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GREEN BANKING DISCLOSURE INDEX: UNLOCKING PROFITABILITY POTENTIAL IN INDONESIA'S ISLAMIC COMMERCIAL BANKING

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Abstract: Green banking, which integrates sustainability into financial practices, has gained global traction but faces adoption barriers, particularly in emerging economies like Indonesia. While prior studies explore green banking's role in financial stability, limited research examines its direct impact on Islamic commercial banks' profitability. This study fills that gap by analyzing the relationship between green banking disclosure and profitability (measured by ROA) in nine Indonesian Islamic commercial banks from 2019 to 2022. Using secondary data from the Financial Services Authority and bank annual reports, the study employs the Green Banking Disclosure Index (GDBI) to quantify green banking implementation. Findings reveal that green banking contributes to long-term sustainability but has no significant short-term effect on profitability. However, the expansion of ATM networks positively influences profitability through increased fee-based income. This study advances the literature by highlighting the profitability dynamics of green banking in Islamic finance, an area previously underexplored. It advocates for stronger regulatory incentives, enhanced sustainability reporting, and greater emphasis on carbon emissions management and waste recycling to align with global sustainability goals while ensuring long-term profitability.

Keywords: Green Banking Disclosure Index, Return on Assets, Profitability, Islamic Commercial Banks

INTRODUCTION

Green banking is increasingly acknowledged as a fundamental component of sustainable financial systems, promoting environmental responsibility while maintaining economic viability. Globally, financial institutions are embracing green banking to align their operations with the Sustainable Development Goals (SDGs), particularly in addressing climate change and environmental degradation. This shift is not solely ethical but also strategic, as green banking offers a competitive edge in a market where stakeholders demand greater environmental accountability. For Islamic commercial banks, the concept holds even deeper relevance, as it inherently aligns with Shariah principles that advocate for environmental preservation, justice, and sustainable development (Dusuki & Abdullah, 2007).

In Indonesia, the Islamic banking sector has grown significantly, supported by the country's status as the largest Muslim-majority nation and its expanding Islamic finance industry (OJK, 2021). The Financial Services Authority (OJK) has emphasized sustainability in financial services through its Roadmap Keuangan Berkelanjutan and green taxonomy frameworks, aimed at guiding financial institutions toward environmentally friendly practices (OJK, 2021). Despite these initiatives, the adoption of green banking practices in Islamic commercial banks remains inconsistent and limited. Studies suggest that Islamic banks lag behind conventional banks in implementing and disclosing green banking practices, largely

due to varying operational priorities and resource limitations (Hasanah & Hariyono, 2022).

The Green Banking Disclosure Index (GBDI) serves as a structured framework for assessing the extent to which financial institutions disclose their green banking initiatives (Meena, 2020). It is a critical tool for evaluating transparency and commitment to sustainable practices within the banking sector. While GBDI has been widely used in studies of conventional banking systems to analyze the correlation between green banking practices and financial performance (Hoque et al., 2022), its application in the Islamic banking sector remains underexplored, particularly in Indonesia. Many Islamic banks in the country are still in the nascent stages of integrating sustainability into their operational frameworks, with limited focus on comprehensive green banking practices. Disclosures related to sustainability are often confined to broad corporate social responsibility (CSR) reports, which lack specificity and fail to highlight measurable green banking initiatives (Hasanah & Hariyono, 2022).

Additionally, the unique operational and ethical frameworks of Islamic banks, such as Shariah compliance and profit-and-loss sharing mechanisms, are not sufficiently reflected in the GBDI metrics, leading to challenges in accurately assessing their environmental contributions (Dusuki & Abdullah, 2007). Existing literature primarily examines the impact of green banking practices on financial performance in conventional banking. For example, Haniffa & Hudaib (2007) and Khan et al. (2020) report a positive correlation between green initiatives and profitability. However, research focusing on Islamic

banks is limited and tends to prioritize compliance, theoretical frameworks, or qualitative assessments over empirical studies on profitability metrics. Furthermore, the unique operational characteristics of Islamic banks, such as the prohibition of interest (riba) and the emphasis on ethical investments, create a distinct context where the financial implications of green banking disclosures might differ from conventional banks. From a regulatory standpoint, while OJK has introduced frameworks to promote sustainability in Indonesia's financial sector, their specific impact on Islamic banks remains unclear. Previous studies, such as Hossain et al. (2016) and Mohammed et al. (2021), highlight the importance of transparent green banking disclosures but focus predominantly on conventional banks or general financial institutions, leaving a critical gap in understanding how these disclosures affect profitability in Islamic banking.

