

The Impact of Green Banking on Indonesia Stock Exchange-Listed Banks' Financial Performance from 2020 to 2024

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ABSTRACT

This study aims to analyze the influence of Green Banking on the financial performance of banks listed on the Indonesia Stock Exchange during the 2020-2024 period using quantitative methods with descriptive and causal approaches. The research sample included 39 banks selected through non-probability sampling techniques with a purposive sampling approach. Data analysis was carried out using the Structural Equation Model (SEM) with Partial Least Square (PLS) through the SmartPLS 4 application. The results of the study prove that Green Banking has a significant positive effect on financial performance as measured through Return on Assets (ROA) and Return on Equity (ROE). Banks that implement Green Banking practices show increased operational efficiency, better reputation, and more effective risk management. These findings indicate that the application of environmental sustainability principles in banking operations not only contributes positively to the environment, but also produces financial performance and makes Green Banking a profitable and sustainable business strategy for the banking industry in Indonesia.

INTRODUCTION

The last ten years have been the hottest period in recorded history which shows that the trend of global warming is becoming more consistent (BMKG, 2024). For the first time in history, in 2024 the global average temperature will reach 1.5oC, which indicates that the earth is getting closer to the global warming limit set in the *Paris Agreement*, which is an effort to contain the global temperature rise below 1.5oC to prevent worsening climate change (Cannon, 2025; Diaz et al., 2023; Fitriani et al., 2024; Hanum et al., 2023; Siddiq et al., 2024).

Indonesia's efforts to reduce climate change still face major challenges. According to the Databoks report (2024), the Processing Sector produces the highest emissions of 340.71 million tons of CO₂ followed by the electricity and gas procurement sector of 297.22 million tons of CO₂. In addition, Indonesia occupies the seventh position as the world's largest carbon emitter, reaching 700 million tons per year, which is largely due to financing unsustainable projects.

The banking subsector contributes to carbon emissions caused by daily activities such as the massive use of paper for transactions, reports and documentation that accelerate forest degradation and destruction, as well as the use of electricity from conventional power plants. In addition, the banking subsector plays a role as a credit financing provider that supports various economic projects, including projects that are not environmentally friendly.

As financial intermediaries, Indonesian banks' primary goals are to promote equitable development, economic progress, national stability, and the execution of national development in order to raise the standard of life for all citizens (Nahdhah, 2022). The real contribution of the banking sector is very influential on economic development in a country (Dangnga & Haeruddin, 2018). Because it shows the bank's capacity to make money, its degree of health, and its operational efficiency, the banking subsector must continue to maintain its financial performance.

Due to the beginning effects of the Covid-19 epidemic, the banking subsector's financial performance in 2020 demonstrated a very poor banking situation, resulting in a sharp decline in bank net income. In 2021, banking ROA decreased by 0.16% from the previous year due to economic conditions that have not yet recovered and banks experienced an increase in non-performing loans. From 2022 to 2024, the ROA of the banking subsector will continue to increase due to the national economic recovery. In 2021, ROE decreased by 1.82% due to economic pressures and high operating costs due to economic disruptions from the pandemic. Then in 2022 to 2023 it continued to experience an increase caused by a good operational strategy, showing that optimal capital efficiency. However, in 2024, the ROE of the banking subsector again decreased by 0.61% due to an increase in loss reserves, reflecting that banks must set aside more funds to anticipate potential credit losses.

A company's ability to make money has an impact on its success. It considers its social obligation to the environment in addition to its concentration on large profits. This aligns with the triple bottom line notion of sustainable development, which focuses on profit, people, and the environment.

In accordance with Bank Indonesia Regulation (PBI) number 14/15/PBI/2012, which evaluates the quality of Commercial Bank assets in the conditions for loan disbursement, an evaluation of debtors' environmental management has been introduced. Furthermore, sustainable financing is described in the Financial Services Authority Regulation (POJK) number 51/POJK.03/2017. According to Naja and SH (2007), these rules encourage public corporations, issuers, and financial services institutions (LJKs) to provide sufficient funding sources for finance connected to climate change and sustainable development. Sustainable economic growth and the adoption of green banking practices are the goals of this.

As an assessment indicator, the Green Banking Disclosure Index (GBDI) gauges how much banks adhere to sustainability standards. The Financial Services Authority Regulation (POJK) No. 51 of 2017 stipulates in article 10 that banks must provide sustainability reports as part of their obligation to conduct economic, social, and environmental performance.

