Green Finance and Competitiveness in Fintech Adoption: Digital Transformation and Sustainability in Indonesian Banks

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ABSTRACT

The increasing global focus on sustainability is prompting organizations to integrate financial technology (Fintech) solutions to increase their sustainability outcomes. This research seeks to explore the intermediary role of green finance and competitiveness, along by the moderating influence of digital transformation (DT), on the link among Fintech and sustainability performance. The study constructs a conceptual framework based on responses from bank employees in Central Java, Indonesia. Data were gathered from 170 bank employees and analyzed utilizing Smart-Partial Least Square (PLS). The findings reveal that Fintech adoption does not significantly negatively impact sustainability performance. Additionally, while Fintech adoption shows a positive but insignificant effect on green finance and competitiveness, it has an insignificant negative impact on competitiveness and sustainable performance. Digital transformation, as a moderator of the connection among Fintech adoption and green finance, competitiveness, and sustainability performance, also shows an insignificant positive effect.

INTRODUCTION

In today's rapidly evolving business landscape, organizations are increasingly prioritizing sustainability to address unique environmental challenges. Implementing sustainable practices not only helps reduce environmental impact but also ensures compliance with regulatory standards and aligns with the growing expectations of stakeholders emphasizing environmental responsibility(Ahn & Kim, 2019; Arulraj & Annamalai, 2020) . The banking industry, as a vital part of the financial ecosystem, plays a significant role in advancing sustainable development. To enhance efficiency, improve risk management, and support decision-making, banks are increasingly adopting financial technology (Fintech) solutions (Moschella et al., 2019). The integration of Fintech in the banking sector has the potential to improve financial performance while advancing sustainability objectives (Urumsah et al., 2022).

However, the relationship between Fintech adoption and banks' sustainable performance is shaped by various mediating and moderating factors. In this context, green finance and competitiveness are critical mediators influencing the link between Fintech adoption and the achievement of sustainability goals (Huang et al., 2022; Li & Wang, 2023) Green financial tools, such as sustainable loans, green bonds, and carbon trading platforms, enable banks to channel financial resources into projects that promote environmental sustainability(Huang et al., 2022) . Additionally, integrating sustainability into competitive strategies allows banks to enhance their market position and reputation, attracting customers and investors who prioritize environmental responsibility.

The role of digital transformation (DT) in the relationship between Fintech adoption and sustainable performance is also crucial. Digital technologies empower banks to improve operational efficiency, process large datasets, and leverage automation and artificial intelligence for informed decision-making (Chen & Hao, 2022; Yang et al., 2023). The degree to which banks adopt DT significantly influences how Fintech integration contributes to sustainable outcomes. This study aims to examine the mediating roles of green finance and competitiveness, alongside the moderating impact of DT, on the relationship between Fintech adoption

and sustainability in the banking sector(Korzeb & Samaniego-Medina, 2019)

Source:BPS 2024

Indonesia has seen remarkable growth in its Fintech sector, driven by factors such as a young, tech-savvy population, increasing internet penetration, and supportive regulatory frameworks. As of 2023, the Fintech ecosystem in Indonesia has grown significantly, with the number of Fintech companies expanding sixfold over the past decade. The adoption of mobile payment platforms, peer-to-peer (P2P) lending, and digital lending services has reshaped the financial services landscape.

The adoption of mobile Fintech apps has surged from 9% in 2019 to 49% in 2024, with projections suggesting it will reach 64% by 2030.

Based on the different results of previous studies, The main difference between this study and previous research is its focus on the mediating role of green finance and competitiveness, as well as the moderating effect of digital transformation (DT) on the relationship between fintech adoption and sustainability performance. Additionally, this study is unique in focusing on the banking sector in Central Java, Indonesia, using data from bank employees, whereas most previous studies have concentrated on developed countries or broader samples. This study provides new insights into the challenges and opportunities for the banking sector, particularly in emerging markets like Indonesia, in integrating fintech with sustainability and competitiveness strategies. The findings can help develop more informed policies and investment decisions to support sustainable financial performance, while also offering a better

understanding of how digital transformation can be optimized to enhance efficiency and sustainability in the financial sector.

