environment. Financial innovation has a strategic role in supporting corporate sustainability from both environmental and social aspects. Innovation in financial instruments and services not only improves operational efficiency but also expands corporate access to funding that supports environmentally oriented activities (Chien et al., 2021; Zameer et al., 2022). Various financial products such as green bonds, sustainability-linked loans and carbon credit trading have become important means of financing green projects and adopting environmentally friendly technologies (Alfandi & Bataineh, 2023; Chien et al., 2021; Welly et al., 2023). Financial innovation also acts as an enabler for strengthening the green innovation ecosystem through easy access to capital and flexibility in financing.

This enables companies to develop more sustainable products and processes and increase investment in research and development activities for green technologies (Aamir et al., 2022). A study conducted by Alfandi and Bataineh (2023) shows that the adoption of financial innovation can increase a company's ability to implement green innovation more widely, both in the form of energy efficiency, emission reduction, and the development of environmentally friendly products. By utilizing financial innovation to support green innovation, companies demonstrate their commitment to social and environmental responsibility, strengthen their reputation and meet stakeholder expectations that demand sustainable business practices (Guo et al., 2020; Li et al., 2023). As such, this hypothesis is proposed.
H4: Financial innovation has a positive effect on green innovation

Green Innovation and Business Sustainability

Stakeholder theory by Freeman (1984), explains that companies to be more responsive to the needs of broader stakeholders, including communities, customers and governments, thereby strengthening the company's reputation and supporting long-term sustainability. Green innovation contributes to energy efficiency and carbon emission reduction, making it an important factor in corporate sustainability strategies (Kharouf et al., 2020). In the financial industry, green innovation includes the application of green technologies such as green banking, internet banking, mobile banking, green environmental strategies, and green marketing strategies. These innovations aim to reduce negative impacts on the environment while improving operational efficiency and business sustainability (Xue et al., 2022; Guang et al., 2023). Green innovation also helps companies comply with environmental regulations, enhance corporate reputation and meet market demand for more environmentally friendly products (Agrawal et al., 2024; Ma et al., 2023). In addition, green innovation directly contributes to reducing operational costs and waste, which ultimately has an impact on increasing corporate profitability and competitiveness (Al-Afeef et al., 2024; Peng et al., 2023), as hypothesized.
H5: Green innovation has an effect positive towards business sustainability

Mediating Role of Green Innovation in the Green Finance, and Business Sustainability

Stakeholder theory by Freeman (1984), explains that financial innovation encourages companies to be more responsive to the needs of broader stakeholders as well as strengthen corporate reputation and support long-term sustainability. The significant use of green finance an important role in encouraging the development of green innovation to achieve a sustainable economy and address climate change challenges (Science et al., 2022; Azam et al., 2023). Arshi et al. (2024) also assessed the relationship between climate finance and sustainable development at the global level indicating that green finance supports the implementation of Green Innovation and enables greener and more sustainable economic growth. The application of green technology plays a crucial role in achieving the Sustainable Development Goals (SDGs) which include inclusive socio-economic growth and environmental challenges that require innovation and sustainable investment (Welly et al., 2023; Cai & Hong, 2024). Green finance serves as a catalyst to raise financial support for environmentally friendly projects which in turn enhance economic sustainability and create long-term positive impacts for society and the environment. Thus, green finance not only serves as a source of funds but also as a driver for the development of environmentally friendly innovations which ultimately contribute to long-term business sustainability (Qiao & Zhao, 2023; Welly et al., 2023; Zhao, 2024). This establishes this hypothesis.
H6: Green innovation mediates influence positive green finance towards business sustainability

Mediating role of green innovation in the financial innovation, and business sustainability