This research addresses these gaps by analyzing the relationship between green banking disclosure, as measured by the GBDI, and financial performance in Indonesia's Islamic commercial banking sector. Specifically, it investigates whether banks that disclose green banking practices more transparently achieve higher profitability, measured through return on assets (ROA) and return on equity (ROE). Despite these developments, empirical research on the relationship between green banking practices and profitability, particularly in the Islamic banking sector in Indonesia, remains limited. Existing studies often focus on conventional banks or lack a comprehensive analysis of green banking's financial implications. To address this gap, the present study examines the influence of green banking practices on the profitability of Islamic commercial banks in Indonesia from 2019 to

2022. Using the Green Banking Disclosure Index (GBDI) as a measure of green banking practices and Return on Assets (ROA) as profitability metric, the study seeks to provide empirical evidence on whether green banking contributes to financial performance in this unique operational context.

Previous studies on green banking have explored its implementation and impact on financial performance across different banking sectors and countries, yet significant research gaps remain in the context of Indonesian Islamic banking. Al-Kubaisi and Abu Khalaf (2023) and Hoque et al. (2022) focused on conventional banking, using panel regression to assess the relationship between green banking and profitability, but did not specifically examine Islamic banks. Febiola et al. and Hasanah & Hariyono analyzed green banking implementation in Indonesia's Islamic banks but did not quantify its impact on profitability. Similarly, studies by Anggraini et al. (2020) and Nabila & Wahyu examined green banking's influence on profitability but did not specifically focus on Islamic banking or utilize the Green Banking Disclosure Index (GBDI) as a measurement tool. Additionally, Sharmeen & Yeaman (2020) compared green banking benefits for conventional and Islamic banks in Bangladesh, while Septa (2020) analyzed its application in Bank Muamalat but lacked a broader industry-wide profitability analysis. Given these gaps, this study fills the void by quantitatively measuring the impact of green banking on the profitability of Indonesian Islamic commercial banks, incorporating GBDI and Return on Assets (ROA) as key variables over the 2019–2022 periods, thus providing new insights into the effectiveness of green banking in the Islamic banking sector.

By focusing on the intersection of green banking and profitability, this study contributes to the growing discourse on sustainable finance and its applicability within Islamic banking. The findings are expected to provide actionable insights for regulators, practitioners, and policymakers, promoting the adoption of green banking practices as a strategy to enhance both financial and environmental outcomes. Ultimately, this research aims to bridge the gap between sustainability and profitability in Indonesia's Islamic banking landscape, aligning with the broader objectives of Islamic finance to achieve ethical and sustainable growth.

Understanding Green Banking

The World Bank defines "green banking" as a practice that integrates sustainability into banking operations to promote environmentally and socially responsible activities (World Bank, 2012). A bank will create its output, competitive advantage, strong corporate identity, and positive image when it implements the concept of green banking in order to meet predefined goals. Implementing green banking fosters long-term competitiveness by aligning banking operations with sustainable practices and enhancing stakeholder trust. Bank Indonesia emphasizes that green banking involves providing financial support to environmentally sustainable business activities, reinforcing the banking sector's role in achieving national sustainability goals (Bank Indonesia, 2020).

The triple bottom line of banking accountability refers to the integration of these three pillars. The TBL framework ensures that green banking not only drives economic outcomes but also advances social and environmental objectives (Elkington, 1997). The

fundamental idea behind green banking is to push banks to expand their portfolio of environmentally friendly loans while also enhancing their risk management capacities, particularly with regard to environmental risks. Green banking involves offering eco-friendly financial products and improving risk management to mitigate environmental risks, fostering a balance between financial performance and sustainability (Bose, 2016). Bose (2016) identifies key indicators of green banking practices, which align with global sustainability standards, such as the Global Reporting Initiative (GRI) and Indonesia's POJK No. 51 of 2017, to measure the Green Banking Disclosure Index effectively, like Carbon emission, Green Rewards, Green Building, Reuse/Recycle/Refurbish, Paper work or paperless, Green Investment.

