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ESG Disclosure, Green Product Innovation, and Financial Performance: Evidence from the Indonesian Banking Sector (2021–2023) on Educational Perspective

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ABSTRACT

This study analyzed the implementation of internal control over ceramic inventory at a building materials distributor in Cirebon City. Using a qualitative descriptive approach, the research identifies key weaknesses in the system, including limited segregation of duties, inadequate human resources, reliance on manual inventory recording, and the absence of regular internal audits. These issues increase the risk of errors, discrepancies, and potential fraud. The study recommends strengthening the organizational structure, enhancing staff training, adopting digital inventory systems, and conducting regular internal audits to improve control effectiveness. The findings contribute to the understanding of internal control practices in distribution businesses and provide practical insights for improving inventory management.

Keywords: *Internal Control; Inventory Management; Distribution Business; Audit; Cirebon*

INTRODUCTION

Globalization has accelerated business growth and intensified competition in the global market, including Indonesia's financial sector. This sector plays a vital role in supporting economic development, promoting equitable income distribution, and ensuring financial system stability (Karamoy, 2024). In Indonesia, the financial services industry comprises banking, insurance, financing companies, pension funds, securities firms, mutual funds, and other Non-Bank Financial Institutions (NBFIs). Among these, banking dominates with around 73% of total financial assets in 2024 (OJK, 2024). Its dominance reflects the sector's central role in mobilizing public funds, extending credit, and adapting to digital innovation under strong regulatory oversight from OJK and Bank Indonesia. According to Law No. 10 of 1998, commercial banks function as intermediaries by collecting deposits and redistributing them through loans and financial instruments, while Islamic banks operate under Sharia principles, avoiding riba, gharar, and maysir, and also serving social functions through the management of zakat and waqf.

Between 2021 and 2024, Indonesia's banking assets grew steadily from IDR 9,098 trillion to IDR 11,553 trillion, despite a slight fluctuation in the number of banks due to

mergers, consolidations, and new entries (OJK, 2024). This growth highlights the resilience and efficiency of the sector in adapting to economic dynamics and regulatory changes. For investors, banking performance is a key indicator of stability and growth potential. Transparency and accountability in financial reporting are therefore essential to strengthen trust and support sustainable development of the industry (Destrilindo & Rohman, 2024).

Figure I-1. Composition of Financial Sector Assets in Indonesia, 2024
Source: Financial Services Authority (OJK), 2024

The increase in Indonesia's banking assets from 2021 to 2024 reflects the industry's expansion in both fund mobilization and credit distribution to households and businesses. During this period, the number of banks experienced slight fluctuations. In 2021, there were 107 banks operating, which decreased to 106 in 2022 and 105 in 2023, mainly due to mergers and consolidations aimed at strengthening the banking structure. Interestingly, in 2024 the number of banks rose again to 106, possibly indicating new market entry or institutional expansion.

The continuous growth of total assets demonstrates stronger financial intermediation, greater efficiency in fund management, and improved financial services. This also suggests that Indonesia's banking industry is adapting well to economic and regulatory changes. For investors, banking performance provides a key indicator of financial stability and growth potential. Hence, transparency and accountability in financial reporting are essential to maintaining public and investor trust (Destrilindo & Rohman, 2024).

Banking performance reflects the extent to which institutions achieve sustainable economic results, measured through financial statement analysis that highlights financial condition and operational effectiveness (Nurul & Takarini, 2022). It serves as a primary indicator of efficiency in asset and liability management, shareholder value creation, and broader contributions to sustainable development (Agustina & Aprianti, 2022). One of the most widely used indicators of profitability is Return on Assets (ROA), which measures how effectively banks generate earnings from their asset base. ROA in Indonesia showed fluctuations from 2021 to 2024. In 2021, ROA stood at 1.84%, rising to 2.43% in 2022 and further to 2.74% in 2023, before slightly declining to 2.69% in 2024. This trend is illustrated in the figure below.

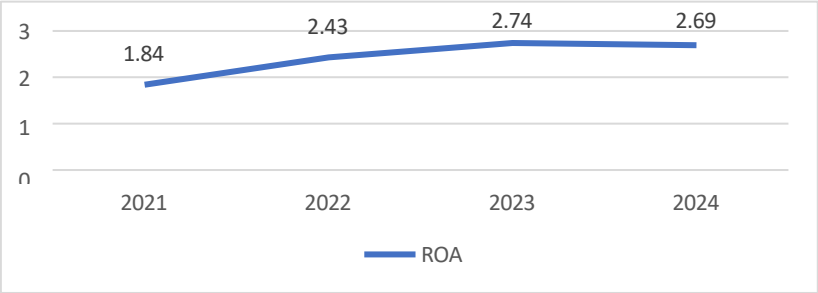

Figure I-3. Return on Assets (ROA) of Indonesian Banking, 2021–2024
Source: Financial Services Authority (OJK), 2024

Despite increasing pressure on profitability, Indonesian banks have demonstrated adaptability amid dynamic economic conditions. The slight decline in ROA in 2024 highlights the need to improve asset management efficiency in order to remain competitive under global uncertainty. By maintaining financial stability and strengthening business strategies, the banking sector is expected to continue contributing to national economic growth.

