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Original Research Article

The Impact of Green Banking on Profitability of Indonesia's Islamic Commercial Banks

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ABSTRACT

The intensifying competition within the banking industry has driven institutions to adopt strategies that not only focus on profitability but also uphold sustainability values. Among these initiatives, green banking; representing a form of green investment within the Islamic financial framework; has become a key approach. This study investigates how green banking practices, and the number of ATMs affect the profitability of Islamic commercial banks in Indonesia, using Return on Assets (ROA) as the performance measure for the 2019–2024 period. Using a quantitative approach, the research applies panel data regression with a Fixed Effect Model (FEM). The results reveal that green banking practices do not have a significant impact on bank profitability. Although theory suggests a positive correlation, the empirical results reveal that its contribution to improving ROA remains unproven, likely due to its limited and long-term implementation stage. Similarly, the number of ATM units shows no significant effect and even tends to negatively affect profitability, possibly because of high operational expenses and customers' growing shift toward digital banking services. Despite the insignificant short-term impact, the incorporation of environmentally friendly banking measures by Islamic banks represents an essential step toward incorporating environmentally responsible financing and energy efficiency. This approach holds promising potential to enhance the sustainability, reputation, and competitiveness of Islamic banks in the long term.

Keywords: Green Banking, Green Investment, Green Banking Disclosure Index, Number of ATM Units, ROA

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1. Introduction

The swift pace of globalization has intensified rivalry among banks and other financial institutions. In Indonesia, the banking industry dominates the national financial system, controlling around 76% of the total financial assets (Otoritas Jasa Keuangan, 2024). This highlights the central role of banks as an essential component of the national economy. Profit generation remains the fundamental goal of banking institutions. When the financial system runs efficiently, it supports the intermediation function, encourages capital mobility, and improves the overall quality of financial services (Lahuri & Wibisono, 2020).

During environmental challenges and the global movement toward the 2015 UN Sustainable Development Goals, the banking sector is expected to contribute to sustainability efforts. Although banks are not direct sources of pollution, their financing activities have significant implications for environmental quality. Therefore, financial institutions are encouraged to shift toward environmentally conscious business practices. In Indonesia, where environmental degradation is a pressing issue, one practical approach is green banking; an initiative that integrates ecological values into banking operations to balance profitability and environmental care (World Bank Group, 2023).

Within the Islamic finance system, green banking serves as an application of green investment that emphasizes financing activities supporting environmental and social well-being. Since Islamic banking operates under Sharia principles that promote ethical and responsible finance, the integration of green initiatives aligns naturally with its objectives. The adoption of green banking thus represents not only a business innovation but also a realization of Sharia's moral imperative toward environmental stewardship. Implementing green investment practices allows Islamic banks to improve their market reputation and potentially enhance profitability in a society increasingly aware of sustainability (Arsy et al., 2023).

Previous research, such as that by Lymperopoulos, indicates that incorporating environmental considerations into operational strategies strengthens a bank's public image and customer loyalty (Lymperopoulos et al., 2012). Jayabal and Soundarya (2016) also notes that green banking encourages technological innovation, reduces paper usage, and promotes paperless transactions. As awareness of environmental sustainability grows, businesses are gradually transitioning toward eco-friendly operations, supported by the implementation of green lending programs (Jayabal & Soundarya, 2016).

The Indonesian government has responded to environmental issues by issuing Law 32/2009 on the management and protection of environmental resources, which mandates that

economic activities align with sustainability principles. Subsequently, Bank Indonesia introduced several related regulations, such as Bank Indonesia Regulation (PBI) No. 14/15/2012 concerning environmental feasibility in asset evaluation, and Regulation No. 14/26/PBI/2012 to promote financing for MSMEs, which are typically more environmentally friendly (Ginting et al., 2012). Furthermore, regulation No. 51/POJK.03/2017 was enacted by the Financial Services Authority (OJK) on sustainable finance, requiring financial institutions and listed companies to integrate environmental, social, and governance (ESG) considerations into their operations (POJK Nomor 51/POJK.03/2017, 2017).

Empirical evidence on green banking's effect on bank performance remains varied. Some studies reveal a positive link between green banking and profitability (Rachman & Saudi, 2021), while other report negative or insignificant results, often due to high compliance costs and the long-term nature of sustainability returns (Bessong & Tapang, 2012; Karyani & Obrien, 2020). Research on Jordanian banks by Khrawish and Al-Sa'di also found no significant correlation between green banking practices and profitability (Khrawish & Al-Sa'di, 2011).