This research is expected to contribute to the accounting and finance management literature by adopting a supply-demand approach to provide evidence on the chosen approach and the factors that influence the amount of sustainable performance.

The next section discusses the literature review, framework, and hypothesis development.

Followed by an explanation of the research method to the data analysis method, then the presentation of results and discussion. Then, it ends with a closing that contains conclusions, limitations, and suggestions for further relevant research

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Fintech Adoption and Sustainability

Fintech adoption has been shown to improve financial inclusion by providing access to banking services for underserved populations (Thomas & Hedrick-Wong, 2019). By incorporating ethical practices and strong governance, banks can foster trust and reduce reputational risks. However, rapid industrialization, economic growth, and population increases have led to higher energy consumption and environmental degradation, posing challenges to sustainable development(Fang et al., 2023). Greenhouse gas (GHG) emissions, a major contributor to climate change, are closely tied to increased energy use.

Fintech innovations allow banks to enhance their sustainability performance by integrating environmental principles into their operations. These tools help banks create innovative products and services that support sustainable economic growth while addressing social and environmental challenges. Despite these advancements, the interplay between digital transformation (DT) and Fintech adoption in driving sustainable performance is underexplored. This study fills the gap by examining strategies and empirical evidence to highlight their interconnected roles.

Hypotheses Testing

H1: Fintech adoption significantly influences sustainable performance.

Fintech enhances access to financial services, reduces poverty, and improves economic participation (I. Lee & Shin, 2018). It also supports risk management and decision-making, enabling banks to address social and environmental risks in their portfolios (Park & Kim, 2020).

H2: Fintech adoption significantly impact greem finance

Fintech platforms simplify green finance processes, reduce costs, and provide accurate risk assessments for investors(Du et al., 2019) (Siddik et al., 2023)]. These innovations enhance transparency and accountability, fostering trust among stakeholders and encouraging investments in green projects.

H3: Fintech adoption significantly affects competitiveness.

Fintech drives innovation and profitability, leveraging artificial intelligence, mobile technology, and blockchain to improve customer experiences and operational efficiency (Zhang & Wang, 2021).

Green Finance

Green finance encompasses financial products, services and investments that are designed to support environmentally sustainable initiatives and facilitate the shift towards a more sustainable and low-carbon economy (Huang et al., 2022). It involves integrating environmental factors into the financial decision-making process, by the aim of allocating capital to projects and activities that have a positive impact on the environment.(Akomea-Frimpong et al., 2022) . Green finance comprises a diverse range of instruments and mechanisms, including Green Bonds, Sustainable Lending, ESG Integration, and Sustainability-linked Finance.

Green Bonds are a unique type of debt security designed to finance projects that are environmentally sustainable. These bonds offer investors the chance to participate in efforts to mitigate climate change, promote renewable energy, increase energy efficiency, develop sustainable infrastructure, and support other environmentally positive activities. By utilizing Green Bonds, capital is strategically directed toward initiatives that align by the objectives of environmental conservation and sustainable development (Hidayat-ur-Rehman & Hossain, 2024).

Despite the growing importance of green

finance in driving sustainability, there remains a significant research gap in fully comprehending its specific impacts across different industries. There is a shortage of studies examining how various financial instruments effectively support sustainability initiatives(Hidayat-ur-Rehman & Hossain, 2024) . In addition, there is a lack of research on the barriers and opportunities faced by businesses, investors and policymakers in implementing green finance strategies. The long-term implications of green finance on economic growth and financial stability need to be scrutinized in greater depth. Bridging these gaps is critical to developing informed policies and strategies to accelerate the transition to a sustainable and low-carbon economy. Fintech Adoption

Financial technology (Fintech) encompasses the use of technology in giving various financial services (Dwivedi et al., 2021). Fintech businesses are innovative intermediaries that leverage technological advances to support new business models, streamline operational processes, and deliver better products and services. (Firmansyah et al., 2022).. The rise of Fintech can be traced back to the early 1990s, coinciding by the advent of the Internet, which has engageed an important role in shaping the growth of the Fintech sector. (Guang-Wen & Siddik, 2023). Although the study of Fintech, which is mainly available in various literatures, was first documented by Mackenzie in 2015 (Guang-Wen & Siddik, 2023) its influence continues to grow. Fintech is considered a transformative force that has the potential to make finance more transparent, user-friendly, and cost-effective (Harris, 2021). It is also considered a catalyst to revolutionize the financial landscape by disrupting traditional financial service providers such as banks, insurance businesses, and investment firms. (Fang et al., 2023).

