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# The Effect of Green Banking Implementation and Financial Performance on Bank Profitability in Indonesia

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**Abstract:** This study aims to analyze the effect of green banking implementation and financial performance on the profitability of commercial banks in Indonesia in the period 2013-2023. This research uses a quantitative descriptive approach with secondary data obtained from the annual reports of eight commercial banks and other relevant literature. Data analysis was conducted using panel data regression, with the best model selection through Chow and Hausman tests. The results showed that GBDI, NPL, and BOPO had a significant negative effect on ROA. GBDI, which should encourage profitability, has a negative impact, indicating that the implementation of green banking is not optimal and requires time and long-term adaptation strategies. CAR and LDR did not show a significant effect on ROA. In conclusion, bank profitability in Indonesia has not been fully driven by green banking practices and other financial indicators consistently. Therefore, sustained commitment and a more comprehensive implementation strategy are needed to make green banking a sustainable driver of profitability.

**Keywords:** Green Banking, Financial Performance, Profit, Profitability

## INTRODUCTION

Modern banking in Indonesia, as in many other countries, faces increasingly complex challenges in integrating sustainable business practices with efforts to improve financial performance and profitability. One of the fastest growing concepts in this sector is green banking, which is a banking approach that emphasizes social and environmental responsibility in the implementation of its business activities. In this context, the role of financial performance and profitability becomes crucial, as the successful implementation of environmentally friendly practices cannot be separated from the bank's ability to continue achieving stable and sustainable economic growth.

Indonesia's banking industry has experienced rapid development over the past few decades and contributed significantly to national economic development. However, behind the massive economic growth come serious environmental challenges, such as increased greenhouse gas emissions, pollution and ecosystem degradation. As an important pillar in the economy, the banking sector is required to not only drive economic growth, but also take an active role in reducing negative impacts on the environment. Therefore, more and more banks

in Indonesia are starting to adopt green banking principles as a response to the growing environmental challenges.

According to Islam & Das (2013), green banking is a concept that supports environmentally friendly practices by reducing the carbon footprint of banking activities. This practice reflects ethical and responsible business behavior, not only encouraging innovation in the financial industry, but also influencing the social awareness and responsibility of other business actors. The implementation of green banking involves various measures, such as service digitization, sustainable project financing, environmental risk management, and optimization of resource use.

Indonesian regulations have also encouraged this direction of development through PBI No. 8/21/PBI/2006 and Bank Indonesia Circular Letter No. 8/22/DPbS, which emphasize the importance of prudence and sustainability in financing. Some banks have even implemented a financing selection policy based on the environmental impact of the proposed project, as explained by (Budiantoro, 2014). In other words, banks have the full right to refuse financing if the project being financed is considered potentially damaging to the environment.

In the midst of various environmental challenges faced by Indonesia, such as deforestation, water pollution, and natural resource degradation, the implementation of green banking is becoming increasingly relevant. In addition to strengthening public image and trust, this practice can also open up new opportunities in the development of sustainable financial products and services. However, the successful implementation of green banking is highly dependent on the bank's ability to maintain financial performance and profitability. Initial investment in green technology, for example, may incur short-term cost burdens, but on the other hand can reduce operational costs and environmental risks in the long run (Rachman & Saudi, 2021).

Profitability is a key indicator in assessing the financial health of banks. Measures such as Return on Assets (ROA), Return on Equity (ROE), and net profit are not only important for investors and shareholders, but also a concern for regulators to maintain financial system stability. Banks with high profitability are considered stronger in the face of economic risks and more capable of contributing to sustainable development.

A number of previous studies, such as those conducted by Ayu & Anityasari (2013), state that green banking commitment should not stop at corporate social responsibility (CSR) programs, but should be implemented comprehensively so that it does not become just a slogan. Banks are also expected to be role models for other industrial sectors in adopting sustainable development principles. In addition, Ahmad & Hassan (2019) study emphasizes that banks can contribute through financing for projects that support renewable energy, energy efficiency, and sustainable agriculture.

In Indonesia, although green banking practices have been adopted in various forms-from green lending to energy efficiency-further efforts are needed to raise the awareness and commitment of banking institutions (Handajani et al., 2019). These practices are proven to have a positive impact on the environmental, social and economic aspects of banking sustainability.

Against this background, this study aims to examine the effect of green banking implementation and financial performance on the profitability of commercial banks in Indonesia during the period 2013 to 2023. Through this research, it is expected to gain a deeper understanding of the dynamics between sustainability and financial performance, as well as provide practical and theoretical contributions to the development of sustainable banking strategies in the future.

