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ANALYSIS OF GREEN BANKING PRACTICES USING THE ENVIRONMENTAL RISK INDEX AND ITS IMPACT ON THE FINANCIAL PERFORMANCE OF BANKS LISTED ON THE INDONESIAN STOCK EXCHANGE

Amalia Fitri[1], Chairil Akhyar[2], Marzuki[3], Ghazali Syamni[4]
Universitas Malikussaleh / Aceh Utara, Indonesia
E-mail: chairilakhyar@unimal.ac.id

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Abstract

This study analyzes the effect of green banking practices on the financial performance of banks in Indonesia using the Environmental Risk Index (ERI) as a proxy. Panel data from seven banks listed on the Indonesian Stock Exchange for the period 2018-2024 were analyzed using the Entropy Weight Method and panel data regression. The results of the study reveal specific findings: ERI does not have a significant effect on ROA and NIM, but it has a negative and significant effect on ROE. These findings strongly indicate that the implementation of green banking in Indonesia is still in a transitional phase. The short-term costs arising from sustainability initiatives have been statistically proven to burden the rate of return on equity (shareholder's return), although their impact on asset-based profitability (ROA) and interest margin (NIM) has not yet been observed. This study provides important implications for banks and regulators that sustainability strategies need to be optimized to align with value creation for shareholders.

Keywords: Environmental Risk Index, Financial Performance Banking, Green Banking Sustainability

INTRODUCTION

The banking sector listed on the Indonesia Stock Exchange plays a strategic role in encouraging economic growth through financial intermediation mechanisms, namely the collection of public funds and their distribution as credit or financing for investment, infrastructure development, and the empowerment of small and medium enterprises. As regulatory pressures increase, public awareness of environmental issues, and financial risks due to climate change, sustainable finance practices are becoming a global trend that encourages banks to apply sustainability principles. Green banking is one of the approaches that integrates environmental, social, and governance (ESG) aspects into all banking operational activities, from lending to investment Lia et al., (2025). OJK Regulation Number 51/POJK.03/2017 provides guidelines for Indonesian banks in implementing green banking practices to support sustainable development that includes economic, social, and environmental aspects. This practice includes managing electricity, water, and paper consumption, as well as financing environmentally friendly projects, with the aim of increasing the bank's operational efficiency, reputation, and competitiveness (Wrespatiningsih & Mahyuni, 2022; Wahyu Ningsih et al., 2020).

However, some studies show mixed results. Prabaningrum & Pramita (2019) found that green banking had no significant influence on profitability, while Loissa (2025) showed that the increase in the Index Green Banking Disclosure (GBDI) has a negative effect on ROA. This underscores the need for more quantitative measurement of the effectiveness of green banking practices, such as through Environmental Risk Index (ERI), which measures the environmental risks of bank operational and financing activities (Prorokowski, 2016; Chew et al., 2016). Effective environmental risk management is believed to increase stakeholder trust, maintain reputation, and support the bank's financial performance. Therefore, this study aims to analyze the influence of green banking practices through ERI on banking financial performance in Indonesia, measured using Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). This research is expected to provide practical insights for banks and stakeholders in formulating sustainability strategies while encouraging optimal financial performance improvements.

LITERATURE REVIEW

Stakeholder Theory

The Stakeholder Theory, as stated by Freeman, emphasizes that the company's responsibility is not only limited to shareholders, but also to all parties involved in or affected by the company's activities (Mahajan et al., 2023). Stakeholders include employees, customers, the government, the community, investors, and the environment, who have the right to transparency of information related to financial, social, and environmental aspects of the company (Wrespatiningsih & Mahyuni, 2022). This relationship is reciprocal, which is reflected through social responsibility and corporate accountability. In the context of green banking, stakeholder pressure plays a very important role in encouraging the adoption of environmentally friendly practices. The study of Chandran et al., (2025) shows that the active involvement of the government, institutional investors, and the community drives the legitimacy of banks in implementing green banking. However, the implementation of this practice creates a trade-off between meeting stakeholder demands and short-term profits for shareholders. Environmental risk management through the Environmental Risk Index (ERI) requires additional resource allocation, such as investment in sustainability systems and restrictions on financing high-risk sectors. Thus, stakeholder theory explains that green banking practices and environmental risk management are more strategic and long-term, focusing on the legitimacy, reputation, and sustainability of the bank, while building stakeholder trust and support.