Stakeholder theory to expose that financial innovation encourages companies to be more responsive to the needs of broader stakeholders including society, customers and government, thereby strengthening the company's reputation and supporting long-term sustainability (Rahman & Hossain, 2025). Financial innovation provides various opportunity for company. For increase power compete and expand the market especially through solution innovative finance like financing green, investment in technology friendly environment and scheme credit sustainable (Nejad, 2022; Srouji et al., 2023; Suki et al., 2023). However, the impact of financial innovation on business sustainability does not occur directly. Companies need to leverage green innovation to implement financial solutions into sustainable business strategies (Science et al., 2022). By implementing innovative approaches in finance and sustainability, companies can achieve a balance between profitability and environmental responsibility, which ultimately strengthens long-term business sustainability (Chien et al., 2021). Thus, financial innovation can improve business sustainability indirectly through green innovation (Baah et al., 2022; Agrawal et al., 2024; Arshi et al., 2024).
H7: green innovation mediates influence positive financial innovation towards business sustainability

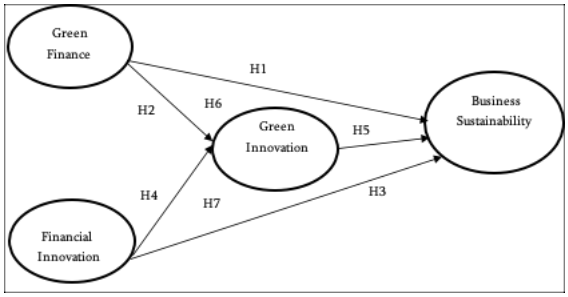

Figure 1. Conceptual Framework

RESEARCH METHOD

This research is quantitative with a survey research type through a questionnaire. Questionnaires or research instruments are used to generate data because questionnaires have a higher level of objectivity (Hair et al., 2022). The questionnaire was developed based on measurement items that have been tested for validity in the relevant literature. The measurement items are assessed on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In Figure 1, the measurement items of the variable green finance have 5 indicators adopted from Ayesha Afzal et al. (2022). Financial innovation has four indicators adopted from Arshi et al. (2024). Green innovation has four indicators adopted from Chien et al. (2021) and Qiao and Zhao (2023). Business sustainability has four indicators adopted from Silva et al., (2020); Ullah et al., (2021) and Umeair Shahzad et al. (2021).

The sample of this study amounted to 352 respondents. The sampling technique used is purposive sampling. which selects samples specifically based on certain characteristics that are relevant to the research objectives: 1) bank employees who have knowledge about green finance, financial innovation, green innovation and business sustainability. 2) bank employees who have worked for at least 2 years so that employees already have knowledge about the company. 3) bank employees who have used green finance especially financial innovation in everyday life.

Khan et al., (2022) argue that Structural Equation Modeling (SEM) is a Smart PLS application used to analyze data. Before testing the hypothesis, this study began by testing the research instrument through validity and reliability tests to ensure that the instrument used has an adequate level of reliability and accuracy. The validity test aims to measure the extent to which the research instrument can measure what should be measured, while the reliability test is used to assess the consistency of measurement results from the same instrument in repeated times or situations (Hair et al., 2022). After ensuring the validity and reliability of the instrument. this study then continues with hypothesis testing, both direct and indirect hypotheses, using the PLS model that can handle complex relationships between variables. Data analysis was carried out in the following stages: first, evaluation of the measurement model to test the validity and reliability of the construct indicators. Second, evaluation of the structural model to test the relationship between variables in the proposed hypothesis. The Smart PLS application was chosen because of its ability to handle models involving many latent variables and complex relationships, as well as the ease of interpreting the analysis results (Hair et al., 2022).