Understanding Profitability

Profitability reflects the effectiveness of a company's decisions and policies in generating net income, as explained by Brigham and Houston (2013). Establishing profitability can be done by computing different pertinent benchmarks. Financial ratios, including profitability ratios, are widely utilized to assess a company's operational efficiency, earning potential, and overall financial stability (Gitman & Zutter, 2015). The profit made from investments and sales serves as a gauge for this. Profitability ratios serve as metrics to determine a company's success in generating income, reflecting managerial efficiency in utilizing resources (Brigham & Houston, 2013). Profitability ratios, such as Return on Assets (ROA), highlight a company's ability to efficiently utilize its assets for profit generation (Ross et al., 2021).

In this study, researchers use ROA to measure profitability because ROA is a widely accepted measure of profitability, focusing on a company's ability to generate net income relative to its total assets (Gitman & Zutter, 2015). ROA is also one of the indicators that measure the success of the company in generating profits. So, a higher ROA indicates superior financial performance, reflecting greater efficiency in asset utilization for profit generation (Ross et al., 2021). ROA evaluates how well a company's investments in assets contribute to its profitability, making it a critical metric in financial analysis (Brigham & Houston, 2013).

Shaumya and Arulrajah (2017) found that implementing green banking practices had a positive and significant influence on the environmental performance of Sri Lankan banks by fostering environmental preservation and enhancing corporate image. Green banking practices align banks with environmental preservation initiatives, improving their reputation and stakeholder trust (Shaumya & Arulrajah, 2017). In line with that, Uwuigbe et al. (2018) observed that the adoption of sustainability reporting positively influenced Nigerian banks' financial performance by reflecting their commitment to social and environmental responsibilities.

However, Rajput et al. (2014) found that green banking practices in India had yet to influence on financial performance. The study explains that the practice of green banking in India due to its nascent stage requiring substantial effort for measurable outcomes. Bessong and Tapang (2012) highlighted that green banking practices imposed additional costs on Nigerian banks, thereby negatively affecting their profitability despite their social benefits. Bose (2016)

identified green banking indicators, such as carbon emissions and green investments, which are aligned with the GRI 4.00 standards to measure the Green Banking Disclosure Index effectively.

H0: The relationship has no effect between green banking and profitability.

H1: The relationship has an effect between green banking and profitability.

Chaarani & Abiad (2018) found that ATMs positively impact bank performance in Lebanon, as customers prefer ATMs over branch visits. Similarly, Ramila & Gurusamy (2015) reported that ATMs significantly influence public, private, and foreign banks in India. However, Jatana & Jain (2020) observed an opposite trend: despite a decrease in ATM numbers over three years, the profitability of Indian commercial banks increased, suggesting that ATM presence may not directly correlate with profitability in the context of green banking. This result can be obtained because based on the data, the number of ATMs decreased from the 3-year study period while the profitability of commercial banks in India increasednking and the profitability of commercial banks in India obtained the opposite result. This result can be obtained because based on the data, the number of ATMs decreased from the 3-year study period while the profitability of commercial banks in India increased.

H0: The relationship has no effect between number of ATM unit and profitability.

H1: The relationship has an effect between number of ATM unit and profitability.

METHODS

This study utilizes secondary data in the form of annual time series data from 2019 to 2022 published by the Financial Services Authority and the Annual Report through the official website. The sample in this study consists of nine Islamic Commercial Banks. The banks are Bank Mu'amalat, Bank Syariah Indonesia, Bank Central Asia Syariah, Bank Mega Syariah, Bank Bukopin Syariah, BTPN Syariah, Bank Panin Dubai Syariah, BJB Syariah, Bank Victoria Syariah. The criteria for determining the research sample are as follows:

a. The Islamic banking sector that publishes complete financial statements during the 2019-2022 period.
b. Banking that applies the concept of green banking.
c. Banks that provide comprehensive financial dan transactional data, including ATM transaction volumes, e-banking activity, and net profit figures, necessary for this research.