The GBDI score continues to improve every year and is able to achieve a perfect score, then the ROA of the banking subsector ranges from 0.87% to 1.89% while the ROE is able to reach between 6.49% to 12.93%. This shows that from 2020 to 2023 the average GBDI, ROA and ROE in banking in Indonesia continue to increase driven by government regulations, stakeholder demands for sustainability and post-pandemic economic recovery to encourage efficiency and innovation in the banking sector. This makes banks more transparent in disclosing environmentally friendly practices which ultimately increases investor confidence and bank profitability. However, in 2024, even though GBDI reaches perfect figures, ROA and ROE will actually decline due to increased operating costs to maintain sustainability standards as well as external pressures such as credit slowdown and declining purchasing power, resulting in a decline in bank efficiency and profitability even though environmental disclosure has been maximized.

Results from some earlier research have been conflicting. According to Bose, Khan, and Monem (2018), green banking has a positive impact on financial performance that is driven by return on assets (ROA). This is supported by the findings of several studies (Ahmar et al., 2024; Arifian et al., 2021; Chen et al., 2022; Hanif et al., 2020; Hossain et al., 2020; Jain et al., 2023; Khan et al., 2021; I. U. Khan et al., 2024; Pasha & Elbages, 2022; Rachmawati et al., 2023; Ramdani et al., 2023; Ramila & Gurusamy, 2015; Wrespatiningsih & Mahyuni, 2022). The implementation of *green banking* requires considerable technological investment. However, its long-term benefits in improving the company's reputation and image are much greater. A positive image can attract new customers which can ultimately increase business volume and revenue. *Green banking practices* such as *paperless* drastically reduce costs such as printing, physical document storage. In addition, the use of technology will reduce electricity and water bills. This effectiveness can raise net profit and lower operating expenses.

However, several findings' outcomes are displayed by (Asyura et al., 2023; Ernawati & Utami, 2024; Gutiérrez-Ponce & Wibowo, 2023; Putri et al., 2022; Retno et al., 2025) states that *Green Banking* cannot affect *the Return On Asset*.

Because the implementation of *green banking* such as *paperless operations* and *green technology* can initially increase operational costs, requiring considerable investment in technology and infrastructure, thus burdening profitability.

Further findings Hossain et al. (2020) that *green banking* has an influence on financial performance by using ROE proxy, as well as the findings (Hanif et al., 2020; Pasha & Elbages, 2022; Wrespatiningsih & Mahyuni, 2022). Banks that implement *green banking* practices tend to attract more customers who care about the environment. This positive reputation not only increases the number of customers, but can also increase *stakeholder trust* because banks comply with OJK regulations regarding sustainable finance.

Nonetheless, some of the findings differ from (Asyura et al., 2023; Ernawati & Utami, 2024; Gutiérrez-Ponce & Wibowo, 2023; Putri et al., 2022; Rachmawati et al., 2023; Retno et al., 2025) which states that *Green Banking* does not affect the *Return On Equity*. Because environmentally friendly projects tend to take time to return *returns*, banks need to wait for the results of the investment.

THEORETICAL REVIEW

Signal Theory

According to Spence (2017), Signal theory explains that the whistleblower can provide signals in the form of valuable information to the receiver. The signals given can be in the form of positive or negative information that can affect the other party's decision. *Green banking* sends a signal that banks have quality management and are able to identify future business opportunities. Signals can also reduce risk perception from investors and other stakeholders, thereby increasing customer confidence to save funds and use bank services. High trust can provide a positive signal from *green banking* to attract *green investors* who provide access to funding at lower costs, thereby increasing the efficiency of asset use.

Legitimacy Theory

According to Suchman (1995), Legitimacy theory is an attempt to equalize the perception or assumption that the actions taken by an entity are in line with the norms, values, beliefs and rules of the applicable social system. If a company does not meet these expectations, the company's legitimacy is threatened and has an impact on business sustainability. By implementing *green banking*, the bank shows its commitment to environmental sustainability, which is currently considered important by the community. So that banks will more easily attract new customers and improve the bank's reputation.

Stakeholder Theory

Stakeholder theory, according to Freeman & McVea (2005), explains the connections between people or groups that are impacted by a company's operations or have the potential to influence them. The implementation of *green banking* meets *stakeholders'* expectations of corporate social and environmental responsibility. *Green banking* is considered to meet the expectations of *stakeholders*, so that the bank gets full support such as capital and customer loyalty.