In addition to technological advances, Fintech is also gaining momentum due to its unique regulatory environment, which allows businesses to operate by greater flexibility under a regulatory sandbox and encourages innovation.(Yudaruddin, 2024). The Fintech ecosystem consists of various elements, including Fintech startups, technology developers, government entities, customers,

and tradisional financial institutions .(Muthukannan et al., n.d.). inside this ecosystem, Fintech business models cover various areas such as payments, wealth management, crowdfunding, peer-to-peer (P2P) lending, capital markets, and insurance.(Zhang & Wang, 2021). It has the potential to reshape the financial industry by giving new solutions and challenging established engageers (Mohsin & Jamaani, 2023).

The proliferation of research on Fintech highlights the need for continued exploration and analysis of this transformative phenomenon. For example, the adoption of Fintech and green finance for DT indicates a substantial research gap (Mohsin & Jamaani, 2023) . Limited studies have explored the synergies and challenges in integrating Fintech innovations to increase the effectiveness of green finance initiatives. Understanding how new technologies such as blockchain, artificial intelligence, and digital platforms can optimize resource allocation, transparency, and impact measurement in sustainable finance is less explored. (Mohsin et al., 2021)]. Bridging this gap is critical to unlock the full potential of Fintech in driving environmental sustainability, as well as to develop strategies to address potential risks and ensure responsible integration of technology in the green finance landscape.

H4: Green finance significantly influences sustainableperformance.

Green finance channels resources to renewable energy, energy efficiency, and clean technology projects, fostering environmental and social benefits. It also integrates ESG factors into banks' decision-making processes, improving reputation and stakeholder engagement(Zhang & Wang, 2021).

H5: Competitiveness significantly impacts sustainable performance.

Competitive banks are more likely to adopt sustainable practices, build strong brand reputations, and attract environmentally conscious investors and customers. Regulatory compliance and proactive risk management further enhance their sustainability (Meng & Shaikh, 2023) .

Digital Transformation

By the advent of Industry 4.0, the prevalence of digitalization has become a prominent trend. Digitalization, centered on digital technology, is shaping both society and the economy in the digital age (Yan et al., 2022). In many countries, digital

transformation (DT) is gaining strategic importance as a way to build a competitive and sustainable economic advantage. (Olavarrieta & Friedmann, 2008).. According to (Amit & Han, 2017)DT refers to organizational change triggered and influenced by the widespread adoption of digital technologies. businesses integrate digital technologies, ranging from artificial intelligence and big data analytics to cloud computing and the Internet of Things (IoT). (Hrustek, 2020). This helps to effectively adapt to evolving customer expectations, disruptive market forces, globalization, regulatory demands and talent needs. (Buchak et al., 2017). Governments are actively competing to prioritize DT (Mohsin & Jamaani, 2023). .

The connection among financial development and carbon emissions is complex, influencing the environment through multiple pathways. According to research by(Mohsin & Jamaani, 2023), energy consumption is a crucial channel through which financial development impacts the environment. This is because financial development facilitates investments in environmentally sustainable technologies, aiding in the reduction of carbon emissions. Consequently, governments, business leaders, and researchers are keen to harness this potential.

In the digital revolution, corporate DT has emerged as a critical factor for business success, empowering businesses to innovate, evolve, and maintain a competitive advantage. DT enables Fintech businesses to provide a seamless and personalized customer experience. Through user-friendly mobile apps, digital wallets, and online platforms, customers can easily access financial services, make transactions, and receive customized recommendations. Customer-focutilized design thinking and data analytics help Fintech businesses understand customer needs, improve products, and provide personalized services.

Fintech businesses utilize big data analytics and advanced data processing techniques to develop data-driven insights. By collecting and analyzing large amounts of data, including transaction records, customer behavior, and market trends, Fintech businesses gain a deeper understanding of customer preferences, identify patterns, and make data-driven decisions. These insights enable them to develop innovative products, improve risk management, and optimize investment strategies.