The Indonesian banking system operates as a legally regulated business entity, primarily tasked with mobilizing public funds in the form of deposits—both conventional and Sharia-compliant. These funds are subsequently channeled into financing activities that not only prioritize profitability but also uphold ethical and social justice considerations (Nurul & Takarini, 2022). In this context, disclosure of Environmental, Social, and Governance (ESG) practices has emerged as a key indicator in assessing financial performance (Agustina & Aprianti, 2022). Given its critical role in economic and social development, the Indonesian banking sector is increasingly expected to integrate ESG principles into its business strategies (Okalesa1 et al., 2021).

The environmental dimension of ESG includes corporate initiatives to minimize negative ecological impacts through energy efficiency, carbon emission management, and waste treatment. Companies are also encouraged to manage natural resources responsibly, prevent overexploitation, and preserve biodiversity and ecosystems to ensure long-term sustainability (Fachrizal et al., 2024).

From a stakeholder theory perspective, corporate attention to environmental issues represents accountability toward society, government, and future generations. Sutopo (2025) found that while environmental disclosures are not yet uniform across the sector, banking initiatives such as green financing and energy efficiency have shaped positive public perception. Banks that demonstrate a strong commitment to environmental sustainability are viewed as more responsible and trustworthy, strengthening their reputation and contributing to improved financial performance.

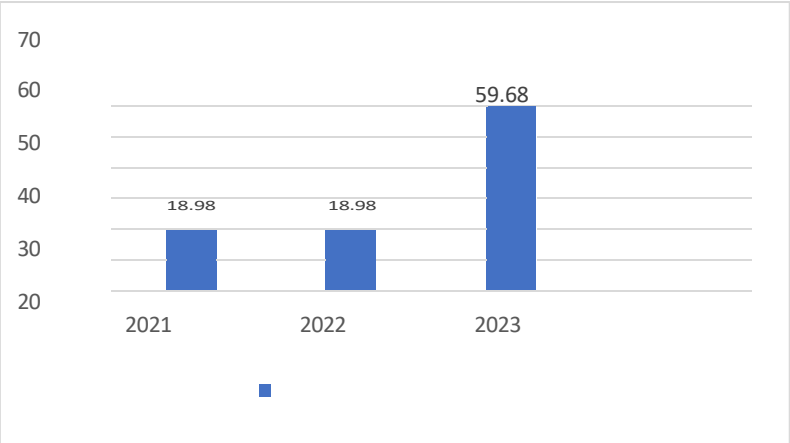

Figure I-4. Environmental Disclosure in Indonesian Banking, 2021–2023
Source: Katadata Corporate Sustainability Index

Based on the chart above, the environmental aspect (E) disclosure shows a significant increase in 2023. While the environmental score remained constant at 18.98 in both 2021 and 2022, it surged to 59.68 in 2023. This sharp rise indicates that banks have become more committed to addressing environmental issues, likely influenced by stricter regulatory requirements, growing investor interest in sustainability, and global pressures to adopt environmentally responsible business practices.

Previous studies demonstrate that corporate attention to environmental concerns often has a positive impact on financial performance. For instance, Natasha Gabriela et al. (2024) found that companies with high ESG scores—particularly in the environmental dimension—tend to gain greater investor trust, which translates into stronger investment inflows and improved financial performance. Similarly, Susi Dwi Mulyani (2024) emphasized that implementing environmental strategies, such as energy efficiency and waste management, can enhance financial outcomes by reducing long-term risks. Khairunnisa and Erna Widiastuty (2023) also reported consistent findings in the Singaporean financial sector, where firms with strong environmental performance achieved higher Return on Assets (ROA).

However, other studies show mixed or even contradictory results. Finatariani (2024) concluded that, in certain contexts, the environmental dimension has little to no significant effect on financial performance. Supporting this view, Era Vivianti Husada (2021) noted that environmental disclosure did not significantly correlate with profitability—whether measured by ROA or other indicators such as Tobin's Q. Similarly, Angela Merici Minggu and Jusuf Aboladaka (2023) argued that corporate environmental commitments have not yet received strong stakeholder responses, suggesting that the financial impact of environmental disclosure depends heavily on social context, regulatory enforcement, and investor awareness of sustainability values.

