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Green Investment Policy as Moderator of ESG and Profitability on Value Relevance in Indonesian Coal Firm

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ABSTRACT

Purpose: This study investigates whether ESG disclosure and profitability affect the value relevance of accounting information proxied by Tobin's Q in coal firms, analyse the Green Investment Policy (GIP) moderation role. It aims to show the ESG efforts and "green" capital allocation uncertainty into higher market valuation in an emission-intensive sector.

Method: Archival coal companies analysis listed on the Indonesia Stock Exchange (IDX) for 2019–2024. Data collected from annual and sustainability reports. The empirical with panel data regression and moderated regression analysis (MRA) using interaction terms (ESG × GIP; Profitability × GIP), also robust standard errors in ensuring the inference in heteroskedasticity.

Findings: ESG disclosure not statistically significant in influencing firm value, either directly or through interaction with Green Investment Policy (GIP). Meanwhile, the interaction between Profitability and GIP is positive and significant, indicating that profits connected to credible green investments are more favourable valued by the market. This suggest that investors prioritize the quality of profit deployment within a sustainable and verifiable framework, rather than merely the total amount of profits. In accounting terms, integrating profitability with credible green investment produces stronger value signals, reflected in higher Tobin's Q.

Novelty/Value: The study redefines value relevance by emphasizing the profits distribution for verifiable green investment than ESG disclosure alone. The study underlining mixed evidence on ESG with the financial performance grows to be value-relevant in relation with credible GIP. The results provide managers, investors, and policymakers to align financial and sustainability objectives in emission-intensive industries.

Keywords: Keywords: accounting information, ESG disclosure, green investment policy, profitability, value relevance.

INTRODUCTION

Climate change is serious problem in global economic stability, affect the nations implement aggressive policies to reduce carbon emissions and accelerate to the green economy transition (Swiss Re Institute., 2021; World Bank., 2020). The business sector expected to contribute through the sustainability practices disclosure and green investments' implementation. ESG disclosure becomes a key instrument for corporate environmental, social, and governance performance communication, where the investors grow attention on the sustainability value (EY., 2013). Spence's (1973), the signaling theory and Francis & Schipper's (1999) value relevance theory, ESG information is the signal which influencing market perceptions of the firm's intrinsic value (Francis & Schipper, 1999; Spence., 1973)

Indonesia is developing country that shows strong commitment to sustainability through strategic policies like the OJK Sustainable Finance Roadmap 2021–2025 (2021) and Presidential Regulation No. 98 (2021) on the carbon economy. These policies strengthened with required sustainability disclosure requirement related to POJK No. 51/POJK.03/2017 and the IDX's initiatives in providing ESG risk assessments. Several initiatives indicate on regulatory compliance (Kelman, 1958) and corporate legitimacy to respond the external pressures (Dowling & Pfeffer, 1975). ESG disclosure become a strategic necessity to maintain competitiveness (Aksan & Gantyowati, 2020).

Profitability reflects a primary indicator of a firm's fundamentals. However, in Indonesia's coal sector show higher ESG disclosure does not always translate into improved market value. PT Harum Energy Tbk, for example had the highest Tobin's Q of 2.49 in 2021 but declined to 1.00 in 2023, despite continuous development in ESG disclosure. The problem raises concern about greenwashing, where companies use ESG to build public image without genuine integration into operational activities (Yildirim, 2023). These practices weaken the credibility of ESG as a reliable signal for investors to assess firm performance (Naibaho & Raudhotuzanah, 2025).

The profitability influence and ESG disclosure on the significance and pertinence of accounting data has been variably reported in recent research. Several studies show favourable correlation (Aydoğmuş et al., 2022; Mohammad & Wasiuzzaman, 2021), while others show negative associations (Al-Tarawneh et al., 2024; Zulaikha et al., 2025). The contradiction underlines conceptual and empirical deficiencies, especially the emerging markets like Indonesia, where regulatory dynamics and investor perceptions are distinctive. The analysis focuses on green investment policy as the moderation element related to profitability, ESG disclosure, and the accounting significance data to connect the disparity. The measures implemented with carbon trading mechanisms and the Indonesian Sustainable Finance Roadmap (Indonesia Carbon Trading Handbook., 2022). The limitation of research has examined the effectiveness to strengthen the relationships. This study enhances the literature through Indonesia's coal sector examination with the biggest emissions contribution and face the rising pressure on energy transition.

Rising global awareness of sustainability has compelled firms to enhance ESG transparency and integrate environmental practices into financial strategies. In Indonesia, issuers face growing pressure to disclose ESG related risks and adapt to green investment incentives aligned with national carbon policies. Investors increasingly rely on ESG and profitability indicators to assess firm value, yet inconsistencies persist in how these signals influence market perception. While profitability remains a core metric of financial performance, its value relevance may shift when aligned with long term green initiatives. Despite regulatory momentum, few studies have examined how ESG disclosure, financial performance, and green investment policies interact to shape the market's valuation of accounting data, particularly in high-emission sectors such as coal. Addressing this gap is critical to improving corporate signaling, public trust, and informed policy making.

The main focus of this research is to evaluate the effect of ESG disclosure and profitability on the value relevance of accounting information, while examining the role of green investment policy as a moderating factor. The study applies a quantitative panel data approach using financial report of coal industry firms listed on the Indonesia Stock Exchange on 2019 and 2024. The Tobin's Q ratio reflects market perception of a company's inherent value and serves as the metric for measuring relevance of accounting information.

The study is distinguished with recent study by several innovative components. It suggests the green investment policy analysis as moderation element related to ESG disclosure, profitability, and value relevance. The recent study has analyzed ESG and value correlation was significance, while green investment regulations as moderation remains unexplored. Then, Indonesia's local context, market features, and regulatory framework, where this study aims to develop critical insights to aid decision-making for corporations and investors. It mainly focuses on coal mining enterprises and relation in sectors registered on the Indonesia Stock Exchange. The MRA implementation utilize panel data tests yields substantial empirical evidence on the ESG disclosure, profitability, and value relevance correlation. The methodology is anticipated producing reliable and generalizable results. The study shows the firms' concerns encounter with sustainability and transparency, by provide a basis for further research in the domain.