Legitimacy Theory

Legitimacy Theory emphasizes that companies must comply with the norms and regulations of their social environment to gain social acceptance (Wrespatiningsih & Mahyuni, 2022). Green information disclosure is a strategic instrument to maintain public reputation, legitimacy, and trust, not solely for economic motives. Sustainability transparency increases the bank's credibility in the eyes of investors, regulators, and the public (Mattew et al., 2024). The implementation of ERI is in line with this theory, as investments in environmental management systems and restrictions on financing of risky sectors can depress short-term profits. With a strong reputation and legitimacy, the bank gained preference in the distribution of green investments and strategic partnerships, thereby supporting long-term financial sustainability and performance.

Triple Bottom Line (TBL) Theory

The Triple Bottom Line was popularized by Elkington, emphasizing that the sustainability of a company does not only depend on profit, but also the planet (environment) and people (social). The integration of these three aspects is a prerequisite for sustainable development. The TBL paradigm encourages companies to reduce negative environmental impacts, improve resource efficiency, and manage waste in an environmentally friendly manner (Yuswohady, 2008; Hourneaux et al., 2018). However, the implementation of TBL raises a trade-off between environmental performance and short-term profitability because it requires additional investment. Therefore, TBL provides a conceptual foundation that green banking and environmental risk management are long-term sustainability strategies, which support the stability and reputation of banks.

Green Banking

Green banking is a banking practice that integrates environmental, social, and economic sustainability principles in all bank operations (Wahyu Ningsih et al., 2020). Its implementation includes the distribution of environmentally friendly credit, energy and water management, reduction of paper use, and investment in sustainable projects (Shaumya & Arulrajah, 2017; Handajani, 2019). Several studies show that green banking improves the reputation and long-term profitability of banks (Febiola & Iqbal, 2023; Yasmin & Akhter, 2021), while other studies noted the potential for high costs and pressures on operational efficiency in public banks (Karyani & O'Brien, 2020). The success of green banking depends on a balance between sustainability commitments and the bank's internal capacity to manage the trade-offs between financial and non-financial objectives.

Environmental Risk Index (ERI)

ERI is used to measure environmental risks related to company or project activities, including electricity consumption, water use, and paper usage intensity (Chew et al., 2016; Prorokowski, 2016). ERIs enable banks to assess and manage environmental risks, meet stakeholder expectations, and support operational sustainability. The weight of the ERI indicator in this study was determined using the Entropy Weight Method (EWM), a data-based method that is objective and reduces subjective bias (Duc Trung, 2022; Yoon, 1987).

Financial Performance

A bank's financial performance reflects its ability to manage resources to achieve profitability and operational efficiency (Tudose et al., 2022). The main indicators in this study are:

1. Return on Assets (ROA) is the ability to generate profit from total assets (Waruwu, 2014).
2. Return on Equity (ROE) is a return on shareholder capital (Damayanti & Andriyani, 2022).
3. Net Interest Margin (NIM) is the effectiveness of banks in generating net interest income (Purwoko & Sudityatno, 2013).

Studies show that the integration of green banking practices and environmental risk management has the potential to improve financial performance through asset efficiency, operational stability, and better reputation (Anggraini et al., 2023; Ruiz & Weber, 2021).

METHOD

This research was conducted on banks listed on the Indonesia Stock Exchange (www.idx.co.id), with a focus on the implementation of green banking and financial performance measured through ROA, ROE, and NIM during the 2018–2024 period. The study population included all banks listed on the IDX (47 banks), with a sample of 7 banks selected using purposive sampling based on the criteria of having annual audited financial statements and continuous sustainability reports. The data used is in the form of panel secondary data, which includes time series and cross section information, obtained through documentation and literature studies from annual reports, sustainability reports, the official websites of IDX and OJK, as well as related scientific literature.