The social (S) dimension, meanwhile, relates to corporate policies regarding labor practices, human rights, and contributions to surrounding communities. Firms are expected to demonstrate clear commitments to respecting human rights throughout their

operations and supply chains. This includes creating safe, inclusive workplaces that support employee well-being through healthcare services, professional development programs, and fair employment opportunities without discrimination. Moreover, contributions to social development—such as educational initiatives, community empowerment programs, and other social projects aimed at improving local livelihoods—form a vital part of this dimension (Rizqi, 2023).

Stakeholder theory further highlights the importance of maintaining harmonious relationships with both internal and external stakeholders, including employees, customers, and society at large. Sutopo (2025) found that social disclosures—such as financial inclusion initiatives, employee welfare, and corporate social responsibility (CSR) activities—play a crucial role in building stakeholder trust and loyalty. When stakeholders feel valued, companies benefit from stronger relationships, operational stability, and greater business efficiency. This, in turn, positively impacts financial performance by reducing social risks and enhancing overall productivity.

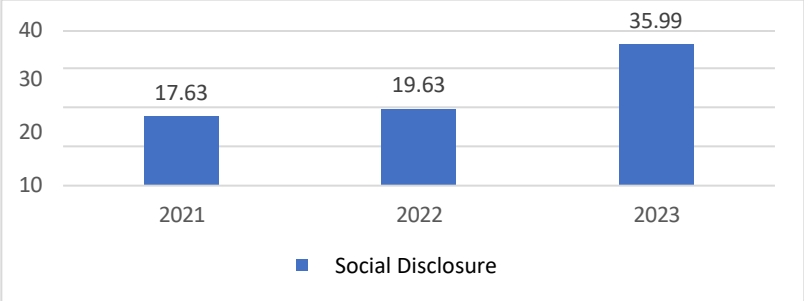

Figure I-5. Social Disclosure in Indonesian Banking, 2021–2023
Source: Katadata Corporate Sustainability Index

Based on Figure I-5, the social (S) dimension in the banking sector shows a consistent upward trend between 2021 and 2023. The social disclosure score increased from 17.63 in 2021 to 19.63 in 2022, and rose sharply to 35.99 in 2023. This reflects a growing commitment among banks to social aspects such as employee welfare, community engagement, and the protection of consumer rights and vulnerable groups.

Empirical studies have highlighted the potential benefits of corporate engagement in social issues for financial performance. Susi Dwi Mulyani (2024) argued that social practices—such as community empowerment initiatives and employee welfare programs—can build public trust while reducing the risk of social conflict, thereby enhancing corporate efficiency and productivity. Similarly, Rahmansyah & Mutmainah (2024) emphasized the importance of social disclosure in attracting investor confidence and strengthening operational stability. Moreover, Khairunnisa & Erna Widiastuty (2023) showed that in countries with high awareness of sustainability, such as Singapore, the social dimension demonstrates a significant relationship with corporate profitability.

By contrast, Finatariani (2024) found that although the social dimension was the only ESG aspect to show significance in a partial model, its impact was not strong enough to influence overall financial performance. In line with this, Esomar (2021) reported that social activities—such as community assistance or CSR programs during

the pandemic—did not exhibit a direct correlation with reduced operational risks. Likewise, Era Vivianti Husada (2021) revealed that the social dimension within ESG had no statistically significant effect on the profitability of the financial sector. These findings suggest that the effectiveness of social initiatives in improving financial performance depends heavily on how well such strategies are designed and implemented across the organization.

Meanwhile, the governance (G) dimension reflects the application of transparency, accountability, and sound internal control mechanisms, including shareholder protection and anti-corruption policies. With increasing market awareness of sustainability, companies that maintain high levels of ESG disclosure tend to gain stronger investor trust, which can, in turn, positively influence financial performance, particularly when measured through Return on Assets (ROA) (Rahmansyah & Mutmainah, 2024).

Governance is closely linked to corporate oversight and control mechanisms. Drawing from stakeholder theory, good governance provides the foundation for trust and the protection of stakeholder rights. Sutopo (2025) found that disclosures regarding board structure, transparency of reporting, and internal audit mechanisms contribute to favorable investor perceptions. Strong governance reduces managerial risks, enhances accountability, and enables companies to manage resources more efficiently—factors that ultimately strengthen financial performance.