The study serves theoretical and practical contributions. The recent body knowledge is predicated on the comprehensive theory amalgamation of value relevance (Francis & Schipper, 1999), bolstered by resource-based view theory (Barney, 1991), compliance theory (Kelman, 1958) stakeholder theory (Freeman, 1984), agency theory (Jensen & Meckling, 1976) and legitimacy theory (Dowling & Pfeffer, 1975) that enhancing signaling theory. These theories establish the conceptual basis for elucidating the green investment policy, ESG disclosure, and profitability related to accounting information significance from Tobin's Q. The findings are aims as strategic reference for companies to develop pertinent sustainability reports while circumventing greenwashing, and policy to guide regulators and investors foster sustainable and value-oriented business practices within Indonesia's capital market.

LITERATURE REVIEW

Grand Theory

Value Relevance Theory by (Beaver, (1968), states the accounting information, especially earnings effectively impact on stock trading volume, and underlined the importance in investors' decision-making processes. The concept developed systematically by Francis & Schipper (1999), with value relevance as the value of accounting information ability to explain changes in stock market prices or confirm the investor expectations. The information such as net income, book equity value, and cash flows assessed the ability to predict the market prices (Ohlson, 1995). As non-financial disclosures develop in practice, value relevance extends to ESG disclosure as the informational element that enhancing investor trust and reduces information asymmetry (Mohammad & Wasiuzzaman S., 2021). The value relevance theory is conceptual foundation in analyze the ESG disclosure effect and profitability on the value accounting information relevance, while green investment policy evaluation strengthens the correlation.

Meanwhile, Signaling Theory by Spence (1973), it begins with the information assumption asymmetry on firms and investors, prompts firms to issue credible signals through various disclosures. ESG disclosure, profitability, and green investment policy is strategic signals to reflect managerial credibility and sustainability commitment. The ESG disclosure signals environmental and social responsibility, profitability signals efficiency and financial sustainability, while green investment policy strengthens a company's positioning within the energy transition agenda (Hurduzeu et al., 2022). The study use signaling theory to explain the three elements provide highly informative signals for investors to assess the value accounting information relevance and the intrinsic firms value in carbon-intensive industries like in Indonesia's coal sector.

Supporting Theory

There are supporting theories to strengthen the conceptual framework related to ESG disclosure, profitability, green investment policy, and the value relevance of accounting information. Stakeholder Theory (Freeman, 1984), the corporations bear responsibility to shareholders and all stakeholders impacted by the operations, such as society and the environment. ESG disclosure is accountability form to stakeholder expectations for sustainability practices (Porter & Van Der Linde C., 1995), that drive higher ESG disclosure quality in the energy sector (Hurduzeu et al., 2022). Furthermore, Agency

Theory (Jensen & Meckling, 1976) provides a basic knowledge related ESG disclosure and green investment policy to degrade agency conflicts and information asymmetry. Agency costs decline when managers demonstrate transparency and accountability through sustainability reporting, especially the market confidence development in financial information quality (Yudhyani et al., 2022; Zhao et al., 2023). In Indonesia's coal sector, ESG is the governance tool in mitigating informational uncertainty and enhance accounting value for investors.

Legitimacy Theory (Dowling & Pfeffer J., 1975), the firms aim to gaining social legitimacy by aligning behaviour and reporting with social norms and public pressures. ESG disclosure and green investment are primary mechanisms in strengthening the legitimacy as the response to growing social and regulatory demands in Indonesia (Handayani & Rokhim R., 2023). Meanwhile, Resource-Based View Theory (Wernerfelt, 1984) reinforces the perspective that ESG commitment and green investment are strategic resources than moral obligation which difficult to imitate and capable to create sustainable competitive advantage (Piao & Mei., 2025). Compliance Theory (Kelman, 1958) enhance the corporate motivations in responding to sustainability regulations, whether external pressure, legitimacy needs, or sustainability internalization values into business strategies. Compliance develops from reactive to strategic related to maturity and sustainability integration within corporate operations (Adhikara et al., 2022). The comprehensive theoretical foundation on study examines the ESG disclosure role, profitability, and green investment policy to shape the value accounting information relevance.

Research Variables

ESG Disclosure is the company's commitment to openly communicate policies and performance regarding environmental, social, and governance issues. Investors increasingly consider non-financial factors in decision-making process (Mohammad & Wasiuzzaman., 2021). ESG disclosure shown to improve market perceptions of firm value especially in energy sector (Aksan & Gantyowati, 2020; Dorothy & Endri E., 2024). ESG is composed the three key elements: Environmental (E), encompass climate change mitigation and resource management (Piao & Mei., 2025); Social (S), focusing on human rights, social inclusion, and community responsibility (Musa et al., 2024); and Governance (G), cover business ethics, board structure, and transparency (Chehade & Procházka, 2024). The Indonesia's regulations like POJK No. 51/POJK.03/2017 and SEOJK No.16/SEOJK.04/2021 mandate the ESG integration into annual reports, supported by the Sustainable Finance Roadmap II (2021–2025) and IDX guidance that significantly increased sustainability report (Chandra Verina & Rohman A., 2024).

Profitability measured with EBITDA ratio to total assets. EBITDA shows a pure operating performance measurement without taxes, interest, and non-cash charges (Forum, 2021). Although not required under IFRS, EBITDA is widely used as consistent management performance measure (IASB, 2018). Its relevance shows the connection on ESG disclosure practices with financial performance improvements (Hurduzeu et al., 2022). The EBITDA-to-assets ratio shows asset efficiency to generate operating income and show credible financial health indicator for lenders (Sufi, 2009). The systematic measure serves sound basis to analyze the profitability and the value accounting information relevance.

Green Investment Policy is resource allocation toward projects supporting environmental sustainability like renewable energy and low-carbon technologies (Bacchiocchi Bellocchi A. & Giombini G., 2024). Rooted in green accounting principles extending the accounting systems to include environmental responsibilities (Owen et al., 1997), green investment is particularly crucial in Indonesia from Paris Agreement commitments and the domestic carbon market (Indonesia Carbon Trading Handbook., 2022). Beyond ecological impact, green investment and signals sustainable corporate commitment to sustainability (Piao & Mei B., 2025) and contributes positively to efficiency and profitability (Cristea et al., 2025). Green investment assessed with content sustainability reports analysis according to indicators from the Indonesian Green Taxonomy and OJK Roadmap, producing an index score ranging from 0–100% (Krippendorff, 2004).