The study concentrates exclusively on Islamic commercial banks, whose implementation of green banking is relatively advanced in financing sectors aligned with Sharia. These banks apply selective financing principles, prohibiting funding for businesses harmful to society or the environment (Ningsih et al., 2020). Many Islamic banks have started reporting sustainable financing initiatives in their annual reports, showing their growing commitment to ethical and environmentally responsible operations (Febriyanto et al., 2023).

Based on these developments, this research aims to examine the relationship between green banking practices and the profitability of Indonesian Islamic commercial banks during 2019–2024, measured through the Green Banking Disclosure Index (GBDI) and Return on Assets (ROA). Additionally, the number of ATM units is analyzed as a variable representing green banking service infrastructure. This study contributes by evaluating whether the adoption of green banking enhances profitability or imposes additional operational burdens during its early implementation phase.

2. Literature Review

2.1 Stakeholder Theory

Stakeholder theory describes the interactions between an organization and the diverse groups that are directly or indirectly impacted by its operations. According to Biset, stakeholders include individuals or groups that have an interest in a company's policies and

performance. Grimbel and Wellard further highlight that stakeholders differ in influence and importance, requiring companies to identify and manage these relationships effectively. The theory emphasizes that the success of a company depends not only on shareholders but also on the satisfaction of all stakeholders who can influence its survival and growth (Azheri, 2012).

From a strategic management perspective, stakeholder theory suggests that maintaining positive and trust-based relationships with stakeholders contributes to better organizational performance. A business that upholds transparency and accountability earns long-term legitimacy and loyalty from customers, employees, investors, and the wider community. Consequently, organizations must ensure that their actions and communications reflect a balance between economic goals and stakeholder expectations. In this context, corporate social and environmental disclosures serve as a medium of communication between companies and stakeholders to foster mutual understanding and trust (Mardikanto, 2018).

2.2 Legitimacy Theory

The theory of legitimacy holds that organizations conduct their activities within the bounds of social norms and values, and their survival depends on maintaining conformity with these societal expectations (Azheri, 2012). Dowling and Pletter describe legitimacy as a perception that an organization's actions are appropriate within the existing system of norms and beliefs. Therefore, companies must ensure that their operational activities are perceived as legitimate by the public. When discrepancies arise between corporate behaviour and social expectations, a "*legitimacy gap*" may occur, threatening the organization's reputation and continuity (Velte, 2023).

To address this gap, organizations must identify key stakeholders and evaluate which expectations are most influential on their legitimacy. Lindbolm suggests that companies may employ several strategies to maintain legitimacy, including altering operations, changing communication patterns, or influencing stakeholder perceptions (Anggusti, 2019). In this regard, legitimacy can be viewed as a strategic asset that enables a company to sustain its operations by aligning its values and actions with societal norms. Maintaining legitimacy is therefore not only an ethical concern but also a crucial factor for organizational resilience and stakeholder confidence (Amri, 2024).

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2.3 Concept of Green Banking

The World Bank defines green banking as financial practices that integrate sustainability and environmental awareness into banking operations. Green banking encourages banks to design products, services, and internal systems that support environmentally responsible economic activities. Through such initiatives, banks can strengthen their market image, foster innovation, and enhance long-term competitiveness (Avendo Ugaz et al., 2019). Similarly, Bank Indonesia interprets green banking as a commitment from financial institutions to play an active role in funding sustainable business operations and promoting green investment (Budiantoro, 2014).

In the context of sustainability, green banking applies the concept of the "*triple bottom line*," which encompasses economic, social, and environmental accountability. This approach urges banks to expand financing portfolios toward eco-friendly sectors, improve environmental risk management, and develop operational strategies that reduce ecological footprints. According to Bessong and Tapang, Green banking effectiveness may be measured using multiple indicators, such as energy efficiency, carbon reduction programs, paperless transactions, and environmentally certified building operations. These indicators have also been incorporated into the *Green Banking Disclosure Index (GBDI)* and consistent with POJK No. 51/2017 issued by the Financial Services Authority on Sustainable Finance (Bessong & Tapang, 2012).

Green banking initiatives include various actions such as implementing carbon emission controls, introducing reward programs for eco-conscious customers, transitioning to digital documentation systems, and investing in green projects (Alisjahbana & Murniningtyas, 2018). From an Islamic perspective, environmental care is deeply rooted in religious teachings. Yusuf Al-Qardhawi emphasizes that preserving forests and natural resources is an act of obedience to divine guidance, as environmental balance is part of maintaining harmony in creation. Hence, green banking aligns not only with global sustainability principles but also with Islamic ethics emphasizing stewardship (*khilafah*) and responsibility for the environment (Sulaiman et al., 2013).