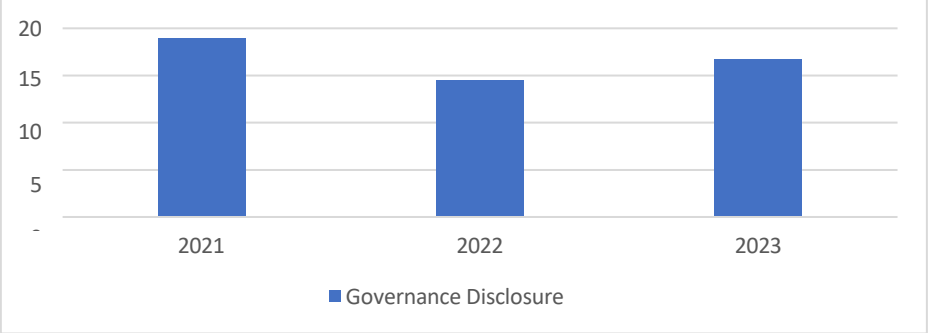

Figure I-6. Governance Disclosure in the Indonesian Banking Sector, 2021–2023
Source: Katadata Corporate Sustainability Index

Unlike the environmental and social dimensions, governance disclosure in the Indonesian banking sector has shown a fluctuating and declining trend. The governance score stood at 18.91 in 2021, dropped to 14.49 in 2022, and slightly recovered to 16.67 in 2023. This indicates that principles of good corporate governance—such as transparency, accountability, and effective oversight—have not yet become a consistent priority for most banks.

Prior studies highlight that strong governance practices can enhance financial performance by improving investor confidence and strengthening internal control mechanisms (Rahmansyah & Mutmainah, 2024; Angela Merici Minggu & Aboladaka, 2023). However, other research suggests that governance disclosure has not always shown a significant impact on profitability, with results varying across industries and

contexts (Finatariani, 2024; Susi Dwi Mulyani, 2024; Era Vivianti Husada, 2021). These mixed findings imply that the effectiveness of governance in supporting financial outcomes largely depends on implementation quality, transparency, and stakeholder perception.

Within the broader framework of ESG, corporate governance remains integral to sustainability strategies. Stakeholder theory emphasizes that firms are accountable not only to shareholders but also to a wider set of stakeholders, including regulators, employees, customers, and communities (Mahajan et al., 2023). In this regard, transparent ESG disclosure strengthens trust, reduces risk, and may contribute to long-term competitiveness.

Table I-1. ESG Scores of Indonesian Banks, 2024

No.	Code	Bank	ESG Score
1	BMRI	PT Bank Mandiri (Persero) Tbk	17.52
2	BBRI	PT Bank Rakyat Indonesia (Persero) Tbk	17.83
3	BBCA	PT Bank Central Asia Tbk	21.51
4	BBNI	PT Bank Negara Indonesia (Persero) Tbk	23.17
5	BNGA	PT Bank CIMB Niaga Tbk	23.45
6	BBTN	PT Bank Tabungan Negara (Persero) Tbk	28.02
7	BRIS	PT Bank Syariah Indonesia Tbk	28.48
8	NISP	PT Bank OCBC NISP Tbk	30.06
9	BTPS	PT Bank BTPN Syariah Tbk	32.52
10	ARTO	PT Bank Jago Tbk	33.27
		Average	**25.68**

The ESG scores of the ten Indonesian banks listed on the IDX reveal an average of 25.68, indicating that ESG adoption in the domestic banking industry remains moderate and has not yet been fully integrated into corporate governance systems. Notably, several of the largest state-owned banks, such as Bank Mandiri (BMRI) and Bank Rakyat Indonesia (BBRI), recorded relatively low scores of 17.52 and 17.83, respectively. This suggests that despite undertaking social initiatives and sustainability programs, ESG disclosure and reporting practices remain fragmented.

By contrast, banks with a stronger focus on digital services and financial inclusion—such as Bank Jago (ARTO), Bank BTPN Syariah (BTPS), and OCBC NISP (NISP)—achieved the highest scores, ranging from 30 to 33. These higher scores can be attributed to more transparent reporting practices, the use of digital platforms for sustainability disclosures, and business models more aligned with modern sustainability principles.

Overall, while Indonesian banks have demonstrated growing awareness of ESG, further progress is needed in integrating sustainability strategies, adopting globally recognized reporting standards, and building long-term commitment to responsible business practices. ESG scores not only reflect a firm's alignment with sustainable development goals but also serve as an indicator of transparency, stakeholder trust, and

resilience. Prior research (Minggu & Aboladaka, 2023; Priandhana, 2022; Kartika et al., 2023) shows that ESG disclosure can function as a form of social investment, enhancing corporate reputation and, in some cases, improving financial performance.

However, findings remain mixed. While studies (Natasha Gabriela et al., 2024; Rahmansyah & Mutmainah, 2024; Khairunnisa & Widiastuty, 2023) highlight a positive relationship between ESG performance and financial outcomes through improved stakeholder trust and investor confidence, others (Husada, 2021; Minggu & Aboladaka, 2023) argue that ESG activities have yet to demonstrate a significant financial impact in the banking sector. These inconsistencies highlight the need for further empirical studies on ESG–performance linkages, particularly in banking, where systemic roles and regulatory pressures differ from other industries.