## METHOD

This research uses a quantitative descriptive approach with secondary data obtained from bank annual reports, journals, articles, and relevant previous studies. The dependent variable used is Return On Asset (ROA), while the independent variables consist of Green Banking Disclosure Index (GBDI), Capital Adequacy Ratio (CAR), Non Performing Loan (NPL), Operating Expenses to Operating Income (BOPO), and Loan to Deposit Ratio (LDR). The object of research includes eight commercial banks in Indonesia. Data analysis was conducted using panel data regression, which includes selecting the best model through the Chow test (to determine the Common Effect or Fixed Effect model) and the Hausman test (to determine the Fixed Effect or Random Effect). After the best model is selected, further regression analysis and statistical tests, including F test, t test, and coefficient of determination ($R^2$), are conducted to determine the significant effect of each variable on ROA as well as the overall model feasibility.

## RESULTS AND DISCUSSION

### Results

First, descriptive statistics are carried out to describe or summarize the data that has been collected to make it easier to understand.

**Table 1. Descriptive Statistics**

| | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|
| ROA | 0.020000 | 6.200000 | 2.052125 | 1.493756 |
| GBDI | 0.380000 | 0.950000 | 0.702250 | 0.159810 |
| CAR | 12.34000 | 32.70000 | 19.32863 | 4.084740 |
| NPL | 0.080000 | 7.110000 | 2.427750 | 1.401690 |
| BOPO | 46.50000 | 111.0900 | 80.00450 | 14.70792 |
| LDR | 32.49000 | 102.7000 | 81.48513 | 12.61928 |

The results of descriptive statistics show that the ROA variable has the lowest ratio of 0.02 and the highest of 6.2 with a mean of 2.02 and a standard deviation of 1.49. GBDI has a ratio between 0.38 to 0.95, an average of 0.70 and a standard deviation of 0.15. CAR ranges from 12.34 to 32.7 with a mean of 19.32 and a standard deviation of 4.08. NPL has a value between 0.08 to 7.11, an average of 2.42 and a standard deviation of 1.40. BOPO has a range of 46.5 to 111.09 with a mean of 80.004 and a standard deviation of 14.70. While LDR has a ratio between 32.49 to 102.7, with an average of 81.48 and a standard deviation of 12.61.

Next, panel data regression analysis aims to measure and analyze the effect of independent variables on the dependent variable by utilizing data that combines the dimensions of time (time series) and individuals or entities (cross section).

**Table 2. Chow Test Results**

| Methods | Prob. Chi-Square | Decision | Description |
|---|---|---|---|
| *Chow Test* | 0,0000 | Ho rejected | *Fixed Effect* |

Based on the estimation results, the resulting probability value is 0.0000 <0.05, so Ho is rejected and Ha is accepted, which means that the more appropriate model is the Fixed Effect model. The second test that must be done is the Hausman Test to choose which model is more appropriate between Fixed Effect and Random Effect.

**Table 3. Hausman Test Results**

| Methods | Prob. Chi-Square | Decision | Description |
|---|---|---|---|
| *Hausman Test* | 0.0878 | Ho accepted | *Random Effect* |

By testing using the Hausman Test, the probability value of the Chi-square is 0.0878> 0.05. Thus the null hypothesis (Ho) is accepted, so that the better model used is the estimation with Random Effect. Therefore, LM testing will be carried out for the next test.

**Table 4. LM Test Results**

| Methods | *Cross Section Breusch Pagan* | Decision | Description |
|---|---|---|---|
| *LM Test* | 0.0013 | Ho rejected | *Random Effect* |

By testing using the LM Test, the probability value of the Chi-square is 0.0013 <0.05. Thus the null hypothesis (Ho) is rejected, so the better model to use is the Random Effect estimation.

Model Selection Conclusion. Based on the above tests, the Fixed Effect model has been selected 2 (two) times, namely in the Hausman Test and LM Test. Thus it can be concluded that of the three models (Common Effect, Fixed Effect, and Random Effect), the Random Effect model is better at interpreting panel data regression to answer research objectives.

Finally, panel regression analysis statistics aim to test and determine the effect of independent variables on the dependent variable by using data that is a combination of cross section data (between objects) and time series (between time).