Value Relevance of Accounting Information captures the ability of accounting data to influence economic decisions by associating with market value (Francis & Schipper K., 1999). Building upon Beaver (1968) and Ohlson (1995), this study uses Tobin's Q as a proxy for firm value, aligned with the informative view of Francis & Schipper (1999)), which measures the extent to which accounting information explains market value. Tobin's Q is calculated as the ratio of market value of equity and

debt to total assets (Tobin, 1969) , and is widely applied in analyzing ESG and green investment impacts on information relevance in the energy and agriculture sectors.

Previous Researchers

Previous studies have examined the relationships between ESG disclosure, profitability, green investment, and the value relevance of accounting information, often in isolation. Dorothy & Endri (2024) demonstrated that ESG disclosure and profitability positively influence firm value in the energy sector, showed that profitability and capital structure shape market perceptions of firm value, particularly in the coal subsector. Although studies such as (Aydoğmuş et al., 2022) emphasize the significance of ESG for financial performance and firm value, findings across countries remain inconsistent due to varying contextual and regulatory environments. Related study analyzed specific ESG dimensions, like (Zhao et al., 2023) highlight ESG's role to reduce firm risk, and Swarly & Wibowo (2022) stressing governance and profitability as key market perception drivers. The studies have not related to ESG with the value accounting information relevance, tending instead focusing on firm value or stock returns.

The growing attention to sustainability and the energy transition, several Indonesian studies highlighting green investment and internal efficiency as firm value determination (Handayani & Rokhim R., 2023; Susilowati et al., 2024). However, explicit empirical analyse Green Investment Policy moderates the ESG disclosure, profitability, and value relevance relationship remains scarce, particularly within the coal industry. The study addresses the gap with integrated approach, measure ESG disclosure and green investment against POJK No. 51/POJK.03/2017 and GRI standards, while EBITDA-to-assets ratio is profitability indicator and Tobin's Q is value relevance measurement. Thus, the research provides theoretical and practical contributions to strengthen the value relevance framework by sustainability factors corporation, in line with Francis & Schipper (1999), support the accountants role in strategic sustainability reporting (Ramadhan et al., 2023).

Relationships Between Variables

Sustainability reporting from ESG disclosure is integral to enhance the value accounting information relevance, especially when combined with profitability and green investment policy. The three elements play strategic roles to shape market firm value perceptions, where ESG enhances credibility, profitability reflects efficiency, and green investment signals long-term sustainability commitments (Mohammad & Wasiuzzaman S., 2021). The Value Relevance Theory (Francis & Schipper K., 1999) and Signaling Theory (Spence, 1973), where study posits accounting information complemented with sustainability signals exerts a positive influence on market value perceptions. Green investment as the moderation variable and a direct predictor (Martínez-López et al., 2020). The **H1** states ESG disclosure and profitability influence the value relevance of accounting information, moderated by green investment policy.

ESG disclosure is communication tool for corporate social and environmental accountability, also positive management quality signal and corporate governance (Piao & Mei B., 2025). Transparent ESG reporting develops legitimacy and market trust, degrades information asymmetry, and strengthens firm performance evaluation especially in energy sector (Dorothy & Endri E., 2024; Naibaho & Raudhotuzanah, 2025)). In line with ESG disclosure shown to correlate with higher firm value, as Tobin's Q which indicate that the market now regards non-financial information as equally relevant as financial information (Mohammad & Wasiuzzaman S., 2021). Therefore, the **H2** states that ESG disclosure influences the value relevance of accounting information.

Profitability is a key operational strength and efficiency signal. The higher profitability reduces informational uncertainty and reinforces investor confidence in reported information (Cristea et al., 2025). Moreover, financially profitable firms report shows higher predictive quality and related statistically with increases in Tobin's Q (Hurduzeu et al., 2022). Accounting information like earnings and book value that becomes more relevant when underpinned by strong financial performance. The **H3** states that profitability influences the value relevance of accounting information.

Green Investment Policy signals corporate readiness aims on environmental regulations and stakeholder expectations regarding sustainability. From the legitimacy theory like policy strengthens

social firm acceptance (Musa et al., 2024), while resource-based perspective stated green investments is strategic, inimitable resources to enhance competitive advantage (Barney, 1991). Empirical findings show green investment policies positively correlate with market perceptions of accounting information quality and firm value (Bacchiocchi et al., 2024). Therefore, the **H4** states that green investment policy influences the value relevance of accounting information.

The ESG disclosure credibility is questioned if not supported by concrete implementation in green investments' form. Green investment validates sustainability disclosures, reinforces market trust, and mitigates risks of "greenwashing" (Hasan & Al-Najjar, 2024). The consistency in signaling theory among disclosure and action strengthens a firm's positive signal (Oza & Patekar, 2024). Cristea et al (2025), stated the only firms combining ESG disclosure with green investments achieved significant development in firm value. The **H5** states green investment policy strengthens the relationship between ESG disclosure and the value relevance of accounting information.

High profitability provides a financial foundation to support sustainability agendas through green investment. Within the RBV framework, profits drive green investment strategies which enhancing competitiveness and investor perceptions (Bacchiocchi et al., 2024). (Piao & Mei B., 2025) stated profitability impact on firm value becomes more significant when combined with green investments. The combination of signals on short-term efficiency and long-term sustainability. The **H6** states green investment policy strengthens the relationship between profitability and the value relevance of accounting information.

Research Model

Based on Figure 1, the model shows ESG disclosure and profitability as independent variables, accounting information value as the dependent variable, and green investment policy as a moderator. It tests five direct and two moderating hypotheses to explore financial and non-financial impacts on firm value. Hypothesis Development:

1. There is an influence of ESG disclosure and profitability on the value relevance of accounting information, with green investment policy serving as a moderating variable.
2. ESG disclosure has a significant effect on the value relevance of accounting information.
3. Profitability has a significant effect on the value relevance of accounting information.
4. Green investment policy has a significant effect on the value relevance of accounting information.
5. Green investment policy strengthens the relationship between ESG disclosure and the value relevance of accounting information.
6. Green investment policy strengthens the relationship between profitability and the value relevance of accounting information.