In addition, the growing emergence of green financial products—such as green loans, green bonds, and sustainability-linked investment instruments—further demonstrates banks' evolving role in promoting sustainable finance (Triyani & Setyahuni, 2020; Roestanto et al., 2022). This development is largely driven by rising stakeholder awareness, stricter government regulations, and increasing demand for environmentally responsible financial services (Zaneta et al., 2023; Sari et al., 2024; Putri et al., 2022). Consistent with stakeholder theory (Mahajan et al., 2023), banks that integrate ESG principles into their financial products and services can strengthen investor and customer confidence, improve operational efficiency, and ultimately enhance financial performance as reflected in Return on Assets (ROA).

Green product innovation in the Indonesian banking sector has shown a steady upward trend over the past three years. Scores rose from 17.82 in 2021 to 18.98 in 2022, and further to 20.03 in 2023, reflecting a gradual but consistent response to the market's growing demand for sustainable financial services. These include financing for renewable energy projects, environmentally friendly transportation, and other green credit programs. Nevertheless, the pace of improvement remains relatively slow, requiring stronger regulatory support and more robust internal strategic initiatives from banks.

In recent years, Indonesian banks have become increasingly active in developing green financial products as part of their sustainability strategies. Such innovations include green financing, green bonds, green savings, and digital banking solutions aimed at reducing excessive use of natural resources. A key example is green loans—financing facilities dedicated to sustainable projects such as renewable energy, waste management, sustainable agriculture, and low-carbon transportation. Major banks like Bank Mandiri and BRI have allocated specific funds for clean energy and circular economy projects. Similarly, BNI and BCA have issued green bonds as part of their strategies to expand sustainable finance portfolios.

Other innovations include green savings accounts and ESG-based investment products, which channel customer funds into environmentally positive projects. For instance, Bank Syariah Indonesia (BSI) offers ESG-focused investment schemes, providing customers the opportunity to support companies committed to sustainability. Operational innovations are also evident in paperless banking, energy-efficient digital

platforms, and eco-friendly branch offices designed to reduce the sector's carbon footprint.

The development of green products has been reinforced by regulatory initiatives such as the Sustainable Finance Taxonomy introduced by the Financial Services Authority (OJK), alongside increasing public awareness of sustainable investments. Despite challenges—such as high implementation costs and limited public education—these initiatives demonstrate a growing commitment within the banking sector to support sustainable economic growth. If supported by sound policy frameworks, green product innovation has the potential to accelerate Indonesia's transition toward a green economy.

From a theoretical perspective, green financial innovation refers to the design of banking services that both support sustainability and reduce negative environmental impacts. These products include green loans, green bonds, and insurance services that reinforce environmentally responsible practices. Their primary goal is to facilitate the transition toward a greener economy while sustaining and potentially enhancing banks' financial performance.

Empirical evidence, however, presents mixed findings. Several studies suggest that adopting green financial products improves competitiveness and efficiency, leading to stronger profitability (Rizqi, 2023; Minggu & Aboladaka, 2023). Other studies argue that green innovation alone has not shown a significant impact unless integrated with broader ESG strategies. For instance, Mulyani (2024) found that ESG practices did not significantly reduce financial risk, while Khairunnisa & Widiastuty (2023) reported a positive relationship between green product innovation and financial performance. Conversely, Saputra (2020) and Kartika et al. (2023) found that in the short term, green innovation does not significantly affect financial outcomes, largely due to market limitations, low consumer awareness, and regulatory barriers.

These variations suggest that the effectiveness of green product innovation in enhancing financial performance is highly dependent on market readiness, regulatory support, and the strategic capacity of banks to implement sustainable finance. As Rizqi (2023) notes, the success of green innovation lies in its ability to improve operational efficiency and strengthen competitive positioning, while Minggu & Aboladaka (2023) emphasize that weak market reception and limited ESG adoption remain significant obstacles.

Given these inconsistencies, there is a research gap in understanding the combined effect of ESG disclosure and green product innovation on financial performance in the banking sector. This study, therefore, aims to examine the simultaneous influence of ESG disclosure and green financial innovation on banks' financial performance—measured by Return on Assets (ROA)—among firms listed on the Indonesia Stock Exchange. The findings are expected to contribute both to theoretical development and to practical policy recommendations for regulators in strengthening sustainable finance initiatives. Based on the above background, the researcher is interested in conducting a study entitled: "The Effect of Environmental, Social, and Governance (ESG) Disclosure

and Green Product Innovation on Financial Performance (A Case Study in the Indonesian Banking Sector)."