The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with Smart PLS 4.0, which is considered suitable for complex models involving latent variables and mediation testing (Hair et al., 2022). The assessment of the measurement model began with evaluating indicator reliability through outer loadings, where values above 0.70 were deemed acceptable, although indicators between 0.40–0.70 could be retained if theoretically justified and if their removal did not increase the Average Variance Extracted (AVE) or Composite Reliability (CR) (Hair et al., 2019). Internal consistency reliability was assessed using Cronbach's alpha and CR, both of which must exceed 0.70 to be considered satisfactory (Chin, 1998). Convergent validity was evaluated based on AVE, with the minimum threshold of 0.50 indicating that the construct explains more than half of the variance of its indicators (Fornell & Larcker, 1981). Discriminant validity was examined using both the Fornell-Larcker criterion and the Heterotrait-Monotrait (HTMT) ratio of correlations, with HTMT values recommended to be below 0.90 (Henseler et al., 2015). In addition, multicollinearity was assessed through the Variance

Inflation Factor (VIF), where values below 5 are generally acceptable, though more conservative thresholds recommend values below 3.3 (Diamantopoulos & Siguaw, 2006).

The structural model was then evaluated by testing collinearity among predictor constructs, estimating path coefficients, and examining the explanatory power of the model through the coefficient of determination (R^2). Effect sizes (f^2) were calculated to determine the contribution of each predictor, and predictive relevance (Q^2) was assessed using the blindfolding procedure, with values above zero indicating acceptable predictive relevance (Hair et al., 2022). Hypothesis testing was carried out using a non-parametric bootstrapping procedure with 5.000 resamples, which produced standard errors, t-statistics, and confidence intervals to determine the significance of direct and indirect effects (Chin, 1998; Hair et al., 2019).

RESULTS

The reliability and validity of the measurement model were examined through key indicators such as factor loadings, Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). Table 1 presents the results for all constructs—Business Sustainability, Financial Innovation, Green Finance, and Green Innovation—each of which was measured by multiple reflective indicators. These statistics confirm how well the observed variables represent their underlying latent constructs.

Table 1. Outer Model Summary

Variables	Indicator	Loading	VIF	Alpha	CR	AVE
Business sustainability (BS)	BS2	0.887	2.037	0.811	0.888	0.726
	BS3	0.861	1.857			
	BS4	0.806	1.603			
Financial Innovation (FI)	FI1	0.831	2.051	0.829	0.887	0.663
	FI2	0.77	1.578			
	FI3	0.891	2.586			
	FI4	0.757	1.601			
Green Finance (GF)	GF1	0.879	2.627	0.86	0.905	0.705
	GF2	0.788	1.720			
	GF3	0.858	2.225			
	GF5	0.83	2.187			
Green Innovation (GI)	GI1	0.894	4.740	0.883	0.92	0.742
	GI2	0.914	5.253			
	GI3	0.813	1.983			
	GI4	0.82	2.149			

As shown in the table, all constructs achieved satisfactory thresholds: loadings exceeded 0.70 in most cases, Cronbach's alpha values were above 0.80, and CR values ranged from 0.887 to 0.920, well above the recommended 0.70. The AVE values were also higher than the 0.50 benchmark, confirming convergent validity. The variance inflation factor scores well under 10, exhibiting the absence of collinearity in the model. This study also expands the test with the discriminant validity test as evident in this Table 2.

Table 2. Fornell-Larcker Criterion

Constructs	Business sustainability	Financial innovation	Green finance
Business sustainability (BS)	0.852		
Financial innovation (FI)	0.801	0.814	
Green finance (GF)	0.817	0.764	0.840

The data in Table 2 reveals the passing of the model's discriminant validity. As all vertical and horizontal directed construct is higher than the ones not being measured, the Fornell-Larcker indicated the model to satisfy the rules. This quality criteria provides the clearance for the measurement of the hypothesis testing in the statistics as provided in Table 3.