DT in Fintech is reshaping the financial industry, revolutionizing the way financial services are delivered and empowering both businesses and consumers (Gupta et al., 2019)..

The literature gap in the connection among DT and Fintech adoption is apparent. The reasons behind the limited emphasis on DT in Fintech adoption have not been adequately explored. Many current studies emphasize the advantages of Fintech adoption but often overlook the specific challenges that impede the full implementation of a comprehensive digital transformation (DT) strategy. It is crucial to understand why some financial institutions or sectors fall behind in adopting a more integrated DT approach. Factors such as outdated legacy systems, regulatory hurdles, cybersecurity issues, and internal resistance inside organizations may contribute to this lag. Research should focus on exploring these barriers and developing strategies to overcome them, offering practical guidance for financial institutions to increase their Fintech adoption by more thorough DT integration, thereby boosting efficiency, fostering innovation, and promoting sustainability inside the financial sector.

Moderating Role of Digital Transformation (DT)

H6a: DT moderates the relationship between Fintech adoption and green finance. DT enables efficient allocation of funds to green projects, enhances risk management, and improves transparency in financial transactions (Huang et al., 2022).

H6b: DT moderates the relationship between Fintech adoption and sustainable performance. By leveraging advanced technologies, DT increases operational efficiency, optimizes sustainability practices, and fosters stakeholder collaboration (Milian et al., 2019) [40].

H6c: DT moderates the relationship between Fintech adoption and competitiveness. DT enhances customer-centric services, drives innovation, and supports strategic partnerships between traditional banks and Fintech firms, fostering a competitive edge (Mohsin & Jamaani, 2023).

Sustainable Performance

Sustainable performance refers to the ability of an organization to achieve long-term success while minimizing negative environmental and

social impacts. It encompasses the integration of ESG factors into business strategies and operations, by the aim of creating value not only for share holders but also for other stakeholders, including employees, customers, communities and the planet. In the context of the banking sector, sustainable performance involves banks adopting practices and initiatives that are aligned by environmental and social goals, while maintaining financial stability and profitability (Markopoulos et al., n.d.).

Banks can increase sustainable performance by implementing environmentally responsible practices, such as minimizing carbon emissions, efficiently managing energy and resource usage, financing renewable energy projects, and adopting sustainable lending policies for eco-friendly initiatives. By embedding environmental conce rns into their operations, banks can significantly contribute to combating climate change and advancing ecological sustainability.

Achieving sustainable performance in the banking sector also requires upholding rigorous governance standards and ethical conduct. This involves maintaining transparency, accountability, and prudent risk management practices. Banks should establish a robust corporate governance framework, adhere to regulatory obligations, and emphasize ethical behavior across all facets of the ir operations. By consistently applying these gove rnance principles, banks can foster trust among stakeholders and reduce reputational risks.

Rapid economic expansion, industrialization, and population growth have led to increased ene rgy consumption and environmental degradation, threatening sustainable development.(Fang et al., 2023). Global utilization of primary energy sources experienced a 1.3% growth by 2022. Leve raging Fintech solutions enables banks to incre ase their sustainability performance, helping to lower greenhouse gas emissions, align by global sustainability goals, and meet the increasing demands of customers, regulators, and investors. Fintech provides banks by the tools to embed sustainability into their core operations, offer innovative products and services, and contribute to a more sustainable banking industry that foste rs economic growth, social welfare, and environme ntal protection.

There is a notable gap in the existing lite rature concerning the intersection of sustainable performance and digital transformation (DT) as a moderating factor. Most studies tend to focus either on sustainable practices or the benefits of DT, often overlooking a comprehensive exploration of how these elements interact. Understanding how DT can specifically increase sustainable performance is crucial, as this gap limits a full comprehension of the potential synergies among technological advance ments and sustainability objectives. This research aims to address this gap by exploring practical strate gies and giving real-world examples, supported by empirical studies and robust statistical analysis, to illuminate the connection among sustainability and effective DT.