METHOD

This study employs a quantitative approach using multiple regression analysis to examine the relationship between Environmental, Social, and Governance (ESG) disclosure and green product innovation on the financial performance of banks, measured by Return on Assets (ROA).The sample in this study was selected using a purposive sampling technique with predetermined criteria. The first criterion is banks that consistently publish annual reports and sustainability reports during the research period. Consistency in reporting is essential because this study requires complete and standardized ESG data to measure the extent of corporate disclosure on sustainability principles. The second criterion is banks with accessible and available data related to ESG disclosure and green product innovation.

The descriptive statistics test is used to provide a general overview of the data utilized in the study. This analysis includes calculating the mean, median, maximum, minimum, and standard deviation for each variable. Through descriptive statistics, the researcher can better understand the distribution and tendencies of ESG disclosure, green product innovation, and ROA.

Hypothesis Testing

a. Multiple Linear Regression Analysis

Multiple linear regression is employed to analyze the relationship between one dependent variable and two or more independent variables. In this study, regression analysis is used to examine the impact of ESG disclosure and green product innovation on financial performance (ROA). Prior to estimation, it is crucial to ensure that the regression model satisfies the assumptions of normality, no multicollinearity, and homoskedasticity. Violations of these assumptions could bias the results and hinder proper interpretation (Rahmansyah & Mutmainah, 2023).

The regression model in this study can be expressed as follows:

$ROA = \beta 0+\beta 1ESG+\beta 2GreenInnovtion+\epsilon$ROAβ0+β1ESG+β2GreenInnovation+ϵ

Where:

ROA	= Return on Assets, measuring financial performance
ESG	= ESG score obtained from sustainability reports or ESG indices published by the IDX
Green Innovation	= Number and type of green financial products launched by banks
β0	= Constant (intercept), representing ROA when independent variables are zero
β1, β2	= Regression coefficients, representing the effect of independent variables on ROA
ε	= Error term, representing other factors not included in the model that may influence ROA

This model assumes a linear relationship between independent and dependent variables. Therefore, classical assumption tests are essential to ensure unbiased and valid regression estimates.

t-Test (Partial Test)

The t-test is conducted to examine the significance of each independent variable individually on the dependent variable. This test determines whether ESG disclosure and green product innovation significantly affect ROA.

Hypotheses:

H0: $\beta i = 0$ (no significant effect of the independent variable on ROA)

H1: $\beta i \neq 0$ (significant effect of the independent variable on ROA)

If the p-value is less than the significance level ($\alpha = 0.05$), H0 is rejected, indicating a significant effect. Conversely, if the p-value is greater than 0.05, the effect is insignificant (Era Vivianti Husada, 2021).

F-Test (Simultaneous Test)

The F-test assesses whether all independent variables jointly influence the dependent variable. In this study, it tests whether ESG disclosure and green product innovation together significantly affect ROA.

Hypotheses:

H0: $\beta 1 = \beta 2 = 0$ (ESG and green product innovation have no simultaneous effect on ROA)

H1: At least one $\beta \neq 0$ (ESG and green product innovation have a simultaneous effecton ROA)

If the p-value is less than 0.05, H0 is rejected, indicating a joint significant effect (Ikbaar & Tarjo, 2024).

FINDINGS AND DISCUSSION

Descriptive Statistics Analysis

This study employed descriptive statistical analysis to illustrate the characteristics of the research sample in an informative and relevant manner.

Table IV-1. Descriptive Statistics Results

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Observations
ROA	1.490208	1.395000	3.450000	0.090000	0.835740	48
ENV	0.616667	0.540000	1.360000	0.090000	0.320527	48
SOC	0.407083	0.410000	0.850000	0.020000	0.189253	48
GOV	0.438958	0.450000	0.590000	0.040000	0.129520	48
IPH	0.718750	0.750000	0.875000	0.500000	0.142405	48

Source: EViews 12 Output, processed by the author (2025)

The descriptive statistics are interpreted as follows:

a. Financial Performance (ROA) (Y)

The ROA variable shows a minimum value of 0.09, recorded by PT Bank Jago (ARTO) in 2022, and a maximum value of 3.45, recorded by PT Bank Central Asia (BBCA) in 2023. The average ROA is 1.49, with a standard deviation of 0.84, indicating moderate variability in financial performance among banks.

b. Environmental (ENV) (X1)

The ENV variable ranges from a minimum of 0.09 (PT Bank Sinarmas/BSIM in 2021) to a maximum of 1.36 (PT Bank Negara Indonesia/BBNI in 2023). The mean value is 0.62 with a standard deviation of 0.32, reflecting differences in environmental disclosure practices across banks.

c. Social (SOC) (X2)

The SOC variable has a minimum value of 0.02 (PT Bank Permata/BNLI in 2021) and a maximum of 0.85 (PT Bank Negara Indonesia/BBNI in 2023). The mean is 0.41, while the standard deviation is 0.19, suggesting moderate variation in social disclosure.

d. Governance (GOV) (X3)