Table 3. Model Measurements

Hypothesis	Effect size	*t*-value	*p*-value	Decision
GF → BS	0.110	2.209	0.027	Accepted
GF→GI	0.073	1.205	0.228	Rejected
FI→BS	0.306	5.098	0.000	Accepted
FI→GI	0.814	14.321	0.000	Accepted
GF→ GI → BS	0.041	1.223	0.222	Rejected
FI → GI→BS	0.464	7.613	0.000	Accepted
R2 Business sustainability (BS)		0.892		
R2 Green innovation (GI)		0.771		

Source: Adapted Smartpls 4 Output (2025)

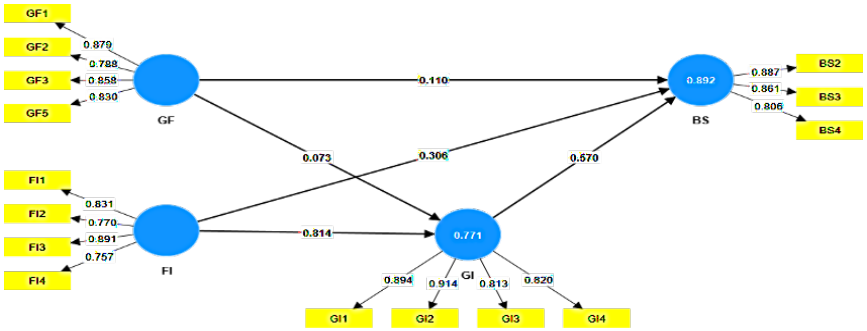

Figure 2. Model Presentation

DISCUSSION

Green finance emerges as a tangible force in shaping the sustainability of businesses. By directing capital into environmentally friendly projects, it creates pathways for companies to align economic goals with ecological responsibility. This contribution is evident in instruments such as green bonds, targeted green lending, and the integration of environmental risk assessments into credit decisions (Dai & Siddik, 2022; Abbas et al., 2024). These practices resonate with the insights of Ahmad et al. (2024) and Liu and Wu (2023), who describe green finance as a mechanism that stimulates investment in renewable energy, efficiency improvements, and sustainable technologies. Banks that adopt such policies tend to build portfolios around clean energy, resilient infrastructure, and responsible waste management (Ullah et al., 2021; Lakho et al., 2024). Moreover, green funding has been found to facilitate closed-loop supply chains and circular economy strategies (Maldonado-guzmán, 2024). Incentives in the form of favorable rates or extended tenors further illustrate how banks can merge sustainability with competitive advantage (Aamir et al., 2022; Ting Liang et al., 2022).

When viewed against innovation, however, green finance reveals its limitations. The literature anticipates that green finance should catalyze investment in research, development, and the adoption of sustainable technologies (Liu & Wu, 2021; Hussain & Zaman, 2021). Indeed, previous studies emphasize its potential to accelerate innovation when combined with government incentives and industry collaboration (Guang et al., 2023; Menne et al., 2022). Yet, in many emerging markets, implementation remains incomplete. Limited financial schemes, a narrow base of green bond issuance, and minimal innovation incentives have slowed progress (Azam et al., 2023; Wang & Wang, 2023). In addition, banking institutions often display low adoption of advanced ecological technologies, reducing the effectiveness of financial support in driving innovation.

Financial innovation presents a sharper trajectory. Scholars describe it as a driver of sustainable projects and as a catalyst for resilience in firms and markets (Nejad, 2022; Srouji et al., 2023). It reshapes access to finance, enhances efficiency in resource allocation, and enables adaptive business models that can meet regulatory and market shifts (AlKoliby et al., 2023). Digital services, ESG-aligned products, and creative funding mechanisms not only improve reach but also anchor firms to sustainability goals (Ting Liang et al., 2022; Lakho et al., 2024). Yet, the literature also cautions that innovation has too often emphasized digital expansion over

sustainability integration, leaving gaps between short-term efficiency and long-term strategy (Chien et al., 2021; Nejad, 2022).

Unlike green finance, financial innovation demonstrates its strength in stimulating innovation directly. It offers flexible and adaptive mechanisms that allow firms to invest in new technologies and environmentally responsible practices (Aamir et al., 2022; Science et al., 2022). Studies show that innovation in finance accelerates the uptake of green technologies by lowering barriers to investment and creating new avenues for environmentally oriented strategies (Nejad, 2022; Srouji et al., 2023). Sustainability-linked products such as green financing, ESG-based portfolios, and digital transactions support this momentum, while also reducing footprints through energy efficiency and resource savings (Lakho et al., 2024; Ullah et al., 2021).