Banks can engage a pivotal role in tackling climate change and promoting ecological sustainability by integrating environmental conside rations into their operations. This can be achie ved through efforts to reduce carbon emissions, manage energy and resource consumption, support renewable energy projects, and apply sustainable lending practices to eco-friendly initiatives. Sustainable performance in the banking industry also requires upholding high standards of gove rnance and ethical conduct. This involves ensuring transparency, accountability, and responsible risk management. By establishing a strong corporate governance framework, adhering to regulatory standards, and prioritizing ethical behavior across all operations, banks can build trust by stakeholde rs and mitigate reputational risks.

Rapid economic growth, industrialization, and population growth have led to increased ene rgy consumption and environmental degradation, threatening sustainable development. (Fang et al., 2023). Global primary energy source use experie nced 1.3% growth in 2022. The established corre lation among energy consumption and economic growth directly contributes to environmental degradation, by greenhouse gas (GHG) emissions from energy consumption identified as a key driver of climate change (Shobande & Ogbeifun, 2022). By utilizing Fintech solutions, banks can improve their sustainability performance to reduce GHG, align by the global sustainability agenda, and meet the evolving expectations of customers, regulators,

and investors. Fintech empowers banks to inte grate sustainability into their core operations, offer innovative products and services, and contribute to a more sustainable banking sector that supports economic growth, social welfare, and environme ntal protection.

In the realm of sustainable performance and digital transformation (DT) as a moderator, there is a significant gap in the current literature and rese arch. Studies often focus on sustainable practices or the benefits of DT, neglecting a holistic exploration of their interconnection. It is crucial to investigate how DTs can specifically contribute to sustainable performance improvement. This gap hinders a comprehensive understanding of the potential syne rgies among technology and sustainability goals. Therefore, this research seeks to prioritize filling this gap by diving into practical strategies and real-world examples, offering valuable insights from empirical studies utilizing powerful statistical tools for the harmonious connection among sustainable performance and effective DT.
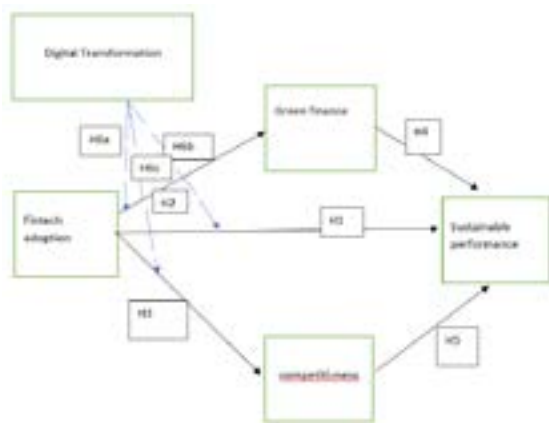

Figure 1

RESEARCH METHODS

Population And Sample

The study focutilized on bank employees in Central Java, Indonesia, by a population size of approximately 441,145 individuals. From this population, a sample of 170 employees was selected for the research. The sampling method employed was the saturated or census sampling technique, which involves selecting a sample size that includes all members of the population.

Data Analysis Techniques utilizing Descriptive Statistical Analysis Descriptive statistics are utilized to analyze data by describing or describing the data that has been gathered as it is devoid of intending to make conclusions that apply to the public or gene ralizations. (Hair et al., 2011). Analysis techniques to describe the data are percentage and average.

The demographic characteristics of the respondents are as follows: 58.4% are male and 41.6% are female. In terms of age, 38.4% are under 31 years, while 29.9% are aged between 31 and 40 years. Regarding education, 54% hold a bachelor's degree, 36.5% have a master's degree, and 9.5% fall into other categories. For work experience, 40.9% are customer service officers, 33.1% are cash office rs, and 17.5% hold assistant manager positions. The research model was then analyzed by inner, outer model and hypothesis testing utilizing SmartPLS software.

Operational Definition and Variable Measurement

Variable	Operational Definition	Measurement
Fintech Adoption (Buchak et al., 2017)	The extent to which banks integrate technological innovations such as digital lending, mobile payments, and blockchain into their financial operations.	Measured by the adoption of specific Fintech tools, such as mobile apps, peer-to-peer lending platforms, and digital payment systems.
Green Finance (Muganyi et al., 2021)	Financial products and services that support environmentally sustainable projects, such as green bonds, sustainable lending, and investments in renewable energy.	Measured by the volume of green investments, including green bonds and sustainable loans issued by the bank.
Competitiveness (Sanchez-Gu-tierrez et al., 2016)	The ability of a bank to perform well in the market, driven by factors like innovation, customer satisfaction, and efficiency.	Measured by market share, profitability, customer satisfaction ratings, and operational efficiency indicators.