**Table 5. Statistical Results of Panel Regression Analysis**

| Variable | Coefficient | T.Stat | Prob |
|---|---|---|---|
| **C** | 9.926691 | 9.585743 | 0.0000 |
| **GBDI (+)** | -1.763481 | -3.045000 | 0.0032 |
| **CAR (+)** | -0.010199 | -0.528129 | 0.5990 |
| **NPL (-)** | -0.144111 | -2.631388 | 0.0103 |
| **BOPO (-)** | -0.080739 | -10.29466 | 0.0000 |
| **LDR (+)** | 0.004545 | 0.776968 | 0.4397 |
| **R-squared** | 0.661235 | | |
| **Adjusted R-squared** | 0.638346 | | |
| **Prob(F-statistic)** | 0.000000 | | |

The results of the individual parameter significance test (t test) show that the GBDI variable has a negative coefficient of -1.7634 and is significant ($p < 0.05$), but the direction of the effect is not in accordance with the theory because it is negative, so it is concluded that GBDI has a significant but not positive effect on ROA. CAR also has a negative coefficient of -0.010 but is not significant ($p > 0.05$), so it has no effect on ROA. NPL has a significant negative effect on ROA with a coefficient of -0.1441 and $p < 0.05$, in accordance with theory. BOPO also has a significant negative effect on ROA with a coefficient of -0.080 and $p < 0.05$, in accordance with the theory. Meanwhile, LDR has a positive coefficient of 0.0045 but is not significant ($p > 0.05$), so it has no effect on ROA. Simultaneously (F test), all independent variables together have a significant effect on ROA ($p < 0.05$). The coefficient of determination ($R^2$) of 0.6383 indicates that 63.83% of ROA variation can be explained by GBDI, CAR, NPL, BOPO, and LDR variables, while the remaining 36.17% is explained by other variables outside the model.

## Discussion

### 1. Green Banking Disclosure Index (GBDI) to Return on Asset (ROA)

The statistical test results obtained an estimated coefficient of -1.7634 which means that an increase in GBDI by 1% will reduce ROA by 1.7634% and vice versa, reducing GBDI by 1% will increase ROA by 1.7634%. these results show that the statistical findings are not in accordance with the theory. The statistical t value is -3.045 with a prob of 0.0032 <0.05, so Ho

is rejected (Ha is accepted) so it can be concluded that GBDI is not proven to have a positive effect or a negative effect even though it is significant to ROA.

Although the research results are not in accordance with theory, these results are in line with the results of research conducted by Ratnasari et al. (2021) on the implementation of green banking and the financial performance of commercial banks in Indonesia, which in their research found that GBDI has a negative and significant effect on ROA. Other research conducted by Afifah et al. (2023) on the impact of green finance on profitability with credit risk as an intervening variable which found that the GBDI variable had a negative and significant effect on GBDI. and research conducted by Ramdani et al. (2023) which discusses the Impact of Green Banking Implementation, Financial Performance, and the COVID-19 Crisis on the Profitability of Islamic Banks in Indonesia. In his research, he found that the Green Banking (GB) variable has a negative and significant effect on profitability as measured using ROA.

However, the results of this study contradict research conducted by Tia et al. (2023), Al Maun & Rana (2020), Weber (2016), and Rachman & Saudi (2021) which found that the GBDI variable has a positive and significant effect on profitability as measured by ROA. The results of the study found a negative and significant GBDI value on ROA. This indicates that the implementation of green banking does not increase bank profitability, there are other factors that contribute to profitability. The results of research conducted by Puspitasari & Wulandari (2022) found that environmental performance has no significant impact on financial performance. This research conducted in Indonesia concluded that this could happen because banks in Indonesia are still not perfect in practicing green banking. It takes a long time to be able to implement a good green banking process.

**2. Capital Adequancy Ratio (CAR) to Return on Asset (ROA)**

The results showed that the estimated coefficient value of CAR is -0.010, which means that an increase in CAR by 1% will reduce ROA by 0.010% and conversely, a decrease in CAR by 1% will increase ROA by 0.010%. these findings show that the expected sign is not in accordance with the theory. The statistical t value is -0.5281 with a prob of 0.5990> 0.05 then Ho is accepted (Ha is rejected) so it can be concluded that CAR has no effect on ROA. Although the research results are not in accordance with the theory, these results are in line with the results of research conducted by Afifah et al. (2023) on the impact of green finance on profitability with credit risk as an intervening variable. Where the CAR variable has a negative and significant effect.

However, these results contradict research conducted by Ratnasari et al. (2021) regarding the implementation of green banking and financial performance at commercial banks in Indonesia where the CAR variable is positive and significant to ROA. CAR is not significant because banks must follow BI regulations which require banks to maintain CAR at a certain level. So that banks must prepare more funds to fulfill this ratio. High CAR must be balanced with good fund distribution. Although the capital owned by the bank is high, it will not affect the profitability of the bank because the bank will tend to be more careful in investing its funds.