Financial Performance

Financial performance is an achievement or added value obtained by comparing the real results of the implementation of activities with standards or targets that should be achieved under certain conditions (Liow, 2022). Financial performance may serve as a foundation for financial plan creation and decision-making as it can reveal issues pertaining to the company's finances. In addition, financial performance is also an indicator to see how effective the company's business and operational strategy is (Kustinah, 2021; Yudha Putri & Kustinah, 2025). **Return On Asset (ROA)**, the company's capacity to make money from the utilization of all resources or assets possessed within a specific time period, is the financial performance employed in this study (Naja & SH, 2007; Dewi & Sembiring, 2022; Aspari & Ramli, 2024; Fadilah & Simatupang, 2025). Furthermore, **Return On Equity (ROE)** measures the amount of return that a business provides for each rupiah of capital contributed by shareholders and signifies the capacity of the business to make money using share capital (Desmiza, 2021; Dewi & Sembiring, 2022).

Green Banking

Green banking, also known as green banking, is a concept in banking that considers environmental factors in all aspects of its operations, including waste management, financing for environmentally friendly projects, lowering paper use, energy efficiency in operations, conserving water, and assessing environmental risks when financing and promoting digital banking services.

In addition to helping the environment, implementing green banking may enhance the bank's reputation. This study uses a disclosure index, the Green Banking Disclosure Index (GBDI) with 10 indicators created by Bose et al. (2018), to gauge the extent of green banking implementation. The goal of green banking practices is not only to promote eco-friendly activities but also to lower the carbon footprint of banking operations. Among these indications are:

1. Details about financing green projects, such as biogas plants, renewable energy projects, and the construction of compressed natural gas (CNG) stations, as well as tracking clients' environmental projects, like recycling facilities, smoke and gas containment units, and waste treatment plants (ETPs).
2. Information about minimizing paper waste through the use of recycled paper, double-sided printing, and email-based internal communication.
3. Details about how the bank is using policies and technology, such water conservation, to cut down on gas and water waste in internal operations.
4. Details on the usage of eco-friendly products, such solar power systems and recycled paper, among other things.
5. Details on energy-saving measures for business operations, such using energy-efficient lighting to save power.
6. Details on the launch of several new green products aimed at lowering carbon emissions, such as mobile banking, automated teller machines (ATMs), and internet banking.

7. Details on whether the bank has studied the possible environmental effects of the client's company or intends to do so before authorizing the financing arrangement.
8. Details on any awards the bank has won for its eco-friendly initiatives, contributions to environmental enhancement, and superior environmental reporting standards.
9. Details on the annual budgetary allotment for green banking initiatives.
10. Using distinct reports or pages for reporting on green banking in yearly reports.

The association between the variables in this study is explained as follows:

The Influence of Green Banking on Return On Asset (ROA)

Signal theory provides an explanation of the connection between green banking and return on asset. A indication of great management and the ability to spot future business prospects is sent by green banking. The idea is backed by a number of other research, including Bose et al. (2018), which claims that green banking improves financial performance, particularly ROA, and that this benefit is fueled by cost effectiveness in Bangladeshi commercial banks. Findings Ramila & Gurusamy (2015) stating a positive relationship, that *green banking practices* such as *mobile banking* adopted by banks contribute greatly to the profitability of banks in India. According to research by Jain & Sharma (2023), green banking practices have a favorable impact on funding and investment in green initiatives, operational efficiency, and banking profitability, particularly return on assets (ROA). Similarly, studies (Ahmar et al., 2024; Chen et al., 2022; Hanif et al., 2020; Hossain et al., 2020; Jain & Sharma, 2023; H. Z. Khan et al., 2021; I. U. Khan et al., 2024; Pasha & Elbages, 2022; Rachman & Saudi, 2021; Rachmawati et al., 2023; Ramdani et al., 2023; Wrespatiningsih & Mahyuni, 2022) found that Green Banking had a favorable impact on ROA. Every increase in the green banking index's value will have an impact on raising profitability if the link is favorable. The more green banking a bank has, the more profitable it will be and the more successful it will be in putting green banking methods into practice to achieve a green economy. The implementation of *green banking* can be a positive signal for the market. Banks that implement *green banking* practices show that banks have a concern for the environment and clear goals for the future. These positive signals can increase investor and customer confidence. This has an impact on increasing the bank's profitability.

The Influence of Green Banking on Return On Equity (ROE)

The legitimacy hypothesis explains the connection between return on equity and green banking. The principle of social legitimacy may enhance the bank's public image and investor confidence through green banking. By implementing *green banking*, the bank shows its commitment to environmental sustainability, which is currently considered important by the community. So that banks will more easily attract new customers and improve the bank's reputation.