Variable	Operational Definition	Measurement
Sustainable Performance (K. H. Lee et al., 2020; Yun et al., n.d.)	The ability of a bank to achieve long-term success while minimizing negative environmental and social impacts. This includes adopting environmental, social, and governance (ESG) practices.	Measured by ESG performance indicators, including carbon emissions reduction, resource efficiency, and compliance with sustainability regulations.
Digital Transformation (DT) (Kaondera et al., 2023)	The integration of digital technologies into all areas of banking operations, including AI, big data, cloud computing, and the Internet of Things (IoT), which impact operational efficiency.	Measured by the extent of technological adoption in banking processes, such as the use of AI in decision-making, cloud computing for operations, and digital platforms.

Source: Data 2024

Regression equations (with PLS) would be expressed as:

Sustainable Performance =

$\beta1 \times$ Digital Transformation $+ \beta2 \times (\beta4 \times$ Digital Transformation $+ \beta5 \times (\beta6 \times$ Digital Transformation $+ \epsilon3) + \epsilon2) + \beta3 \times (\beta7 \times$ Digital Transformation $+ \epsilon4) + \epsilon1$

1. **Sustainable Performance** = $\beta1$ * Digital Transformation + $\beta2$ * Competitiveness + $\beta3$ * Green Finance + ε
   Where $\beta1$, $\beta2$, and $\beta3$ are coefficients to be estimated.

2. **Competitiveness** = $\beta4$ * Digital Transformation + $\beta5$ * Fintech Adoption + ε
   Where $\beta4$ and $\beta5$ are coefficients.

3. **Fintech Adoption** = $\beta6$ * Digital Transformation + ε
   Where $\beta6$ is the coefficient.

4. **Green Finance** = $\beta7$ * Digital Transformation + ε
   Where $\beta7$ is the coefficient.

Where ε represents the error term for each equation.
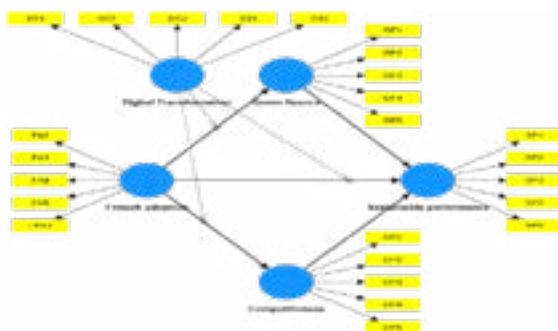
RESULT AND DISCUSSION

Figure 2. Indicator validity (Outer loadings) and Convergent Validity (AVE)

The validity of an indicator is rigorously evaluated through the metric of its outer loading score, which serves as a critical determinant of its reliability. An indicator is generally considered to exhibit sufficient validity when its outer loading exceeds the threshold of 0.70. Furthermore, to meet the stringent criteria for validity, the Average Variance Extracted (AVE) must also surpass the minimum benchmark of 0.50. In instances where the outer loading of an indicator falls below 0.70 but remains above 0.40, the indicator may still be retained inside the model, contingent upon the AVE meeting or exceeding the 0.50 criterion. This ensures the construct's overall validity is preserved. Conversely, indicators that exhibit outer loading scores below 0.40 should be systematically excluded from the model due to their insufficient contribution to the construct's validity (Hair et al., 2011)

The Cronbach's Alpha values for all variables are below 0.70, as indicated by red markers. According to the results of the Construct Reliability calculations (Cronbach's Alpha and Composite Reliability), some variables do not meet the necessary criteria. Additionally, the calculations for Outer Loading, AVE, and Composite Reliability all fail to meet the required standards.