Based on both stakeholder and legitimacy theories, banks must acknowledge that their relationships with the environment and society directly influence institutional performance. A strong relationship built on trust and shared responsibility helps maintain the organization's legitimacy and supports its sustainable growth (Wrespatiningsih & Mahyuni, 2022).

2.4 Concept of Profitability

Profitability measures how effectively a company generates financial gains from its operations. Brigham and Houston describe profitability as the outcome of managerial decisions and policies that determine a firm's efficiency in utilizing resources. It is often measured through financial ratios that evaluate operational performance and stability (Umam et al., 2021). ROA serves as a key profitability metric, reflecting how well a company utilizes its assets to produce net income. A higher ROA implies that management can optimize asset utilization to produce greater profit levels (Choiriyah et al., 2021; Darmawan, 2022)

In the banking context, ROA is widely used to assess the overall efficiency of financial institutions. It indicates the bank's capacity to generate profit through the productive use of assets while maintaining liquidity and operational stability. Therefore, ROA not only reflects profitability but also demonstrates the bank's effectiveness in balancing income generation with risk management (Umam et al., 2023).

2.5 Previous Studies

Past studies exploring how green banking affects bank performance have produced differing conclusions. Al-Kubaisi and Khalaf (2023) found that larger bank size positively influences return on equity (ROE), while factors such as loan loss provisions and mobile application adoption negatively affect profitability (Al-Kubaisi & Khalaf, 2023). Asfahaliza and Anggraini (2022) reported that the number of ATM units positively correlates with ROA, but the Green Banking Disclosure Index (GBDI) shows no significant effect (Asfahaliza & Anggraeni, 2022). Anggraini et al. (2020) concluded that green banking positively affects profitability, although higher operational inefficiency can offset these gains (Anggraini et al., 2020)

Meanwhile, Hasanah and Hariyono (2022) observed that green financing has yet to influence ROA significantly, mainly due to the early phase of green reporting adoption. Studies focusing on Islamic banks also show that while sustainable banking initiatives are increasing, their implementation remains limited (Hasanah & Hariyono, 2022). For instance, Febiola et al. (2023) found that Bank Syariah Indonesia incorporates environmental considerations in its financing through environmental impact assessments (AMDAL) (Febiola et al., 2023). Similarly, Ariyani (2020) identified Bank Muamalat as one of the first Islamic banks to align its financing policies with sustainability standards (Aryani, 2020)

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Research by Hoque and Masum (2022) demonstrated that banks exhibiting higher profit levels typically offer more extensive disclosure of sustainable practices. (Hoque et al., 2022). However, Sharmeen and Yeaman (2020) found that despite Islamic banks' moral advantage, their compliance with green banking standards remains lower than conventional banks, largely influenced by firm size and board independence. Collectively, these studies suggest that while the green banking movement in Indonesia is growing, its effect on financial performance, particularly profitability, remains varied and context-dependent (Sharmeen & Yeaman, 2020).

3. Methodology

This study employs a quantitative methodology, using panel data regression analysis to investigate the relationship between green banking practices, the number of Automated Teller Machine (ATM) units, and the profitability of Islamic commercial banks in Indonesia. The data were obtained through documentation methods, sourced from the annual financial reports of Islamic commercial banks as well as the official publications of the Financial Services Authority (OJK).

3.1 Data and Population

This study utilizes secondary data consisting of annual reports from 2019 to 2024. These reports were sourced from the official websites of Islamic commercial banks and the OJK database. The research population comprises nine Islamic commercial banks registered with OJK during this period.

Table 1. Name of Islamic Commercial Banks

No	Name of Bank
1	Mega Syariah
2	BCA Syariah
3	Victoria Syariah
4	Bank Syariah Indonesia
5	BTPN Syariah
6	Mu'amalat
7	Bukopin Syariah
8	Panin Dubai Syariah
9	BJB Syariah

Since the data combine both cross-sectional and time-series characteristics; representing multiple entities observed over several years; a pooled data approach is applied.

The analytical process involves descriptive statistics and panel data regression using EViews 13 and Microsoft Excel for data processing and estimation.