In addition, *stakeholder* theory also supports the relationship. The interactions between people or organizations that are impacted by a company's

operations or have the potential to influence them are described by Freeman & McVea (2005). The use of green banking satisfies stakeholders' demands for environmental and social responsibility. In order to receive full support from stakeholders, including capital and consumer loyalty, green banking is thought to match their expectations.

Numerous earlier studies, including those by Hossain et al. (2020), which found that green banking improves financial performance, particularly ROE, and Pasha & Elbages (2022), which found that green banking, particularly digital-based banking transactions, influences the rise in bank profitability, particularly ROE in Egypt, support the theory. However, these effects only appear after three years of implementation, because investing in environmentally friendly technologies requires capital for large investments. The findings of Hanif et al. (2020) and Wrespatiningsih & Mahyuni (2022) also showed that Green Banking has a favorable impact on return on equity. The reputation of banks will improve when they engage in green banking activities, such as financing environmentally friendly initiatives or establishing sustainable operations. Currently, banks that implement green policies are more attractive to investors. This opens up greater financing and growth opportunities.

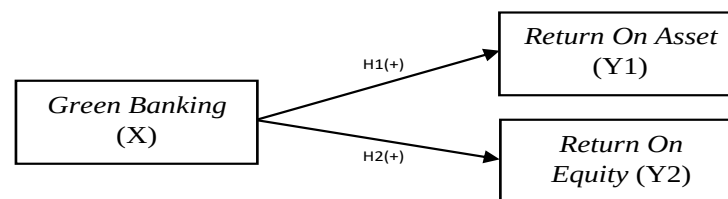


Figure 1. Conceptual Framework

This description allows for the formulation of the research hypothesis, which is as follows:

H1 : During the 2020–2024 timeframe, green banking improves return on assets for banks listed on the Indonesia Stock Exchange.

H2 : During the 2020–2024 timeframe, green banking improves return on equity for banks listed on the Indonesia Stock Exchange.

METHODOLOGY

This study's research methodology is quantitative and employs a descriptive and causation approach. The impact of green banking on the financial performance of banks listed on the Indonesia Stock Exchange throughout the 2020–2024 timeframe is examined using the descriptive technique. In the meanwhile, the degree to which Green Banking affects financial performance is assessed using the causality technique.

The study's population consists of 47 banks that were listed between 2020 and 2024 on the Indonesia Stock Exchange (IDX). According to the criteria of banks that are regularly listed on the Indonesia Stock Exchange between 2020 and 2024, banks that release annual reports during that time, and companies that release sustainability reports during that time, a non-probability sampling

method with a purposive sampling approach was employed in this study. 39 banks make up the study's sample based on these standards.

The Indonesia Stock Exchange (IDX) provided secondary data for this study in the form of annual reports and banking sustainability reports for the 2020–2024 timeframe that were listed on the IDX. Consequently, the documentation method issued by the Indonesia Stock Exchange (IDX) is the method of data collecting that is employed.

Structural Equation Model (SEM) analysis with Partial Least Square (SEM-PLS) is the data analytic method utilized in this study to examine the relationship between variables. The SmartPLS 4 application is the software utilized. The analysis consists of:

1. Descriptive statistics are used to explain the state of the variables under study.
2. Assessment of Measurement Models (Outer Model): comprises reliability, discriminant validity, and convergent validity tests.
3. Structural model (inner model) evaluation, including path coefficient, goodness of fit, and R-squared for hypothesis testing.

RESULTS

Descriptive Statistics

The following are the findings of the descriptive statistical analysis of the study variables of Green Banking on the financial performance of banks throughout the 2020–2024 period:

Table 1. Descriptive Statistics

Name	Mean	Median	Minimum	Maximum	Standard Deviation
X1	0.815	1	0	1	0.388
X2	0.99	1	0	1	0.101
X3	0.764	1	0	1	0.425
X4	0.646	1	0	1	0.478
X5	0.759	1	0	1	0.428
X6	0.938	1	0	1	0.24
X7	0.697	1	0	1	0.459
X8	0.59	1	0	1	0.492
X9	0.385	0	0	1	0.487
X10	1	1	1	1	0
Y1	0.497	0.563	-18.058	8.409	2.644
Y2	4.281	3.002	-22.632	21.165	7.597