Based on the problems found, this research is a type of quantitative research panel data registration analysis. This study used documentation techniques. This information was downloaded from the annual reports of Islamic Commercial Banks and the Financial Services Authority website. The model examines financial performance and the relationship between green finance and profitability:

$$ROA_{it} = \beta o + \beta 1\ GBDI_{it} + \beta 2\ Number\ of\ ATM\ Units_{it} + a_{it} + \varepsilon_{it}$$

ATM = Automated Teller Machine

ROA = Return on Asset,

GB = Green Banking,

i = The abundance of banking,

t = The number of years,

β_{oi} = Coefficient intercept, $\beta_{1,}$ $\beta_{2,}$ ... β_n = Cophicin slopes,

ε_{it} = Error.

Panel data combines time series and cross-sectional data. To find out the most efficient method of the three equation models, namely the Common Effect Model (CEM), Fixed Effect Model (FEM) and Random Effect Model (REM), each model needs to be tested using the panel data regression estimation method as follows:

Common Effect Model (CEM)

The regression results using the Common Effect Model (CEM) reveal that the constant value is estimated at -0.868136 with a probability of 0.7888, indicating it is not statistically significant. This means the constant alone cannot reliably predict the profitability of Islamic Commercial Banks when all independent variables are zero. The Adjusted R-squared value of 0.154630 shows that only 15.46% of the variation in profitability is explained by Green Banking Discolusre Index and the Number of ATM Units, while the remaining 84.54% is influenced by other factors outside the model, such as macroeconomic conditions, market competition, and operational efficiency.

Table 1: CEM Result

Dependent Variable: Y
Method: Panel Least Squares
Date: 01/05/24 Time: 12:00
Sample: 2019 2022
Periods included: 4
Cross-sections included: 9
Total panel (balanced) observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.868136	3.214155	-0.270098	0.7888
X1	8.165338	4.001208	2.040718	0.0493
X2	-0.832555	0.348706	-2.387553	0.0228

R-squared	0.202936	Mean dependent var	1.586667
Adjusted R-squared	0.154630	S.D. dependent var	3.844810
S.E. of regression	3.535073	Akaike info criterion	5.443000
Sum squared resid	412.3925	Schwarz criterion	5.574960
Log likelihood	-94.97401	Hannan-Quinn criter.	5.489058
F-statistic	4.200985	Durbin-Watson stat	0.629690
Prob(F-statistic)	0.023694		

Source: Data processed with Eviews version 13

The low Adjusted R-squared suggests that the Common Effect Model is insufficient for capturing the relationship between Green Banking and profitability, as it assumes homogeneity across banks. This simplification overlooks the unique characteristics of individual banks, making the CEM a less realistic choice for analyzing the 2019-2022 periods.

Random Effect Model (REM)

The regression analysis using the Random Effect Model (REM) shows a constant value of 3.722528 with a probability of 0.2802, indicating it is not statistically significant. The Adjusted R-squared value of 0.084877 suggests that only 8.49% of the variation in profitability is explained by Green Banking Disclosure Index and the Number of ATM Units, while 91.51% is influenced by unobserved factors such as macroeconomic conditions, competition, or regulatory

changes. The low explanatory power and lack of significance in the constant term suggest that REM may not adequately capture the relationship between Green Banking and profitability. Its assumption that unobserved differences across banks are random and uncorrelated with the explanatory variables appears unrealistic, given the likely influence of unique bank-specific characteristics.

Table 2: REM Result

Dependent Variable: Y
Method: Panel Least Squares
Date: 01/05/24 Time: 12:04
Sample: 2019 2022
Periods included: 4
Cross-sections included: 9
Total panel (balanced) observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.004618	3.749774	1.334645	0.1940
X1	0.734783	3.294954	0.223002	0.8253
X2	-0.884941	0.478157	-1.850734	0.0761

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.848410	Mean dependent var	1.586667
Adjusted R-squared	0.787775	S.D. dependent var	3.844810
S.E. of regression	1.771225	Akaike info criterion	4.227688
Sum squared resid	78.43093	Schwarz criterion	4.711541
Log likelihood	-65.09838	Hannan-Quinn criter.	4.396565
F-statistic	13.99189	Durbin-Watson stat	2.849974
Prob(F-statistic)	0.000000		

Source: Data processed with Eviews version 13

Thus, the REM oversimplifies the complexities of this relationship. A Fixed Effect Model (FEM) or advanced econometric approaches, such as dynamic panel data models, may provide more accurate insights by accounting for bank-specific heterogeneity and

temporal dependencies. Future studies should explore alternative analytical models to provide a deeper understanding of the relationship between green banking practices and profitability.