The Heterotrait-Monotrait Ratio (HTMT) serves as a sophisticated diagnostic tool for evaluating the discriminant validity of constructs by comparing the correlations among differing traits against those inside the same trait. This ratio is computed by averaging the correlations among indicators of distinct constructs (referred to as heterotrait-heteromethod correlations) and then normalizing this value by the geometric mean of the average correlations among indicators corresponding to the same construct. In

essence, the HTMT ratio approximates the true correlation among two constructs under the assumption of perfect measurement reliability, often termed as the disattenuated correlation. When this disattenuated correlation approaches unity, it signals a potential violation of discriminant validity. For constructs to maintain distinctiveness as latent variables, it is generally required that their HTMT values remain below the threshold of 0.90, thereby ensuring adequate discriminant validity in the measurement model (Hair et al., 2011)

The results of the HTMT calculation reveal a value exceeding 0.90, highlighted by a red marker. This indicates that the construct variable fails to establish a distinct latent variable and does not fulfill the Heterotrait-Monotrait ratio criteria, thereby suggesting a lack of discriminant validity.

The evaluation of collinearity inside the structural model adheres to the same conceptual framework as that of the formative measurement model, specifically by examining the Variance Inflation Factor (VIF). To ensure the absence of multicollinearity, the VIF must remain below the threshold of 5.0. This criterion confirms that the model is devoid of multicollinearity symptoms across all predictor variables and respondent data, thereby validating the model's readiness for further analytical testing (*Ghozali_2020*, n.d.; Hair et al., 2011)

The R^2 values indicate low model accuracy: Competitiveness (13.7%), Green Finance (8.5%), and Sustainable Performance (12.6%), with most variations (86.3%, 91.5%, and 87.4%, respectively) influenced by factors outside the research model.

Variabel Laten	f-square
Competitivness -> Sustainable performance	0.031
Digital Transformation -> Competitivness	0.077
Digital Transformation -> Green finance	0.026
Digital Transformation -> Sustainable performance	0.022
Fintech adoption -> Competitivness	0.094
Fintech adoption -> Green finance	0.055
Fintech adoption -> Sustainable performance	0.049
Green finance -> Sustainable performance	0.002
Digital Transformation x Fintech adoption -> Competitivness	0.000
Digital Transformation x Fintech adoption -> Green finance	0.002
Digital Transformation x Fintech adoption -> Sustainable performance	0.000

Based on the table above, the following information can be found:

Fintech adoption → Sustainable performance shows an Original Sample (O) value of -0.224 by P-values of 0.298, which are higher than 0.05. This indicates that the negative effect is not statistically significant, leading to the rejection of H1 and the acceptance of H0. Similarly, Fintech adoption → Green finance has an Original Sample (O) value of 0.227 by P-values of 0.440, also exceeding 0.05. This suggests that the positive effect is not statistically significant, resulting in the rejection of H2 and the acceptance of H0.

Fintech adoption → Competitiveness has an Original Sample (O) value of -0.287 by P-values of 0.136, which exceed the 0.05 threshold. This suggests that the negative effect is not statistically significant, leading to the rejection of H3 and the acceptance of H0. Similarly, Green finance → Sustainable performance shows an Original Sample (O) value of -0.044 by P-values of 0.785, indicating an insignificant negative effect, resulting in the rejection of H4 and the acceptance of H0.

In the case of Competitiveness → Sustainable performance, the Original Sample (O) value is 0.176, by P-values of 0.381, which are also greater than 0.05. This demonstrates an insignificant positive effect, leading to the rejection of H5 and the acceptance of H0.

For Digital Transformation x Fintech adoption → Green finance, the Original Sample (O) value is 0.051, by P-values of 0.381, indicating an insignificant positive effect. Consequently, H6a is rejected, and H0 is accepted. Similarly, Digital Transformation x Fintech adoption → Competitiveness has an Original Sample (O) value of 0.017, by P-values of 0.862, showing an insignificant positive effect, leading to the rejection of H6c and the acceptance of H0. Lastly, Digital Transformation x Fintech adoption → Sustainable performance has an Original Sample (O) value of 0.012 by P-values of 0.892, also indicating an insignificant positive effect. As a result, H6b is rejected, and H0 is accepted.