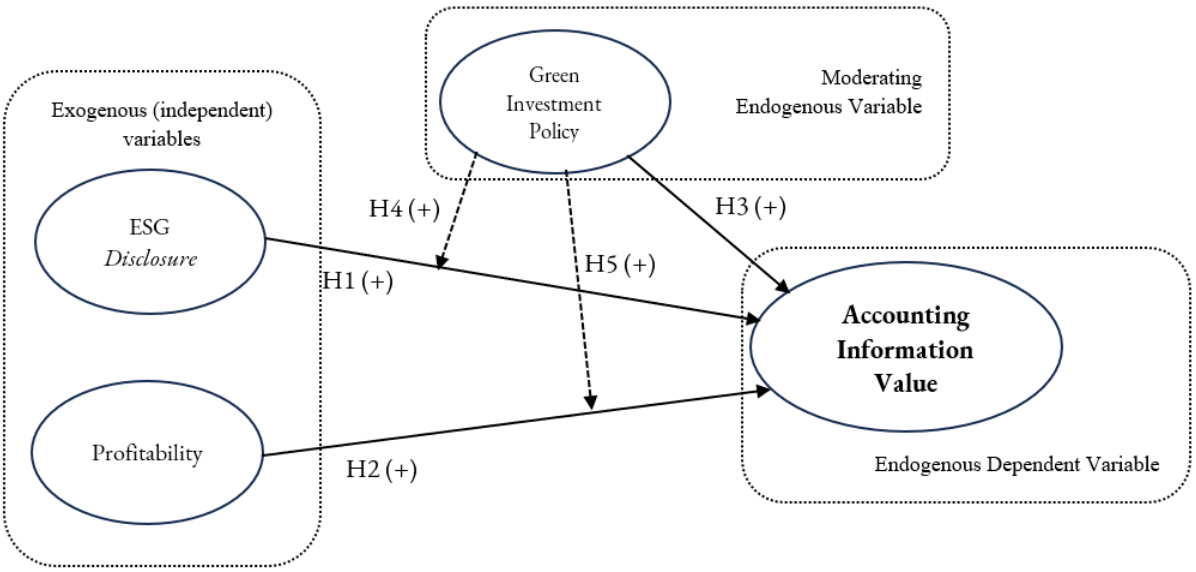

Figure 1. Research Model Visual

RESEARCH METHOD

Research Design

The quantitative methodology implements with a causal-explanatory research design to investigate the ESG Disclosure and Profitability impact on the value relevance of accounting data, such as moderating impact of Green Investment Policy. The analytical model utilized panel data regression employing multiple linear regression and interaction analysis MRA, with companies as the entities and years as the temporal dimension.

Type and Source of Data

The quantitative data collected from secondary sources such as annual reports, sustainability reports, and audited financial statements. The data obtained from the authorized the Indonesia Stock Exchange (www.idx.co.id) webpage and related to corporate websites. The time horizon focuses on a time-series coal sector companies' panel. The data processed into ESG scores, EBITDA values, Green Investment Policy scores, and components to calculate Tobin's Q.

Population and Sample

The saturation sampling strategy aims to utilize complete population that related requirements as the sample. The population are all enterprises functioning within the energy industry and registered on the Indonesia Stock Exchange (IDX) from 2019 to 2024 with 27 entities.

Data Analysis Technique

The panel data regression with Moderated Regression Analysis to analyze the data. This method is used to show ESG Disclosure and Profitability affect the Significance of Accounting Information Value Relevance as dependent variable. It also shows Green Investment Policy directly and indirectly affects the ESG Disclosure, Profitability, and Value Relevance correlation. The panel data methodology integrates cross-sectional data (among enterprises) with time-series data (across years). The regression panel models with moderation factors are delineated:

Model 1: Direct Effects

$$TobinQit = \alpha + \beta1ESGit + \beta2PROFit + \beta3KIHit + \epsilon it \quad (1)$$

Model 2: Moderating Role of Green Investment Policy

$$TobinQit = \alpha + \beta1ESGit + \beta2PROFit + \beta3KIHit + \beta4(ESGit \times KIHit) + \beta5(PROFit \times KIHit) + \epsilon it \quad (2)$$

Where:
TobinQit = Firm value of firm I at year t, measured with Tobin's Q ratio as a proxy for value relevance of accounting information.
A = Intercept show average Tobin's Q ratio when all independent variables equal zero.
ESGit = ESG Disclosure as the first independent variable.
PROFit = Firm profitability measured with the ratio of EBITDA to Total Assets.
GIPit = Green Investment Policy as independent variable and moderator.
ESGit × GIPit = Interaction among ESG Disclosure and Green Investment Policy to test moderation effects.
PROFit × GIPit = Interaction between Profitability and Green Investment Policy, used to test moderation effects.
Eit = Error term, representing unexplained variation for firm I in year t.

Model Selection

Before the model is tested, the classical assumption test has been conducted. The panel data regression integrated with Moderated Regression Analysis (MRA) used as analytical method. It aims to examines the ESG Disclosure and Profitability effect on the Value Relevance of Accounting Information as the

dependent variable, then the moderating Green Investment Policy role on the ESG Disclosure, Profitability, and Value Relevance relationship through direct and indirect pathways.

The MRA assesses Green Investment Policy (GIP) intensifies or diminishes the ESG Disclosure and Tobin's Q correlation to examine Profitability and Tobin's Q. This step is crucial to analyze the interplay among variables and establish if the green investment policy amplifies the ESG Disclosure or Profitability effect on business worth. The data process with STATA statistical software.

RESULTS AND DISCUSSION

Results

Descriptive Statistics Test

The descriptive statistical analysis study focuses on 162 observations' characteristics across the variables Tobin's Q, ESG disclosure, profitability, and Green Investment Policy (GIP). It aims to understand the distribution and detect potential outliers prior to advanced analysis.