Fixed Effect Model (FEM)

The Fixed Effect Model (FEM) regression results provide significant insights into the relationship between green banking practices, the number of ATM units, and profitability in Islamic commercial banks from 2019 to 2022. The constant value, estimated at 5.004 with a probability of 0.1940, is not statistically significant and should be interpreted cautiously. However, the Adjusted R-squared value of 0.787775 demonstrates strong explanatory power, with 78.78% of the variation in profitability explained by the independent variables, while the remaining 21.22% is influenced by unobserved factors like operational efficiency or macroeconomic conditions. The FEM is preferable because it accounts for unique, time-invariant bank-specific characteristics, such as management quality or regional factors that might otherwise bias results.

Table 3: FEM Result

Dependent Variable: Y
Method: Panel EGLS (Cross-section random effects)
Date: 01/05/24 Time: 12:09
Sample: 2019 2022
Periods included: 4
Cross-sections included: 9
Total panel (balanced) observations: 36
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.722528	3.390929	1.097790	0.2802
X1	1.939869	3.063568	0.633206	0.5310
X2	-0.803065	0.396659	-2.024574	0.0511

Effects Specification	S.D.	Rho
Cross-section random	3.443878	0.7908
Idiosyncratic random	1.771225	0.2092

Weighted Statistics			
R-squared	0.137170	Mean dependent var	0.395163
Adjusted R-squared	0.084877	S.D. dependent var	1.832938
S.E. of regression	1.753427	Sum squared resid	101.4587
F-statistic	2.623117	Durbin-Watson stat	2.239463
Prob(F-statistic)	0.087653		

Unweighted Statistics			
R-squared	0.143554	Mean dependent var	1.586667
Sum squared resid	443.1162	Durbin-Watson stat	0.512761

Source: Data processed with Eviews version 13

Unlike the Common Effect Model (CEM) and Random Effect Model (REM), FEM provides a more robust framework by controlling for unobserved heterogeneity, offering a more accurate understanding of how Green Banking and ATM Units influence profitability. In conclusion, the FEM's ability to capture these dynamics and its high explanatory power make it the most realistic and reliable model for analyzing the impact of Green Banking practices on profitability in the diverse and complex context of Islamic Commercial Banks.

RESULT AND DISCUSSION

The Result of The Chow Test

Table 4: The Result of Chow Test

Effect Test	Statistic	d.f	Prob
Cross-Section F	13.306357	(8,25)	0,0000

Source: Data processed with Eviews version 13

The Chow Test results confirm that the Fixed Effect Model (FEM) is the most appropriate for this study, as the probability value of the cross-section F statistic (0.0000) is below the 0.05 significance threshold, leading to the rejection of the Common Effect Model (CEM). This indicates significant differences among Islamic Commercial Banks that must be accounted for, likely due to variations in management strategies, regional economic conditions, and operational efficiency. By using FEM, the analysis effectively controls for these cross-sectional differences, ensuring more accurate estimations of the impact of Green Banking Disclosure Index and the Number of ATM Units on profitability. This methodological rigor prevents oversimplification and enhances the reliability of the findings, providing a clearer understanding of green banking's role in shaping bank profitability during the 2019-2022 period.

Table 5: The Result of HaussmanTest

Test Summary	Chi-Sq. Statistic	Chi-Sq.d.f	Prob
Cross-Section Random	1.340127	2	0.5117

Source: Data processed with Eviews version 13

The Haussman Test results (p-value = 0.5117) suggest that the Random Effect Model (REM) is appropriate, as the null hypothesis cannot be rejected. However, the study ultimately selects the Fixed Effect Model (FEM) based on the Chow Test results, which indicate significant cross-sectional differences among Islamic Commercial Banks. FEM better captures these differences and controls for unobserved heterogeneity, ensuring more reliable estimates of the impact of Green Banking practices and the Number of ATM Units on profitability. While REM is efficient under certain assumptions, FEM provides a more accurate analysis for the 2019–2022 periods by addressing bank-specific factors that could influence the results.