Variable Operational Definition

ERI is a quantitative tool to measure banks' effectiveness in managing environmental risks and increasing transparency related to social and environmental responsibility (Chew et al., 2016). ERI includes the measurement of the consumption of resources such as electricity, water, and paper adjusted to the number of employees.

$$\mathrm{ERI_i} = \sum_{j=1}^{n} w_j \cdot r_{ij}$$

ROA measures the bank's ability to generate profit from the overall assets it owns eflecting the efficiency of asset use in the bank’s operations

$$\mathrm{ROA} = \frac{\text{Net Income}}{\text{Total Assets}} \times 100\%$$

ROE indicates the level of return on equity held by shareholders, indicating profitability relative to its own capital

$$\mathrm{ROE} = \frac{\text{Net Income}}{\text{Total Equity}} \times 100\%$$

NIM assesses the bank's efficiency in generating net interest income from its productive assets, as an indicator of the bank's financial performance in intermediation activities.

$$\mathrm{NIM} = \frac{\text{Net Interest Income}}{\text{Average Earning Assets}} \times 100\%$$

Data Analysis Methods

This study uses a quantitative approach with panel data to analyze the influence of Green Banking practices, which are operationalized through the Environmental Risk Index (ERI), on the financial performance of banks as measured by ROA, ROE, and NIM. Panel data was obtained from the bank's annual report and sustainability report for the period 2018–2024, so it includes time series and cross sections. The analysis begins with descriptive statistics to describe the distribution of data, including mean, median, minimum, maximum, and standard deviation (Sugiyono, 2012).

The panel data regression model is used to estimate the influence of ERI on financial performance, with the following model:

$$\text{Model 1 – ROA: } \mathrm{ROA_{it}} = \alpha + \beta_1 \cdot \mathrm{ERI_{it}} + \varepsilon_{it}$$
$$\text{Model 2 – ROE: } \mathrm{ROE_{it}} = \alpha + \beta_2 \cdot \mathrm{ERI_{it}} + \varepsilon_{it}$$
$$\text{Model 3 – NIM: } \mathrm{NIM_{it}} = \alpha + \beta_3 \cdot \mathrm{ERI_{it}} + \varepsilon_{it}$$

Description:
i= unit (bank)
t= time (years)
α= regression constant
β= coefficient of influence of independent variables
ε= Error term.

The selection of the panel regression model was carried out through the Chow Test (CEM vs FEM), the Hausman Test (FEM vs REM), and the Lagrange Multiplier Test (CEM vs REM) to determine the best model.

RESULTS AND DISCUSSION

Classical Assumption Test

A classical assumption test is performed to ensure that the regression model of the panel data used is free of bias and meets the requirements of valid estimation. The tests in this study include normality tests and autocorrelation tests.

1. Normality Test

The normality test aims to assess whether the residual of the regression model is normally distributed. This is important to ensure the validity of statistical tests and parameter estimation. The method used is the Jarque-Bera Test, with a hypothesis of zero: normal distributed residual (Aditiya et al., 2023).

Table 4.1 Normality Test Results

Variable	ROA	ROE	NIM	Prob
ERI	0,664	0,701	0,664	0,00000

2. Autocorrelation Test

The autocorrelation test aims to identify whether the regression residual has a correlation with itself. Autocorrelation can decrease the efficiency of estimation and affect the validity of hypothesis tests (Wooldridge, 2010). The method used is the Durbin-Watson (DW) Test, with the following criteria:

- $-2 \leq DW \leq 2 \rightarrow$ No autocorrelation.

Table 4.2 Autocorrelation Test Results

Variable	DW Value	Conclusion
ROA	1,220607	No autocorrelation
ROE	1,433116	No autocorrelation
NIM	1,168308	No autocorrelation

Panel Data Estimation Model

Panel data regression allows for simultaneous analysis of data that is cross-temporal and cross-individual, as well as controlling for the heterogeneity of unobserved individuals (Hutagalung & Darnius, 2022).

1. Chow Test

The Chow test is used to choose between CEM and FEM. Zero hypothesis: CEM is more accurate than FEM. Decisions are made based on statistical F-values and p-values (Wooldridge, 2010).