**3. Non Performing Loan (NPL) to Return on Asset (ROA)**

From the results of data processing, the estimated coefficient of the NPL variable is -0.1441, which means that an increase in NPL of 1% will reduce ROA by 0.1441% and vice versa, reducing NPL by 1% will increase ROA by 0.1441%. the results of this finding show that the expected sign is in accordance with the theory. The t statistical value of -2.631 with a prob of 0.013 <0.05 then Ho is rejected (Ha is accepted) so it can be concluded that NPL has an effect on ROA. These statistical results are in line with research conducted by Tia et al.

(2023), Afifah et al. (2023), and Ramdani et al. (2023) where the results of the study found that the NPL variable had a negative and significant effect on ROA.

The greater the NPL variable, the bank must continue to allocate the cost of reserves and losses due to non-performing loans so that this will reduce the bank's ability to book profits. The higher the NPL value in Indonesian banking, the higher the potential for bank default, the higher the potential for default will reduce the Company's profits and will have an impact on decreasing profitability.

**4. Operating Expenses Operating Income (BOPO) on Return on Asset (ROA)**

From the processing results obtained the estimated coefficient of BOPO value of -0.080 which means that with an increase in BOPO by 1%, it will reduce ROA by 0.080% and vice versa, reducing BOPO by 1% will increase ROA by 0.080%. the results of this finding show that the expected sign is in accordance with the theory. With a statistical t value of -10.29 with a prob of 0.0000 <0.05, Ho is rejected (Ha is accepted) so it can be concluded that BOPO has a significant effect on ROA.

These results are in line with research conducted by Ratnasari et al. (2021), Afifah et al. (2023), Anggraini et al. (2020), Ramdani et al. (2023). Where previous studies used BOPO to measure bank profitability and get negative and significant results in accordance with the theory of BOPO on profitability. The magnitude of the BOPO ratio can be one measure for banks to carry out cost efficiency and in an effort to increase banking profitability. To try to increase profitability, banks must be able to reduce BOPO by making efficiency and increasing operating income both from interest income through lending and non-interest income or Fee Based Income. If banks can be efficient in reducing their operating costs, banks can reduce losses due to bank inefficiency in terms of managing their business.

**5. Loan To Deposit Ratio (LDR) to Return on Asset (ROA)**

The results of data processing obtained an estimated coefficient of 0.0045 which means that with an increase in LDR by 1%, it will increase ROA by 0.0045% and conversely reduce LDR by 1%, it will reduce LDR by 0.0045%. the results of this finding show that the expected sign is in accordance with the theory. The statistical t value is 0.7769 with a prob of 0.4397> 0.05, so Ho is accepted (Ha is rejected) so that it can be concluded that the research results conclude that LDR has no effect on ROA. The results of this study contradict research conducted by Ratnasari et al. (2021) who used the LDR variable in their research and found that LDR has a positive and significant effect on ROA.

However, the results of this study are in line with research conducted by Tia et al. (2023), Ratnasari et al. (2021), Anggraini et al. (2020) who used the LDR variable in their research and found that LDR has a positive but insignificant effect on banking profitability as measured by ROA. A high LDR is an indicator of the bank's ability to channel funds raised to credit recipients and if the quality is good, it will bring in interest income which contributes significantly to profit. However, a high LDR number will also show the weakness of the bank in collecting third party funds and lending in large amounts which increases risk assets. Because a high LDR can have a positive impact as well as increase the risk of the bank.

## CONCLUSION

Based on the results of research on the effect of Green Banking implementation and financial performance on bank profitability in Indonesia, it is concluded that the Green Banking Disclosure Index (GBDI) variable has a negative and significant effect on Return on Assets (ROA), thus not supporting the initial hypothesis. The Capital Adequacy Ratio (CAR) variable also shows a negative, but insignificant effect on ROA. Meanwhile, the Non Performing Loan (NPL) and Operating Expenses of Operating Income (BOPO) variables are proven to have a

negative and significant effect on ROA, indicating the importance of credit risk management and operational efficiency. In contrast, the Loan to Deposit Ratio (LDR) variable has a positive but insignificant effect on ROA. The policy implications of these findings include the need for bank management to be more careful in applying green banking principles so as not to sacrifice profitability, improve credit risk management, and encourage operational efficiency through technological innovation. In addition, banks need to carry out the intermediary function optimally while still paying attention to liquidity risk in lending. For future research, it is recommended to extend the observation period or use monthly data to obtain more detailed information, add other variables related to financial performance and green banking implementation, group banks based on the level of green banking implementation and asset size, and try different analytical approaches to get more comprehensive results.

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