Classical Assumption Test

After determining the right model to be used in panel data regression equations is the Fixed Effect Model (FEM), it is necessary to test it with classical assumption tests, classical assumption test consists of multicollinearity test, with the following explanation:

a. Multicollinearity Test

The multicollinearity test results show a low correlation (0.177206) between Green Banking Disclosure Index (X1) and the Number of ATM Units (X2), far below the 0.85 threshold, confirming the absence of multicollinearity. This ensures that both independent variables can coexist in the regression model without distorting coefficient estimates, allowing for a precise measurement of their individual impact on profitability. With no multicollinearity concerns, the analysis remains reliable and interpretable, strengthening the study's credibility in examining the relationship between Green

Banking practices, ATM Units, and the profitability of Islamic Commercial Banks from 2019 to 2022.

Table 6: The Result of Multicollinearity Test

Variabel	VIF
Green Banking (X1)	0,177206
Number of ATM Units (X2)	0,177206

Source: Data processed with Eviews version 13

Hypothesis Test

The hypothesis testing conducted in this study involves three primary tests to evaluate the model's overall performance and the significance of individual predictors. These tests include the Adjusted Coefficient of Determination (R^2), the simultaneous test (F-test), and the partial test (t-test), applied within the framework of a panel data regression model using the Fixed Effect Model (FEM). The detailed interpretation of these tests is as follows:

a. Adjusted Coefficient of Determination Test R^2

The Adjusted R^2 value of 0.787775 indicates that 79% of profitability variation in Islamic Commercial Banks during 2019–2022 is explained by the Green Banking Disclosure Index and the Number of ATM Units, demonstrating a strong relationship. The remaining 21% is influenced by unexamined factors like macroeconomic conditions and regulatory policies. These findings highlight the potential of Green Banking initiatives and ATM optimization to enhance sustainability, attract eco-conscious customers, and improve profitability. The model's high explanatory power underscores its reliability while

suggesting future research should explore additional influencing factors for a more comprehensive analysis.

b. The Result of F-Test (Simultan Test)

The F test results indicate that the Green Banking Disclosure Index and Number of ATM Units have a significant joint impact on profitability in Islamic Commercial Banks during 2019–2022. The F-value of 13.99189 exceeds the F-table value of 3.2849, with a probability of 0.0000 ($p < 0.05$). This confirms a meaningful relationship, rejecting the null hypothesis of no joint effect. These findings highlight the importance of sustainability initiatives and efficient ATM networks as key drivers of profitability. Green Banking practices can enhance reputation and attract environmentally conscious customers, while an optimized ATM network improves accessibility, customer satisfaction, and revenue potential. For Islamic banks, these results underscore the need to prioritize both sustainability and operational efficiency. By addressing these factors together, banks can achieve stronger financial performance and align with broader environmental and customer-focused goals.

c. The Result of T-Test (Partial Test)

1) Green Banking Disclosure Index

The Green Banking Disclosure Index variable has been analyzed using a T-Test to assess its impact on profitability, specifically Return on Assets (ROA). Based on the results, the calculated t-value for the Green Banking Disclosure Index is 0.223002. This value is compared to the negative critical value from the t-distribution table, which is -1.690924. As we observe, the calculated t-value of 0.223002 is greater than the negative critical t-value of -1.690924, indicating that the test

statistic does not fall in the rejection region of the hypothesis test. Additionally, the probability value (p-value) for this t-test is 0.8253, which is greater than the commonly used significance level of 0.1. In hypothesis testing, a p-value greater than the significance level means that we fail to reject the null hypothesis. The null hypothesis in this context likely posits that there is no significant relationship between the Green Banking Disclosure Index and profitability (ROA). Given these results, it can be concluded that there is no statistically significant effect of the Green Banking Disclosure Index on profitability (ROA) at the 10% significance level. Therefore, any increase in the Green Banking Disclosure Index variable does not lead to a noticeable change in the Profitability (ROA) variable. This suggests that while the Green Banking Disclosure Index may be an important indicator in other contexts, its direct impact on the profitability of firms in this particular study appears to be minimal or non-existent based on the current data and statistical analysis.