Source: Processed Data, 2025

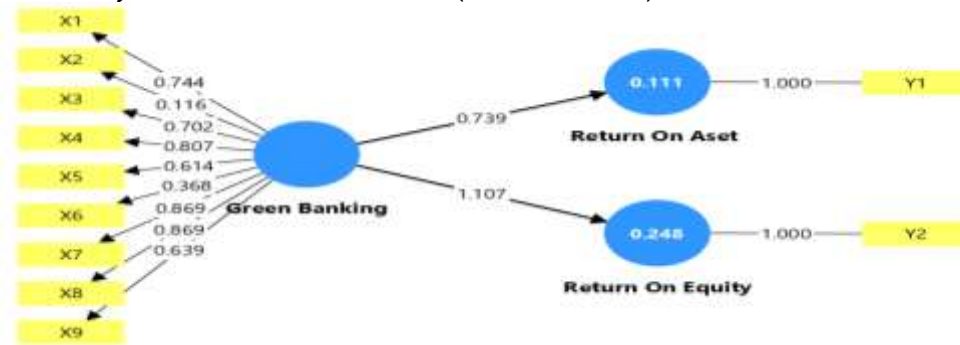
Most of the *Green Banking* indicators show a high mean *value*, ranging from 0.59 to 1 which identifies that *Green Banking practices* are beginning to be implemented by banks in Indonesia. The usage of separate pages for reporting, or the X10 indication, has a mean value of 1 and a standard deviation of 0, indicating that the indicator has been implemented consistently throughout the banking sample. Indicator X9, which is the allocated budget information, has the

lowest *mean* value of 0.385, indicating that there are variations in the application of the indicator in various banks.

The *mean* ROA value of 0.497 with a *median* of 0.563 shows that the average ability of banks to generate profits from their assets is still quite low. The *min* value of -18,058 indicates that there are banks that have suffered significant losses, while the *max* value of 8,409 indicates that there are banks with good performance. The standard deviation of 2.644 indicates a fairly high variation in ROA performance between banks.

The bank's capacity to make money off of its own capital is demonstrated by the mean ROE value of 4.281 and the median of 3.002. A very wide range of values of -22,632 to 21,165 indicates a very significant difference in financial performance between banks. The standard ROE deviation of 7.597 indicates that there is a high heterogeneity in the ROE performance of banks.

Evaluation of Measurement Models (Outer Model)



Source: Processed Data, 2025

Figure 2. Evaluation of Measurement Models (Outer Model)

Convergent Validity Test

According to Hair et al. (2017), the Green Banking construct's Average Variance Extracted (AVE) value of 0.717 is higher than 0.5. Illustrating that the validity of the convergent is well fulfilled and the *Green Banking* variable is able to explain about 71.7% of the variances of the indicators.

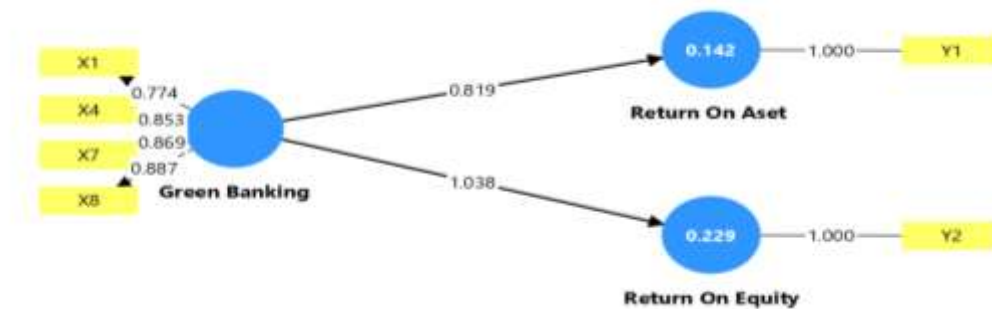
Discriminating Validity Test

The square root value of AVE in the *Green Banking* variable of 0.847 is greater than the correlation of other constructs of 0.392 in the Return On Asset variable and 0.494 in the Return On Equity variable. This demonstrates that the discriminant's validity is satisfied, indicating that each concept is distinct and does not overlap with other constructs (Hair et al., 2017).

Reliability Test

Both the Composite Reliability and Cronbach's Alpha values are above 0.7, at 0.872 and 0.910, respectively. Therefore, it can be said that the Green Banking measuring tool is dependable for use in studies (Hair et al., 2019).