The role of green innovation itself is central. Its adoption leads firms toward renewable energy, emissions reduction, efficient resource use, and sustainable supply chains (Simanjuntak et al., 2023; Maldonado-guzmán, 2024). Beyond operational improvements, it enhances compliance with stricter regulations and satisfies consumer demand for sustainable products (Kharouf et al., 2020; Ullah et al., 2021). The result is both reputational strength and long-term competitiveness, as echoed by findings that emphasize reductions in cost, waste, and inefficiencies alongside gains in resilience (Al-Afeef et al., 2024).

The mediating role of green innovation, however, reveals a split narrative. On the one hand, studies underline that it should link green finance to sustainability, channeling financial flows into innovation that strengthens resilience (Zameer et al., 2022; Azam et al., 2023). On the other hand, the evidence suggests this pathway remains weak, largely because companies underutilize green instruments and lack infrastructure and human resource readiness to integrate sustainability into strategy (Azam et al., 2023). By contrast, the connection between financial innovation and sustainability is successfully mediated by green innovation. Scholars highlight that financial innovation improves efficiency while simultaneously encouraging green practices as part of business strategy (Aamir et al., 2022; Abbas et al., 2024). In this role, green innovation serves as a channel through which the benefits of financial innovation extend into both economic and environmental performance (Apriliani et al., 2021; Nejad, 2022). Yet, challenges remain—banks often prioritize short-term profitability, face skill and regulatory gaps, and struggle with technological unevenness (Nejad, 2022; Agrawal et al., 2024; Aamir et al., 2022; Azam et al., 2023).

The results of this study provide several practical implications for companies and policy makers in promoting business sustainability through financial innovation and green innovation. First, companies are advised to be more active in adopting financial innovation, especially those focused on financing and developing green technology for their role in facing long-term sustainability challenges (Aamir et al., 2022). For example, the use of innovative financial instruments such as green bonds or sustainable loans can help companies allocate resources to environmentally friendly projects and support the development of more sustainable products and services (Al-Afeef et al., 2024). Second, it is important for companies to build strong internal capacity to utilize green finance in financing green innovations that are relevant to their business sustainability. Governments and financial institutions must also collaborate in developing policies that encourage green investment. and provide incentives for companies that invest in environmentally friendly technologies (Ma et al., 2023; Thanasi Boçe & Hoxha, 2024). These results strengthen the view that financial innovation not only provides benefits in terms of operational efficiency, but also supports the implementation of green technology that contributes to the long-term sustainability of the company (Aamir et al., 2022; Jang et al., 2023).

CONCLUSION AND FURTHER STUDY

This study shows that both green finance and financial innovation support business sustainability, yet their pathways differ. Financial innovation strengthens sustainability directly and also indirectly through green innovation, while green finance, despite its promise, fails to translate into innovation benefits in this context. However, the role of green innovation appears uneven—reinforcing sustainability when linked with financial innovation but not when tied to green finance.

The study has limitations. Its focus on the banking sector in Yogyakarta narrows generalizability, the cross-sectional design captures only a snapshot in time, and the absence of

cross-country comparison limits institutional insights. Future research should broaden the regional scope, adopt longitudinal designs, and incorporate comparative analyses with other emerging economies to capture regulatory and market dynamics more fully. Theoretically, the findings extend understanding by positioning green innovation as a critical mediator in the financial innovation–sustainability nexus, a link often overlooked in prior studies. Practically, they highlight that green finance requires stronger institutional support and ecosystem development.

ETHICAL DISCLOSURE

All participants provided written informed consent prior to participation. They were informed about the study's purpose, their voluntary participation, the right to withdraw at any time, and the confidentiality of their responses.

CONFLICT OF INTERESTS

The authors declare no conflict of interest.

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