2) Number of ATM Units

The analysis reveals that the Number of ATM Units has a statistically significant negative effect on profitability (ROA) at the 10% significance level. The calculated t-value of -1.850734 is lower than the critical t-value of -1.690924, placing it within the rejection region of the null hypothesis. Additionally, the p-value of 0.0761, being below 0.1, confirms that the null hypothesis—stating no relationship between ATM units and profitability—should be rejected in favor of the alternative hypothesis, which suggests a significant impact. The negative t-value indicates an inverse relationship, meaning that a reduction in ATM units correlates with lower profitability. This may be

due to decreased customer accessibility, fewer transactions, or operational inefficiencies from a smaller ATM network. In practical terms, maintaining an optimal ATM presence is crucial to balancing accessibility and cost efficiency, ensuring stable financial performance.

The Relationship of Green Banking Disclosure Index to Bank Profitability

The study found that the adoption of green banking, measured by the Green Banking Disclosure Index (GDBI), does not significantly affect bank profitability (ROA). Regression analysis results show a t-statistic of 1.655927, which is lower than the negative t-table value of -1.690924, and a probability value of 0.1102, indicating no significant impact. This suggests that a decrease in GDBI would reduce profitability, but the effect remains statistically insignificant. The lack of impact is likely due to banks failing to meet key Green Economy indicators, such as carbon emission reduction and effective waste management (reuse, recycle, refurbish). Similar findings from Ainul Yaqin (-0.569707, p = 0.5721) and Gustika Nurmalia, Zuliansyah, and Muhammad Kurniawan (2021), green banking has no significant impact on the profits of Islamic Commercial Banks. The R-squared value of 0.2217 indicates that only 22.1% of profit variation is explained by green banking, with the remaining 77.9% influenced by other factors. A t-test result ($p = 0.0956 > 0.05$) confirms the insignificance. This may be due to the relatively recent implementation of green banking (starting in 2019) and the continued reliance on electricity and paper in daily operations. Kashfia Sharmeen and Ahsan Mahbub Yeaman (2020) examined the benefits of green banking for Islamic and conventional banks in Bangladesh. Their findings reveal

that while Islamic banks gain more from green compliance, they show lower adherence to green banking codes compared to conventional banks. Company size and board independence significantly influence compliance, whereas governance has no notable effect on either type of bank. Additionally, external factors like COVID-19 economic downturns, ROA variations across banks, and pandemic-related losses, such as those faced by Panin Dubai Syariah Bank, further weaken the relationship between green banking and profitability. While some studies (e.g., Diah Lestari and Meilani Wulandari) argue that green banking can enhance profitability, they highlight its long-term rather than short-term benefits. This aligns with the view that green investments contribute to financial stability over time, but current inconsistent implementation and regulatory challenges hinder immediate profitability gains.

The Relationship of the Number of ATM Units to Bank Profitability

This study finds that the number of ATM units influences bank profitability, as panel data regression analysis shows a t-value of -1.850734 (t-table = -1.690924) and a probability of 0.0761, indicating a significant impact on ROA. While ATMs enhance customer access by enabling round-the-clock transactions, their high operational costs and transaction fees can negatively affect profitability. Supporting studies by Maylasofa & Lediana (2020), Pradivta & Sundari (2020), and Hani El Chaarani (2021) confirm that ATM expansion improves financial performance, while Adinda Nabila & Puspitasari (2021) and Anggi Rahma & Rachmad Kresna (2021) found a similar effect in Indonesia. However, some research, such as Rubaeni (2022), suggests that ATM

proliferation may not always boost profits if operational costs surpass transaction revenue. Likewise, in accordance with the research of Siahaan (2021) that Green Banking has no effect on the value of the Company, it indicates that the implementation of green banking does not increase bank profitability, there are other economic factors that contribute to the research. Similarly, Ghaith N, Bassam Al-Own, and Tareq Bani Khalid (2022) found no significant correlation in Jordan, emphasizing that leverage and bank size might play a more decisive role in profitability. Ultimately, while ATMs generate fee-based income and enhance financial inclusion, their impact depends on efficient management, cost control, and strategic deployment, highlighting the need for innovative banking policies to optimize profitability.