Table 1. Descriptive Statistics

Variabel	N	Mean	Std. Dev.	Min	Max
Firm Value (TQ)	162	1.934831	2.760742	0,.0530882	18.10736
ESG Disclosure (ESG)	162	0.5619202	0.4298655	0	1
Profitability (PROF)	162	0.1874945	0.1855583	-0.1377339	0.8269146
Green Investment Policy (GIP)	162	0.6337449	0.2914052	0	1

Source: Data Processed – 2025

Based on Table 1, the descriptive statistics summarize 162 observations of coal sector firms during the study period. The average Tobin's Q of 1.93 shows coal sector firms are generally valued by the market above the book value. ESG disclosure with average 56.19% show moderate transparency, with variability, which enhancing investor trust. Profitability measured by EBITDA to total assets, where 18.75% average, showing a reasonably strong operational performance. Meanwhile, GIP records 63.37% average, signaling growing awareness among firms toward environmentally friendly investments. The finding suggests despite the transitioning challenges to sustainability; coal sector companies show positive commitment signs to transparency and sustainable business strategies.

Correlation Test

It aims to identify the the key variables' relationship: ESG disclosure, profitability, Green Investment Policy (GIP), and firm value (Tobin's Q).

Table 2. Correlation Matrix

	TQ	ESG	PROF	GIP
TQ	1.0000			
ESG	0.0583	1.0000		
	0.4614			
PROF	0.2013	0.3708	1.0000	
	0.0102	0.0000		
GIP	0.0507	0.7999	0.3407	1.0000
	0.5216	0.0000	0.0000	

Source: Data Processed – 2025

Based on Table 2, the correlation matrix reveals varied relationships among the key variables. The ESG disclosure and GIP lack a statistically significant connected with firm value and exhibit correlation coefficients of 0.0583 (p = 0.4614) and 0.0507 (p = 0.5216). The profitability variable positively and significantly related with company value (r = 0.2013; p = 0.0102), meanwhile the correlation is minor. Conversely, the independent variables correlation exhibits a more robust connection. ESG disclosure shows a significant relation with profitability (r = 0.3708; p = 0.0000) and a robust relation with GIP (r = 0.7999; p = 0.0000.

Table 3. Summary of Correlation Results

Correlation	R	p-value	Interpretation
TQ – ESG	0.0583	0.4614	× Not significant, no correlation
TQ – PROF	0.2013	0.0102	√ Weak but positive and significant
TQ – GIP	0.0507	0.5216	× Not significant
ESG – GIP	0.7999	0.0000	√√ Very strong correlation and significant
PROF – GIP	0.3407	0.0000	√ Significant and moderate

Source: Data Processed – 2025

Based on Table 3, the summary of correlation results reinforces prior findings from the correlation matrix. ESG disclosure and Green Investment Policy (GIP) show no significant correlation with firm value (TQ), with p-values above 0.05. Profitability, however, demonstrates a weak but statistically significant positive correlation with firm value ($r = 0.2013$; $p = 0.0102$). Notably, ESG and GIP have a very strong and significant correlation ($r = 0.7999$), indicating that firms with higher ESG transparency tend to implement more green investment policies. Similarly, profitability correlates moderately and significantly with GIP ($r = 0.3407$), suggesting financial performance may support sustainability investments.

Assumption testing. All classical assumption tests, including multicollinearity, were conducted prior to regression analysis. The Variance Inflation Factor (VIF) values for all independent variables were below the threshold of 5, indicating no serious multicollinearity concerns and confirming the suitability of the model for further analysis. Detailed results are provided in Appendix.

Selection of Regression Model

The last phase in panel data regression analysis aims to select appropriate panel data model to shows the interrelationships among variables. It aims to determine the company characteristics significantly affect the model.

Chow test. The panel data regression model commences with the Chow Test to determine Fixed Effect Model is better suitable than Pooled OLS. Interpretation of the Chow test is as follows: the null hypothesis (H_0) suggests that the Pooled OLS model is more appropriate, assuming that all individual effects are equal to zero, while the alternative hypothesis (H_1) indicates that the Fixed Effect model is preferable due to the presence of significant individual effects across entities (firms).

Table 4. Regression Test with Pooled OLS

Statistic	Pooled OLS	Fixed Effect
Number of obs	162	162
Number of groups	–	27
Prob > F	0.0850	0.0019

Source: Data Processed – 2025

Based on Table 4, the regression test compares the Pooled OLS and Fixed Effect models to determine the appropriate panel data approach. The results show a Prob > F value of 0.0000 (< 0.05), where H_0 is rejected and the determination that the Fixed Effect Model is more appropriate. It indicates significant differences in characteristics across companies in the analysis. Consequently, the Fixed Effect Model become more accurate to shows relationship among ESG Disclosure, Profitability, Green Investment Policy, and firm value.

Hausman test. The Hausman test implemented in panel data regression to identify the most suitable estimation model among Fixed Effect Model (FEM) and the Random Effect Model (REM). It analyses the individual effects (cross-sectional units like firms) and the independent variables in the model.

Table 5. Hausman Test

Variable	(b) FE	(B) RE	(b – B)	Std. Err. (√diag(V_b – V_B))
ESG	-0.0862041	-0.098405	0.0122009	0.0654083
PROF	0.7783847	0.9467803	-0.1683957	0.1777099
GIP	1.876443	1.738562	0.137881	0.1336606
Chi²(3)			**2.07**	Prob > Chi² = **0.5573**

Source: Data Processed – 2025

Based on Table 5, the Hausman Test is applied to determine the most appropriate panel data estimation model between the Fixed Effect Model (FEM) and the Random Effect Model (REM). The test results show H_0 is accept with 0.5573 Prob > chi² value, which >0.05 threshold, it implies no detectable difference among Fixed Effect and Random Effect Model coefficients. Consequently, the Random Effect Model (REM) is suitable model. The Hausman test shows no significant difference among FE and RE models. The REM is more efficient without sacrificing consistency.

Moderated Regression Analysis (MRA)

MRA aims to ascertain if the Green Investment Policy (GIP) amplifies the ESG disclosure and profitability significance on business value (Tobin's Q). The analysis is crucial to examine interactions among strategic variables, such as interactions may be non-linear and influenced by broader environmental factors such as green investment policies.