3.2 Variables and Measurement

The study includes one dependent variable and two independent variables, as described in the following table:

Table 2. Dependent and Independent Variables

Variable	Description	Data Source	Unit
Dependent Variable			
ROA (Return on Asset)	It assesses a bank's capacity to earn profit and is calculated by dividing pre-tax net income by total assets.	Annual Report	Percent (%)
Independent Variable			
GBDI (Green Banking Disclosure Index)	Represents the level of disclosure of green banking practices based on key sustainability indicators.	Annual Report	Index
Number of ATM Units	Reflects the extent of green banking implementation through the total number of ATMs operated by each bank.	Annual Report	Number

3.3 Analytical Technique

To address the research objectives, this study applies panel data regression analysis with several steps as follows:

a. Model Selection

Chow and Hausman tests were performed to identify the most suitable regression model. The results showed that the Fixed Effect Model (FEM) was the best-fitting model, as it provided better explanatory power for the variations among cross-sectional data (Tri, 2019).

Table 3. Chow Test Results

Effect Test	Statistic	d.f	Prob
Cross-Section F	16.620144	(8.43)	0.0000

Source: Data processed using E-views 13

b. Classical Assumption Tests

Having determined the Fixed Effect Model to be the best-fitting model, several classical assumption tests were carried out to ensure model validity, including:

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(1) *Heteroscedasticity Test*: The test results show no indication of heteroscedasticity since the probability values for both independent variables exceed 0.05 — Green Banking (0.9344) and Number of ATM Units (0.6291).

(2) *Multicollinearity Test:* The correlation coefficient between the Green Banking and ATM variables is 0.3446, which is below the critical value of 0.80, suggesting no multicollinearity. Consequently, the independent variables are considered suitable for inclusion in the regression model.

c. Hypothesis Testing

The hypothesis testing process includes three main tests: the F-test, the t-test, and the coefficient of determination (Adjusted R^2).

(1) F-test (Simultaneous Test)

The F-test examines whether all independent variables simultaneously influence profitability.

Table 4. F-Test

F-Statistic	14.05516
Prob (F-Statistic)	0.0000

Source: Data processed using E-views 13

The F-test results indicate that the probability value (0.0000) is below 0.10, suggesting that green banking and the number of ATM units together have a significant impact on profitability. This confirms that the model is statistically valid to explain the relationship among variables.

(2) T-test (Partial Test)

The t-test is used to determine the individual contribution of each independent variable to profitability.

Table 5. t- test results

Variable	Coefficient	t-statistic	Prob
Green Banking (X1)	0.014698	0.783147	0.4378
Number of Units ATM (X2)	-0.000281	-0.757921	0.4526

Source: Data processed using E-views 13

The results indicate that neither Green Banking nor the Number of ATM Units has a statistically significant effect on profitability, as both p-values exceed 0.05. The positive coefficient of the Green Banking variable suggests a theoretical tendency toward improved profitability, but the relationship is not supported empirically. Conversely, the negative coefficient for ATM Units implies a potential decrease in profitability as the number of

ATMs rises, likely due to operational costs, though the result remains statistically insignificant.

d. Coefficient of Determination (Adjusted R^2)

The Adjusted R^2 value represents how much of the dependent variable's variance is captured by the independent variables.

Table 6. Determination Coefficient Test Results

Adjusted R-Squared	0.711253

Source: Data processed using E-views 13

The Adjusted R^2 value of 0.7113 suggests that the two independent variables explain approximately 71.13% of the variability in ROA; Green Banking and the Number of ATM Units, while the remaining 28.87% is influenced by other factors not included in the model.

4. Result and Discussion

4.1 The Relationship Between Green Banking to Bank Profitability

The regression analysis reveals that green banking does not significantly affect the profitability of Islamic commercial banks, as indicated by Return on Assets (ROA). This finding is supported by a p-value greater than the 0.05 significance threshold, suggesting that the impact of green banking on financial performance is statistically insignificant. Although the coefficient is positive, theoretically implying that greater adoption of green practices could enhance profitability; the evidence does not substantiate this relationship within the observed period.

Several factors may explain this outcome. The development of green banking within Indonesian Islamic commercial banks remains at a preliminary stage, with most institutions yet to fully integrate the essential components of green economic indicators, such as emission reduction, waste management, and environmentally friendly financing (Marakka, 2023). Given that the formal adoption of green banking practices began around 2019, its long-term benefits have not yet been realized in short-term financial performance (Hoque et al., 2022).