Implication Results

Green banking plays a crucial role in promoting sustainability by integrating eco-friendly policies within financial institutions. This approach aligns with stakeholder theory, which prioritizes the interests of all stakeholders over profit maximization, and legitimacy theory, which emphasizes aligning business operations with societal expectations. By implementing green banking, Islamic banks can demonstrate environmental responsibility, improve their reputation, and foster long-term financial growth. However, compared to international banks, Islamic Commercial Banks in Indonesia have been slow to adopt green banking, primarily due to delayed regulatory support and financial constraints.

Empirical research confirms that green banking positively influences profitability. Pradivta & Sundari (2020) found that sustainable banking

strategies lead to better financial performance. However, the COVID-19 pandemic (2019-2022) posed challenges, increasing operating costs and temporarily lowering profitability. Despite these short-term setbacks, the long-term integration of green banking is expected to benefit both financial performance and environmental sustainability. The OJK Regulation No. 51 (2017), aligned with the Paris Climate Agreement, has played a significant role in accelerating green banking adoption in Indonesia, although banks still face difficulties in securing adequate funding for full implementation.

From an Islamic perspective, green banking is strongly supported by Maqashid Sharia theory, which mandates the preservation of key elements such as religion, life, intellect, wealth, and descendants. By adopting green banking, Islamic banks fulfill both social and ethical obligations, ensuring financial stability while contributing to environmental conservation. Moving forward, clear policies, financial incentives, and improved regulatory frameworks are needed to strengthen green banking practices in Indonesia. With stronger commitment from regulators, banks, and policymakers, green banking can drive sustainable economic growth while maintaining environmental responsibility.

To enhance green banking adoption, banks and financial institutions should integrate digital banking solutions to minimize paper use, develop transparent sustainability reports to attract eco-conscious investors, and offer green financial products like eco-friendly home financing or green sukuk. Regulators (OJK, BI, and the government) should provide financial incentives such as tax reductions and low-interest green loans, strengthen regulatory frameworks for

sustainability compliance, and facilitate public-private partnerships to boost investment in green projects. Meanwhile, researchers and academics should investigate the long-term financial impact of green banking on Islamic banks, analyze regulatory effectiveness for improvement, and develop Maqashid Sharia-based sustainability indicators to assess green banking's role in Islamic finance. By implementing these recommendations, Indonesia's banking sector can achieve sustainable growth while maintaining financial stability and environmental responsibility.

CONCLUSION

The findings of this study indicate that the implementation of green banking, as measured by the Green Banking Disclosure Index (GBDI), does not have an immediate effect on the profitability of Islamic commercial banks as measured by Return on Assets (ROA). However, the adoption of green banking through technological advancements, such as expanding ATM networks and reducing paper-based transactions, enhances efficiency and contributes to long-term profitability. This suggests that banks adopting green banking through technological advancements can lower operational costs, reduce energy consumption, and transition to paperless transactions, ultimately enhancing financial performance over time.

To strengthen green banking implementation, policymakers should refine existing regulations and introduce new policies requiring comprehensive sustainability reporting. The relevant authorities must encourage Islamic banks to complete GBDI indicators, including

carbon emissions, waste management, and green financing disclosures. Additionally, banks should innovate by incorporating eco-friendly financing schemes and integrating sustainability into their core business strategies. Strengthening stakeholder engagement through public awareness campaigns and partnerships with environmental organizations can further align green banking practices with national sustainability goals.

Future research should examine the long-term effects of green banking on profitability and financial stability, considering different economic conditions and market trends. Comparative studies between Islamic and conventional banks can provide insights into sector-specific sustainability practices and regulatory effectiveness. Additionally, alternative green banking measurement tools, such as the Bose Discovery Indicators or GRI 4.00, should be explored to enhance the accuracy and reliability of sustainability assessments. By addressing these areas, future research can provide a more comprehensive understanding of how green banking contributes to financial and environmental sustainability in the Islamic banking sector.

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