The GOV variable ranges between 0.04 (PT Bank Sinarmas/BSIM in 2021–2022) and 0.59, reported by PT Bank Tabungan Negara (BBTN, 2021–2023), PT Bank Syariah Indonesia (BRIS, 2022–2023), and PT Bank BTPN (2021 and 2023). The mean is 0.44 with a standard deviation of 0.13, showing relatively smaller variation compared to other ESG dimensions.

e. Green Product Innovation (IPH) (X4)

The IPH variable ranges from a minimum of 0.50, recorded by PT Bank Tabungan Negara (BBTN, 2021–2023), PT Bank CIMB Niaga (BNGA, 2021–2023), PT Bank BTPN (2021), and PT Bank Mega (2021), to a maximum of 0.88, reported by PT Bank Jago (ARTO), PT Bank Negara Indonesia (BBNI), PT Bank Jatim (BJTM), PT Bank Maybank Indonesia (BNII), and PT Bank Syariah Indonesia (BRIS) during 2021–2023. The mean is 0.72 with a standard deviation of 0.14, indicating relatively consistent implementation of green product innovation across banks.

Panel Data Regression Model Selection

Panel data regression requires selecting the most appropriate model among the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The following tests were conducted:

1) Chow Test

The Chow test is used to determine whether the common effect or fixed effect model is more suitable. This test identifies whether there are significant structural differences across individual banks in the dataset.

Table IV-2. Chow Test Results

Effects Test	Probability	Selected Model
Cross-section Chi-square	0.0000	Fixed Effect Model

Source: EViews 12 Output, processed by the author (2025)

The probability value of 0.0000 is less than 0.05, indicating that the null hypothesis is rejected. Therefore, the Fixed Effect Model (FEM) is preferred.

2) Hausman Test

The Hausman test is employed to decide between the fixed effect and random effect models. If the probability of the cross-section random effect is less than 0.05, the fixed effect model is chosen; otherwise, the random effect model is preferred.

Table IV-3. Hausman Test Results

Test Summary	Probability	Selected Model
Cross-section Random	0.0478	Fixed Effect Model

Source: EViews 12 Output, processed by the author (2025)

The probability value of 0.0478 is less than 0.05, which means the Random Effect Model is not appropriate. Both the Chow and Hausman tests consistently indicate that the Fixed Effect Model (FEM) is the most suitable model for this study. Consequently, the Lagrange Multiplier (LM) test is not required.

Classical Assumption Tests

The classical assumption tests were conducted to ensure that the regression model satisfies the required statistical criteria, thereby providing reliable results for decision-making. The tests include multicollinearity and heteroskedasticity diagnostics.

Multicollinearity Test

The multicollinearity test evaluates whether there is an excessively strong correlation among independent variables in the regression model. A VIF value below 10 indicates the absence of multicollinearity, while a value above 10 suggests its presence.

Table IV-4. Multicollinearity Test Results

Variable	Centered VIF	Remarks
ENV	1.852074	No Multicollinearity
SOC	1.947094	No Multicollinearity
GOV	1.136298	No Multicollinearity
IPH	1.113628	No Multicollinearity

Source: EViews 12 Output, processed by the author (2025)

As shown in Table IV-4, all independent variables have VIF values ranging from 1.11 to 1.94, well below the threshold of 10. Thus, it can be concluded that no multicollinearity exists in the model, confirming that the regression results are statistically reliable.

Heteroskedasticity Test

The heteroskedasticity test examines whether the residual variance is constant (homoskedastic) across all levels of the independent variables. A non-constant variance (heteroskedasticity) can bias standard error estimates, reducing statistical validity. The

Glejser test was applied, in which the absolute residuals are regressed against the independent variables. If the probability values are greater than 0.05, heteroskedasticity is not present.

Table IV-5. Heteroskedasticity Test Results

Variable	Probability	Remarks
ENV	0.2907	No Heteroskedasticity
SOC	0.8023	No Heteroskedasticity
GOV	0.6963	No Heteroskedasticity
IPH	0.6489	No Heteroskedasticity

Source: EViews 12 Output, processed by the author (2025)

As indicated in Table IV-5, all independent variables have probability values above 0.05. Hence, no heteroskedasticity is detected, confirming that the model meets the assumption of homoskedasticity.

Panel Regression Results

Panel data regression analysis was conducted to assess the effects of Environmental (ENV), Social (SOC), Governance (GOV), and Green Product Innovation (IPH) on financial performance (ROA). The Fixed Effect Model (FEM), as determined by the Chow and Hausman tests, was applied.