Table 6. Moderated regression Analysis (MRA)

Random-effects GLS regression				Number of obs =		162
Group variable: ID				Number of groups =		27
R-squared:				Obs per group:		
Within =	0.1657			min =		6
Between =	0.0009			avg =		6.0
Overall =	0.0117			max =		6
				Wald chi2(5) =		25.48
corr(u_i, X) = 0 (assumed)				Prob > chi2 =		0.0001
TQ	**Coefficient**	**Std. err.**	**Z**	**P>|z|**	**[95% conf.**	**interval]**
ESG	0.0080429	1.059546	0.01	0.994	-2.068629	2.084715
PROF	-5.139536	2.27416	-2.26	0.024	-9.596807	-0.6822644
GIP	0.4282605	0.8506384	0.50	0.615	-1.23896	2.095481
ESG_GIP	0.0162421	1.419696	0.01	0.991	-2.766311	2.798795
PROF_GIP	7.866555	2.765459	2.84	0.004	2.446354	13.28676
_cons	1.536356	0.6728872	2.28	0.022	0.2175214	2.855191
sigma_u	2.6910219					
sigma_e	1.1307966					
Rho	0.84992301	(fraction of variance due to u_i)				

Source: Data Processed – 2025

Based on Table 6, the moderated regression analysis (MRA) explores how Green Investment Policy (GIP) moderates the effects of ESG disclosure and profitability on firm value. The Wald chi² value of 25.48 and a probability of 0.0001 indicate that the overall model is statistically significant. However, ESG disclosure and its interaction term (ESG_GIP) show no significant effect on firm value ($p = 0.994$ and $p = 0.991$), in contrast, the interaction between profitability and GIP (PROF_GIP) is significant ($p = 0.004$). In detail hypothesis are explained with below.

Hypothesis 1: The effect of ESG disclosure and profitability on Firm Value with Green Investment Policy as a moderator Test. The panel regression shows ESG disclosure, profitability, and Green Investment Policy (GIP) have influenced firm value with high statistical significance ($p = 0.0001$). Nevertheless, it shows 16.57% of the variance in firm value, with the balance affected by

external factors like market risks, ownership structure, and anticipations concerning energy transition (Aydoğmuş et al., 2022). The ESG disclosure average (56.2%) and profitability (18.7%) reflect compliance-oriented characteristics, that not yet become strategic market signals except the integration with GIP (average = 0.63), which as effective moderator.

Hypothesis 2: The Effect of ESG Disclosure on Firm Value Test. The results suggest ESG disclosure lacks a significant effect on firm value (Tobin's Q), and -0.008 coefficient and a p-value of 0.994, show ESG is not market value determination, where hypothesis is rejected. The 56.2% average ESG disclosure with a standard 0.4299 deviation shows inconsistent implementation on firms and the compliance-oriented approach domination.

Hypothesis 3: The Effect of Profitability on Firm Value Test. The regression analysis shows profitability (PROF) significantly influences firm value. The coefficient for Tobin's Q is -5.1395 with 0.024 p-value, where the hypothesis is accepted. However, the negative coefficient shows high profits send a negative signal (bad news) to investors, as cannot fulfill market expectations. The 18.7% average profitability with 0.1856 standard deviation shows relatively low and volatile profit margins in the coal sector, weakening the signaling profitability power when not accompanied by sustainable strategic investments.

Hypothesis 4: The Effect of Green Investment Policy (GIP) on Firm Value Test. The regression results show Green Investment Policy (GIP) create favorable and negligible impact on business value (Tobin's Q) with 0.428 coefficientand p = 0.615, so the hypothesis is rejected. The average GIP score is 0.63 shows most companies implemented the policies, the high variation in implementation shows GIP has not implemented strategically or systematically.

Hypothesis 5: GIP Moderates the Effect of ESG on Firm Value Test. The regression test show interaction among ESG and Green Investment Policy (GIP) does not significantly affect firm value (coefficient = 0.0162; p = 0.991), so the hypothesis is rejected. The finding suggest that GIP has not strengthened the ESG influence disclosure on firm value due to the weak sustainability strategies integration among the two.

Hypothesis 6: GIP Moderates the Effect of Profitability on Firm Value Test. The regression analysis reveals that the interaction between profitability and Green Investment Policy (PROF × GIP) has a positive and substantial effect on business value. (coefficient = 7.8666; p = 0.004), meaning that GIP strengthens the effect of profitability on market valuation. Although the average profitability of 18.7% indicates a moderate financial position, profits are valued by the market only when directed toward supporting green investments, creating a high-quality signal about the company's long-term prospects.

The MRA show ESG disclosure does not substantially influence corporate value (coefficient = 0.0080; p = 0.994), where the market as mere administrative compliance. Profitability shows a significantly negative effect on firm value (coefficient = -5.1395; p = 0.024), where high profits without a sustainability strategy perceived negatively by the market especially in the coal sector. The Green Investment Policy (GIP) not significantly effected (coefficient = 0.4283; p = 0.615), where the market has not entirely shown the green investments worth in the conventional energy sector. The ESG × GIP interaction is not significant (p = 0.991), show no strategic synergy has yet been appreciated by the market. However, the PROF × GIP interaction significantly positive effect (coefficient = 7.8665; p = 0.004), where profitability is more highly valued by the market with commitment to green investment.

Robust Standard Error Test

It aims to show potential homoskedasticity assumptions violations or within-cluster (panel) correlations which bias standard errors and produce inaccurate significance estimation. The robust standard errors in panel data fixing the distortions, especially when model variables have complex interrelationships and data come from multiple entities observed over time.

Based on Table 7, the robust standard error estimation is applied to address potential violations of the homoskedasticity assumption and within-cluster correlation bias. The results remain consistent with the previous model, where ESG disclosure remains insignificant (coefficient = -0.0080; p = 0.994), where the coal sector market has not yet considered ESG as of firm value determinant. Profitability shows unstable negative relationship (coefficient = -5.1395; p = 0.171), where high profits are not

consistently translated into added value by investors, possibly due to concerns on sustainable environmental risks.