Evaluation of Structural Models (Inner Model)



Source: Processed Data, 2025

Figure 3: Structural Model Evaluation (Inner Model)

R-Square (R2)

The Green Banking variable accounts for 14.2% of the variation in ROA, according to the R2 value at the Return On Asset (ROA) of 0.142. The Green Banking variable accounts for 22.9% of the variation in Return On Equity (ROE), according to the R2 value of 0.229. Given that the R2 value is less than 0.3, Green Banking's impact on ROA and ROE is currently comparatively minimal (Juliandi, 2018). This demonstrates that factors other than Green Banking have a bigger impact on banks' financial success.

F-Square (F2)

A moderate impact size is indicated by the F2 values of $0.166 > 0.15$ for the effect of green banking on ROA and $0.297 > 0.15$ for the effect of green banking on ROE. This shows that *Green Banking* has a significant contribution to financial performance, especially in ROE (Hair et al., 2014).

Path Coefficient

Hypothesis 1: green banking improves return on assets.

A beta value of 0.819, T statistics of $6.043 > 2.02$, and P values of $0.000 < 0.05$ were displayed in the test findings. This indicates a favorable relationship between green banking and return on assets. Accordingly, ROA will rise with any expansion of Green Banking adoption. Thus, we accept Hypothesis 1. The findings indicate that Green Banking has a favorable impact on return on assets.

Hypothesis 2: Return on equity is positively impacted by green banking.

According to the test findings, the p-value was $0.000 < 0.05$, the beta value was 1,038 and the T-statistic was $10,378 > 2.02$. This demonstrates that return on equity is positively impacted by green banking. Accordingly, ROE will rise when Green Banking is implemented more widely. Hypothesis 2 is so approved.

These findings indicate that return on equity is positively impacted by green banking.

DISCUSSION

The Influence of Green Banking on Return On Asset (ROA)

Return on Asset (ROA) is positively impacted by green banking, indicating that banks' capacity to make money off of their assets may be enhanced by implementing green banking practices. Green Banking practices help banks reduce operational costs through energy efficiency, reduced paper use and digitization of services. These cost savings directly increase the bank's profitability which is reflected in the ROA. *Green Banking* improves the bank's reputation and image in the eyes of investors and customers who are increasingly concerned about environmental issues. A good reputation can attract more investors and customers, increasing loyalty and increasing bank revenue. By applying criteria in lending methods, banks can reduce the risk of non-performing loans from unsustainable sectors. This enhances asset quality and lessens the burden of loss reserves, both of which lead to better financial performance.

Green Banking's Effect on Return on Equity (ROE)

Return on equity is positively impacted by green banking. This influence is stronger than the influence on ROA. Financing of green projects and appreciation for environmental activities also have a strategic impact on the bank's reputation in the eyes of investors. Banks that earn environmental awards can attract investors who focus on sustainability investments.

The bank's dedication to long-term sustainability is demonstrated by the adoption of Green Banking, which may boost investor and shareholder trust. *Green Banking* helps banks to identify and avoid investing in high-risk projects that can protect shareholders' capital from losses.

Banks that implement *Green Banking* get access to funding at lower costs, which can reduce capital costs and increase *returns* for shareholders. A reputation as an environmentally responsible bank can strengthen the bank's competitive position which ultimately increases *the bank's* Return On Equity.

CONCLUSIONS AND RECOMMENDATIONS

This study demonstrates that Indonesian banks' financial performance benefits from green banking practices. It has been demonstrated that green banking techniques including cutting back on paper, conserving energy, and offering digital services lessen the strain of operating expenses, which raises bank profitability. In addition, the implementation of *green banking* practices provides greater benefits to shareholders as investors today increasingly appreciate banks that have a commitment to environmental sustainability, showing that banks have a long-term view. These findings prove that caring for the environment and profiting are not two contradictory things. On the other hand, banks that implement sustainability can still achieve good financial performance. Thus, investing in sustainability practices is a profitable strategic decision, not just a

regulatory obligation or social responsibility activity, so that banks can leverage this momentum to transition to a sustainable economy as an opportunity to increase competitiveness, strengthen reputation and ultimately achieve stronger business growth in the long term.

Suggestions

In addition, researchers can extend the study period to observe the long-term effects of implementing green banking and take into account other factors that may influence financial performance as well as research moderation or mediation factors that may influence the relationship between green banking and financial performance.

FURTHER STUDY

Green banking methods are still not widely used in Indonesian banking; it is anticipated that this will change and that banks will become more concerned with environmental sustainability in order to cut down on unsustainable financing.

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