Table IV-6. Panel Regression Results

Variable	Coefficient
C	1.207175
ENV	2.766557
SOC	0.709322
GOV	-1.351230
IPH	-1.556354

Source: EViews 12 Output, processed by the author (2025)

The regression equation is expressed as:

$$Y=1.207175+2.766557X1+0.709322X2-1.351230X3-1.556354X4+\varepsilon Y=1.207175+571+0.709322X2-1.351230X3-1.556354X4+\varepsilon$$

Where:
Y = Return on Assets (ROA)
X_1 = Environmental (ENV)
X_2 = Social (SOC)
X_3 = Governance (GOV)
X_4 = Green Product Innovation (IPH)
ε = Error term

The constant of 1.207175 indicates that when all independent variables are zero, ROA is expected to be 1.21. The coefficient for ENV (2.77) suggests that stronger environmental disclosure positively and significantly improves financial performance. The coefficient for SOC (0.71) shows a positive but statistically insignificant relationship

with ROA. The coefficient for GOV (-1.35) indicates a negative, though not significant, effect on ROA. The coefficient for IPH (-1.56) suggests a negative, though not significant, relationship with ROA.

Hypothesis Testing

Partial Test (t-test)

The t-test determines the significance of individual independent variables. A p-value less than 0.05 indicates a significant relationship.

Table IV-7. t-Test Results

Variable	Coefficient	t-Statistic	Probability	Conclusion
C	1.207175	0.09741	0.1952	—
ENV	2.766557	0.687364	0.0004	H1 Accepted
SOC	0.709322	1.110503	0.5282	H2 Rejected
GOV	-1.351230	0.960689	0.1706	H3 Rejected
IPH	-1.556354	1.092174	0.1652	H4 Rejected

Source: EViews 12 Output, processed by the author (2025)

ENV: Positive and significant ($p = 0.0004 < 0.05$).
SOC: Positive but not significant ($p = 0.5282 > 0.05$).
GOV: Negative but not significant ($p = 0.1706 > 0.05$).
IPH: Negative but not significant ($p = 0.1652 > 0.05$).

Simultaneous Test (F-test)

The F-test evaluates whether all independent variables collectively influence ROA.

Table IV-8. F-Test Results

Cross-section fixed (dummy variabel)			
R- squared	0.947718	Mean dependent var	1.490208
Adjusted R-squared	0.912241	S. D. Dependent var	0.835740
S.E. of reqression	0.247580	Akaike info criterion	0.340174
F-statistic	26.71368	Durbin-Watson stat	2.024473
Prob(F-statistic)	0.000000		

Probability F = 0.000000 < 0.05, indicating that ENV, SOC, GOV, and IPH together significantly affect ROA.

Coefficient of Determination (R^2)

The adjusted R^2 value measures the explanatory power of the model.

Table IV-9. Coefficient of Determination Results

Model	Adjusted R^2
Fixed Effect Model	0.912241

Source: EViews 12 Output, processed by the author (2025)

The adjusted R^2 value of 0.912241 indicates that approximately 91.22% of the variation in ROA is explained by the independent variables (ENV, SOC, GOV, and IPH). The remaining 8.78% is attributed to other factors outside the model, including both internal and external influences.

This study confirms that environmental management is not merely a moral obligation but an effective business strategy that drives financial growth. During 2021–2023, Indonesian banks increasingly adopted sustainability initiatives such as green bonds, energy efficiency programs, and GRI-based disclosures, which reduced operational costs, improved efficiency, and enhanced reputation—ultimately contributing to higher ROA. These findings are consistent with prior research (Gabriela et al., 2024; Mulyani, 2024; Khairunnisa & Widiastuty, 2023), which emphasize the financial benefits of environmental performance.

The results also reveal that while the environmental dimension significantly improves profitability, green product innovation, though limited in its immediate financial impact, plays a strategic role in building trust and strengthening stakeholder relationships. This aligns with earlier studies (Khairunnisa & Widiastuty, 2023; Karyani et al., 2022) that highlight the long-term value of sustainable financial products, which require regulatory support, market readiness, and broader literacy to deliver measurable returns.

Importantly, the simultaneous influence of ESG disclosure and green product innovation demonstrates a stronger and more significant effect on financial performance compared to their individual application. This reinforces the view that integrated sustainability strategies—combining ESG practices with innovative green products—enhance reputation, investor confidence, and regulatory compliance, thereby securing competitive advantage and resilience in the banking sector.

CONCLUSION

This study underscores the importance of Environmental, Social, and Governance (ESG) disclosure and green product innovation as strategic factors influencing the financial performance of the banking sector in Indonesia. The findings indicate that banks integrating ESG practices and developing environmentally friendly products are more likely to achieve sustainable growth, enhance corporate reputation, and strengthen stakeholder trust. These results highlight the need for financial institutions to embed sustainability initiatives within their core business models, not only as a compliance measure but also as a driver of long-term competitive advantage. Future research could expand the scope across industries and consider longitudinal data to further validate these relationships.

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