Table 4.2 Model Estimation Results

Statistical Test	Variable	Test Statistics (Prob.)	Decision Criteria	Results	Selected Models
Chow Test	ROA	F = 19.272 (0.0000)	Prob. < 0.05 → minus H0 (FEM > Pooled)	FEM	FEM
	ROE	F = 81.046 (0.0000)	Prob. < 0.05 → minus H0 (FEM > Pooled)	FEM	FEM
	NIM	F = 44.547 (0.0000)	Prob. < 0.05 → minus H0 (FEM > Pooled)	FEM	FEM

Source: Output Results Eviews 12, (2025)
Remarks: The results show that FEM is more precise than CEM

2. Hausman Test

The Hausman test is used to choose between FEM and REM. Zero hypothesis: REM is more precise. If the p-value < 0.05 → select FEM; if > 0.05 → choose REM (Wooldridge, 2010).

Table 4.3 Model Estimates

Hausman Test	**ROA**	Chi-Sq. = 0.245 (0.6203)	Prob. > 0.05 → Failed to Reject H0 (REM)	REM	FEM (Priority)
	ROE	Chi-Sq. = 0.019 (0.8891)	Prob. > 0.05 → Failed to Reject H0 (REM)	REM	FEM (Priority)
	NIM	Chi-Sq. = 1.781 (0.1820)	Prob. > 0.05 → Failed to Reject H0 (REM)	REM	FEM (Priority)

Source: Output Results Eviews 12, (2025)
Description: Although the Hausman test supports REM, FEM is still prioritized because it is more robust in controlling for unobserved individual effects.

Panel Data Regression Estimation

Based on the results of the model selection test, the Fixed Effect Model (FEM) was selected as the most suitable model for analysis. The estimated parameters obtained from the FEM are shown in Table 4.4 below.

Table 4.4 Estimation of Panel Data Regression

Variable Dependency	Coefficients (β)	t-Statistic	p-value	Conclusion
ROA	0,009136	1,646	0,107	Insignificant (α=0.10)
ROE	-0,020401	-1,805	0,078	Significant
NIM	-0,005817	-1,304	0,200	Insignificant (α=0.10)

Source: Output Results Eviews 12, (2025)

Effect of Environmental Risk Index (ERI) on ROA

The regression results showed a positive coefficient of 0.009136 (t = 1.646; p = 0.107 > 0.10), indicating that there was no significant effect of ERI on ROA. These findings are in line with the studies of Weber (2016) and Ayuningtyas & Sufina (2023), which show that environmental risks have not had a significant impact on the profitability of bank assets in the short term. Despite positive trends, the implementation of green banking has not been proven to be able to increase ROA statistically.

Effect of Environmental Risk Index (ERI) on ROE

The analysis showed a negative coefficient of -0.020401 with a p-value of 0.078 (< 0.10), indicating a negative and significant influence of ERI on ROE. This indicates that increased environmental risks tend to lower equity returns. These findings are supported by Wrespatiningsih & Mahyuni (2022) and Anggraini et al. (2023), who

found that the initial costs of implementing green banking such as energy efficiency, process digitalization, and ESG reporting put pressure on net profit and ROE, especially in the short term.

Effect of Environmental Risk Index (ERI) on NIM

For NIM, a coefficient of -0.005817 with a p-value of 0.200 (> 0.10) was obtained, indicating that there was no significant effect of ERI on net interest margin. These findings are consistent with the results of Mayasari et al. (2021) and Febiola & Iqbal (2023), which emphasize that NIM is more influenced by external factors such as interest rate policy and market conditions, so green banking practices have not translated into operational gains or "green premiums". Overall, the results show that the impact of environmental risks on financial performance is indicative and long-term. ROE showed a significant negative response, while ROA and NIM were relatively neutral. These findings support previous research that emphasizes that the initial costs of implementing green banking can weigh on profits before long-term benefits are realized, in line with the literature of Weber (2016), Wrespatiningsih & Mahyuni (2022), and Anggraini et al. (2023).

CONCLUSION

This study shows that the Environmental Risk Index (ERI) has a different effect on the financial performance of banks: not significant to ROA and NIM, but negative and significant to ROE, indicating that the initial cost of implementing green banking has more impact on equity returns than asset profitability or interest margins. Variations in financial performance are more influenced by the bank's internal characteristics (firm-specific effects) than ERIs, as reflected by the high Adjusted R^2 FEM. Overall, these findings illustrate that the banking industry is in a transition phase, bearing the burden of green banking costs on ROE without fully realizing the operational benefits or product price advantages in the market.

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