Table 7. Robust Standard Error

Random-effects GLS regression		Number of obs =	162
Group variable: ID		Number of groups =	27
R-squared:		Obs per group:	
Within =	0.1657	min =	6
Between =	0.0009	avg =	6.0
Overall =	0.0117	max =	6
		Wald chi2(5) =	5.53
corr(u_i, X) = 0 (assumed)		Prob > chi2 =	0.3548

(Std. err. adjusted for 27 clusters in ID)

TQ	Coefficient	Robust std. err.	z	P>|z|	[95% conf.	interval]
ESG	0.0080429	0.9950639	0.01	0.994	-1.942246	1.958332
PROF	-5.139536	3.758139	-1.37	0.171	-12.50535	2.226281
GIP	0.4282605	1.03045	0.42	0.678	-1.591383	2.447904
ESG_GIP	0.0162421	1.297997	0.01	0.990	-2.527786	2.56027
PROF_GIP	7.866555	4.772548	1.65	0.099	-1.487466	17.22058
_cons	1.536356	0.660229	2.33	0.020	0.242331	2.830381
sigma_u	2.6910219					
sigma_e	1.1307966					
rho	0.84992301	(fraction of variance due to u_i)				

Source: Data Processed – 2025

The Green Investment Policy (GIP) remains insignificant (coefficient = 0.4282; p = 0.678), where green strategies cannot attract market responses. The ESG × GIP interaction is insignificant (coefficient = 0.0162; p = 0.990), where reinforce the finding that the synergy is not yet effective to shape value perception. Meanwhile, the PROF × GIP interaction show positively direction (coefficient = 7.8665; p = 0.099).

Key Findings and Conclusions (MRA + Robust)

The moderated regression analysis aims to show the Green Investment Policy (GIP) significantly strengthens the profitability and firm value correlation but is ineffective to moderate the ESG disclosure effect. Although statistical significance decreased after implement the robust standard error corrections, the relationship direction remained consistent, where profitability and green commitment combination can create higher market value. However, the relatively small GIP coefficient (0.428) when other variables are controlled shows adopting green investment policiese is not yet considered sufficient added value by the market. The findings emphasize sustainability must be genuinely implemented rather than merely reported, especially in high-risk industries like coal. Green investment is critical catalyst that reinforces market confidence in the financial information and firm value.

Based on Table 8, the hypothesis testing summary reveals that ESG disclosure consistently shows no significant effect on firm value across both models (MRA and RSE). Profitability significantly influences firm value under the MRA model (p = 0.024), though the RSE model shows insignificance (p = 0.171). Green Investment Policy (GIP) also lacks significance in both models, indicating limited strategic signaling power. The interaction between ESG and GIP fails to produce significant results, confirming weak integration. However, the interaction between Profitability and GIP is significant in MRA (p = 0.004) and moderately significant in RSE (p = 0.099), showing growing recognition of green-aligned profit strategies in enhancing firm value.

Table 8. Hypothesis Testing Summary

No	Variable/ Interaction	Model	KO	PV	SIG	Accounting Interpretation
1	ESG → TQ	MRA	0.0080429	0.994	Not Significant	ESG is not yet valued by the market, considered a cost, not a value creator.
		RSE	0.0080429	0.994	Not Significant	The effect remains negative; investors do not yet view ESG as a value signal.
2	PROF → TQ	MRA	-5.139536	0.024	Significant	High profitability statistically negatively impacts company value.
		RSE	-5.139536	0.171	Not Significant	The instability of the relationship indicates that profitability has not been interpreted by the market as a sustainability signal.
3	GIP → TQ	MRA	0.4282605	0.615	Not Significant	GIP has not yet become a strategic market signal that supports company value.
		RSE	0.4282605	0.678	Not Significant	GIP has not consistently provided signals to the market.
4	ESG × GIP → TQ	MRA	0.0162421	0.991	Not Significant	GIP has failed to moderate ESG; sustainability signals are poorly integrated.
		RSE	0.0162421	0.990	Not Significant	ESG and GIP synergies remain weak; they have not yet formed a strong accounting signal.
5	PROF × GIP → TQ	MRA	7.866555	0.004	Significant	GIP strengthens profits; sustainable profit signals are valued by the market.
		RSE	7.866555	0.099	Moderate, Significant	Statistically strong at the 10% level; the synergy between profit and GIP is increasingly recognized by the market.

Source: Data Processed – 2025

Discussion

The effect of ESG disclosure and profitability on Firm Value with Green Investment Policy as a moderator

The overall findings show that ESG disclosure, profitability, and Green Investment Policy (GIP) influence firm value when examined together. However, the interaction among the variables indicates that sustainability initiatives only create value when aligned with financial performance. This supports the argument that ESG alone is insufficient without strategic integration, particularly in high-impact industries such as coal. The GIP strengthens the function of financial performance by guiding firm resources toward sustainable initiatives, consistent with agency theory which explains that strategic policy alignment reduces information asymmetry and enhances investor trust (Oza & Patekar, 2024; Brahmayanti, 2024). ESG disclosure without tangible commitments like GIP is considered to have no value relevance, which in line with (Cristea et al., 2025). Thus, only profitability supported by GIP is relevant to market value, while ESG disclosure without substantive policies may even generate negative signals (bad news). The findings emphasize the sustainability use and financial performance as a driver for meaningful value indicators in investment decision-making. The ESG ability and profitability to create value materializes when reinforced by a strategically integrated Green Investment Policy.

The Effect of ESG Disclosure on Firm Value

ESG disclosure does not show a significant association with firm value. This suggests that ESG reporting remains largely compliance-oriented and has not yet functioned as a credible signal for investors. The results diverge from signaling theory and value relevance theory, which assume that transparent information should enhance firm valuation. Instead, the findings align with compliance theory, where ESG reporting is treated as a regulatory requirement rather than a strategic tool (Aydoğmuş et al., 2022; Baran et al., 2022). The ESG effectiveness to create market value depends heavily on consistent implementation and sustainable strategic integration by investors. Similar outcomes are reported by Cristea et al. (2025), who found that ESG disclosure lacks market impact when implementation is inconsistent or lacks operational integration. Thus, without substantive practices, ESG disclosure fails to create positive market perception.