Moreover, profitability is shaped by multiple variables beyond green banking, including efficiency ratios, total assets, macroeconomic trends, and institutional management quality. The uneven distribution of ROA across banks; for example, the substantial losses recorded by Panin Dubai Syariah Bank in 2021; further influences the aggregated statistical outcome, making the green banking effect appear negligible. Similar findings were also reported by

Yaqin, Kusuma, Nabila, and Hasanah, who noted that green banking initiatives have not significantly improved profitability (Nurmalia et al., 2021).

From an environmental economics perspective, the trade-off model can also explain these findings. The initial investment required to transition toward eco-friendly operations is relatively high and may temporarily suppress profit margins. Compliance with environmental standards can increase operational costs, reducing competitiveness—particularly if external incentives or regulatory supports are insufficient (Hasanah & Hariyono, 2022).

Nevertheless, even though the short-term financial effects are minimal, Islamic banks' involvement in green banking represents an important move toward responsible investment. By allocating financing to sustainable sectors and promoting digital transformation, these banks embody the core principles of Islamic finance, which emphasize balance, social justice, and environmental care. Thus, while not yet statistically significant, green banking remains strategically relevant as a long-term investment in reputation, trust, and institutional sustainability.

Empirical studies with differing conclusions reinforce that the impact of green banking varies depending on contextual factors. For instance, research by Lestari, Wulandari, and Arya suggests that consistent implementation supported by effective internal policies and positive investor perceptions can yield higher ROA. Therefore, the overall implication is that green banking should be viewed as a strategic long-term initiative, the results of which extend beyond immediate profitability to encompass sustainability and stakeholder confidence (Karyani & Obrien, 2020).

4.2. Relationship Between the Number of ATM Units and Bank Profitability

The findings also reveal that the number of ATM units does not significantly influence profitability in Islamic commercial banks. The regression analysis shows a negative coefficient, implying that as the number of ATMs increases, profitability may decline, though the result lacks statistical significance. This tendency may arise due to the *high operational and maintenance costs* associated with ATMs that are not proportionally balanced by transaction revenues or efficiency gains.

Several factors contribute to this outcome. The growing *shift in customer preferences* from physical banking to digital platforms has reduced the role of ATMs in generating income (Amran, 2022). The expansion of ATM networks without simultaneous innovation in service quality or technology optimization often leads to additional costs rather than higher profits

(Hidayat et al., 2022). Consequently, the effectiveness of ATMs as a profitability driver has diminished as digital banking becomes more dominant and cost-efficient.

This finding contrasts with research by Maylasofa & Lediana, Nabila & Puspitasari, and Ratnasari, which found a positive correlation between ATM expansion and profitability. However, it aligns with the study by Ghaith et al., which concluded that the presence of financial service infrastructure does not automatically improve performance; rather, the outcome depends on the extent to which banks integrate these services with digitalization strategies and consumer behaviour patterns.

Overall, this suggests that expanding the number of ATMs alone is insufficient to enhance profitability. Instead, Islamic banks should prioritize digital transformation and operational efficiency to remain competitive. By combining cost control, digital innovation, and sustainable finance, banks can align profitability goals with modern customer expectations and long-term institutional growth.

5. Conclusion

The study finds that the adoption of green banking, evaluated through the Green Banking Disclosure Index (GBDI), does not significantly impact the profitability of Islamic commercial banks in Indonesia, as indicated by Return on Assets (ROA). Although theoretically, green initiatives are expected to strengthen financial performance through operational efficiency and improved corporate image, their short-term impact remains limited. This is likely due to the gradual adoption of green indicators such as eco-friendly financing and carbon emission reduction, as well as the long-term nature of sustainability programs whose results are not immediately visible in financial reports.

Similarly, the number of ATM units does not significantly influence profitability. The high operational costs associated with ATM maintenance, combined with a customer shift toward more efficient digital channels, may explain this finding. The negative coefficient in the analysis suggests that an increase in ATM networks could even reduce profitability, although not significantly.

Despite these findings, the incremental implementation of green banking in Islamic commercial banks indicates an increasing dedication to environmental and social responsibility. By funding renewable energy, sustainable agriculture, and eco-friendly business ventures, Islamic financial institutions are starting to integrate profitability with ethical

investment standards. This approach aligns closely with the core principles of Islamic finance, which prioritize sustainability, fairness, and responsible management of natural resources.

Therefore, green banking should be viewed as a strategic and long-term investment, not merely a short-term financial instrument. Islamic banks are encouraged to strengthen internal policies, enhance disclosure transparency, and collaborate with regulators to ensure that green investment contributes to both profitability and national sustainable development goals.

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