Hypothesis Testing
The Effect Fintech Adoption on Sustainable Performance

The study found that fintech adoption does not have a statistically significant impact on sustainable performance. This outcome suggests that, despite

the adoption of fintech tools, they do not directly influence a bank's sustainability goals in the context of this research.The result is aligned with previous literature indicating that while fintech has the potential to improve financial access and efficiency, its direct contribution to sustainability may be limited or influenced by other factors such as regulatory frameworks, organizational readiness, and the integration of sustainability strategies (I. Lee & Shin, 2018; Park & Kim, 2020).

The Effect Fintech Adoption on Green Finance

The study found that fintech adoption does not significantly affect green finance. This suggests that simply adopting fintech tools does not automatically result in increased investments in environmentally sustainable projects.This result is consistent with research that acknowledges the challenges banks face in integrating sustainability into their fintech-driven operations (Huang et al., 2022). The absence of a significant effect may be attributed to a lack of targeted policies or infrastructure within the fintech tools that promote green finance.

The Effect Fintech Adoption On Competitiveness

The study found that fintech adoption does not have a significant impact on competitiveness. While fintech can enhance efficiency and improve customer service, it does not seem to directly impact the competitive positioning of banks in this study.

This outcome aligns with findings from other studies that suggest that while fintech tools can foster innovation, they do not necessarily guarantee an enhanced competitive edge without a comprehensive strategy that combines fintech adoption with other competitive factors (Zhang & Wang, 2021).

The Effect Green Finance on Sustainable Performance

The study found that green finance does not significantly influence sustainable performance. Despite the adoption of green financial products, this did not lead to a measurable improvement in the bank's sustainability outcomes. This result is consistent with the notion that green finance, while a growing field, faces implementation barriers such as a lack of awareness, inadequate funding,

or insufficient integration with broader corporate sustainability efforts (Akomea-Frimpong et al., 2022).

The Effect Competitiveness on Sustainable Performance

The study found that competitiveness does not significantly impact sustainable performance. This suggests that being competitive does not necessarily translate into better sustainability practices or outcomes in the banking sector. This finding supports the argument that competitiveness alone is not enough to drive sustainable practices. Other factors such as regulatory compliance, stakeholder engagement, and internal sustainability policies might be more influential in achieving sustainable performance(Meng & Shaikh, 2023) .

The Effect Moderating Role of Digital Transformation On Green Finance, Fintech adoption and Competitivness

Digital transformation does not significantly moderate the relationship between fintech adoption and green finance, sustainable performance, or competitiveness. This indicates that digital transformation, while important, does not play a strong moderating role in the specific context of fintech adoption in this study. This outcome is consistent with research suggesting that digital transformation's impact on sustainability is not straightforward and can be influenced by factors such as the maturity of digital infrastructure, organizational readiness, and the specific digital tools being used(Mohsin & Jamaani, 2023) . Additionally, the lack of significance might indicate that digital transformation's benefits are more complex and multifaceted than what the current study was able to capture. The results of this study contradict research by (Hidayat-ur-Rehman & Hossain, 2024) Competitiveness acts as a mode rating factor. This means that competitiveness mode rates the relationship between the adoption of Fintech, green finance initiatives, and the sustainable performance of banks. Here, competitiveness not only influences the bank's performance directly but also strengthens or alters how the adoption of digital technologies (Fintech) and green policies affect the sustainability of the bank's performance.

CONCLUSION

This study examined how fintech adoption, green finance, competitiveness, and digital transformation affect sustainable performance in the banking sector in Central Java, Indonesia. Based on the findings:

1. Fintech Adoption: Fintech adoption does not significantly impact sustainable performance, green finance, or competitiveness. This suggests that while fintech is innovative, it doesn't directly improve sustainability outcomes by itself.

2. Green Finance: There is no significant effect of green finance on sustainable performance. This indicates that adopting green financial products does not automatically lead to better sustainability results.

3. Competitiveness: Competitiveness in the banking sector does not significantly influence sustainable performance. Being competitive does not necessarily drive sustainability efforts.

4. Digital Transformation: Digital transformation does not significantly affect the relationship between fintech adoption and sustainability outcomes. This shows that digital tools alone may not be enough to achieve sustainability goals.

Final Thoughts:

The study suggests that while fintech and digital transformation are important, their direct impact on sustainability in banks is not as strong as expected. More research is needed to understand the factors that help integrate technology with sustainability practices in the banking sector.

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