The Effect of Profitability on Firm Value

Profitability significantly influences firm value, yet the negative direction indicates that profits alone do not generate positive market responses. In the coal sector, high profits may reflect short-term gains that conflict with sustainability expectations, causing investors to interpret them as "bad news". This contradicts the traditional expectations of signaling theory, where profitability should enhance investor confidence. Instead, the finding aligns with studies showing that profit signals require sustainability alignment to be valued by the market (Dorothy & Endri, 2024; Krismiaji & Surifah, 2020). From the agency theory perspective, profitability without sustainability direction may increase perceived risk and widen information asymmetry (Oyedokun et al., 2020; Brahmayanti, 2024). Thus, profitability becomes value relevant only when supported by sustainability-driven strategic decisions.

The Effect of Green Investment Policy (GIP) on Firm Value

GIP does not significantly affect firm value, indicating that the market has not yet viewed green investment commitments as meaningful value enhancers in the coal industry. From the Resource-Based View (RBV), this illustrates that green investment policies have not matured into strategic resources capable of strengthening competitive advantage. The finding is consistent with Bacchiocchi et al. (2024) and Hasan & Al-Najjar (2024), who found that green investment initiatives in resource-intensive industries often influence internal processes rather than directly translating into market valuation. Stakeholder theory further supports this outcome, as stakeholders may still perceive GIP as symbolic or limited in execution.

Green Investment Policy Moderates the Effect of ESG on Firm Value

The interaction between ESG disclosure and GIP does not significantly impact firm value. This shows that GIP has not enhanced the credibility of ESG disclosure. Both remain weak signals because they lack integration into firm strategy and operational practices. This finding aligns with compliance theory, where ESG disclosure is perceived as a formal requirement rather than a genuine sustainability strategy. Prior research Oza & Patekar (2024) and Aydoğmuş et al. (2022), also demonstrates that ESG provides market value only when connected to concrete sustainability investments. In this case, the absence of strategic synergy results in ESG remaining non-value relevant.

Green Investment Policy Moderates the Effect of Profitability on Firm Value

GIP significantly strengthens the effect of profitability on firm value. This shows that profit becomes a credible and positive signal when firms allocate financial resources toward green investment initiatives. The market values profitability not as an isolated financial metric, but as a foundation for long-term sustainable growth. This supports signaling theory and value relevance theory, where sustainability-oriented profit allocation enhances information credibility and investor confidence. The result also aligns with. Cristea et al. (2025) and Biju et al. (2025) who found that integrating financial performance with environmental commitments improves market perception of firm value. From an agency theory standpoint, the alignment reduces conflict of interest by demonstrating management's commitment to long-term stakeholder value.

Research Findings

These findings support the value relevance of accounting information, emphasizing that information disclosed to the public must be useful for decision-making processes. In this context, signaling theory suggests that profits allocated to green investments convey more credible signals to investors. ESG disclosure without the support of substantive policies is insufficient to function as a strategic signal, as it does not adequately represent a firm's long-term commitment. From the perspective of agency theory, allocating profits to Green Investment Policy (GIP) can also mitigate conflicts of interest between management and shareholders by demonstrating a long-term orientation. Consistent with value relevance theory, only profits reinforced by green investment policies are proven to be relevant to market value. Meanwhile, the weak influence of ESG disclosure aligns with compliance theory, where ESG is perceived primarily as a reporting obligation rather than a value-creating mechanism.

These results further imply that information disclosed by firms cannot yet be fully relied upon by the market to interpret firm value, as investors tend to react naively to such information. Consequently, this condition generates a bad news signal, reflected in the negative coefficients associated with firm performance. Even relatively strong fundamentals in terms of profitability and ESG disclosure are interpreted as containing unfavorable information. The transformation of bad news into a good news signal occurs only through the moderating role of GIP. This interpretation is supported by Cristea et al. (2025), who emphasize the importance of integrating sustainability initiatives with financial performance as a credible value signal. Additional support is provided by Aydoğmuş et al. (2022) and Oza & Patekar (2024), who find that ESG disclosure unaccompanied by concrete policies such as GIP is insufficient to influence firm value. Therefore, the success of ESG disclosure and profitability in creating market value materializes only when reinforced by strategically integrated green investment policies.

This study affirms that Green Investment Policy (GIP) plays a strategic role in strengthening the relevance of profits to firm value by transforming negative signals from weak profitability into positive perceptions when accompanied by green investment commitments. GIP acts as a reputational mechanism that enhances market credibility, making it a strategic necessity rather than an optional measure. In the context of IFRS S1 and S2 adoption, which is currently progressing through the development of the Indonesian Sustainability Disclosure Standards (PSPK) by the Indonesian Institute of Accountants (IAI), companies are expected to utilize the 2025–2026 transition period to build comprehensive readiness for sustainability reporting. Failure to respond adequately during this period risks undermining competitiveness and market trust. Therefore, integrating GIP into corporate reporting is not merely a regulatory response but an essential component of value-driven strategy.

CONCLUSION

This study concludes that ESG disclosure has not demonstrated a substantial impact on firm value, either directly or when moderated by Green Investment Policy (GIP). This indicates that ESG has not yet become a strategic signal valued by the market in the coal sector. In contrast, profitability combined with GIP shows a significant effect on market value, suggesting that investors value profits only when they are directed toward supporting sustainable investments. These findings reinforce the notion that integrating financial performance with sustainability orientation creates stronger accounting signals in shaping long-term perceptions of corporate value.

The research is constrained by the relatively small number of observations and the narrow sectoral scope, which constrains the generalizability of its findings. Moreover, ESG measurement relies solely on formal reporting without considering the quality of implementation in practice, while GIP is measured using a still-limited approach. Other limitations include potential variations in reporting transparency across firms and the absence of considerations for non-linear effects within the model, both of which may affect the accuracy of empirical results.

Future study should broaden the sample coverage across other industries and historical periods, and to use ESG data from independent sources to strengthen external validity. Incorporating qualitative approaches, such as management interviews, is also recommended to capture the strategic nuances

behind ESG practices. Furthermore, the measurement of GIP should be developed into a more comprehensive evaluative framework that integrates green capital expenditure, internal policies, and sustainability impacts, thereby providing a more holistic strategic perspective in shaping firm value.

The findings of this research enrich Value Relevance Theory by showing that profitability only has market relevance when accompanied by credible sustainability signals. Moreover, the findings reinforce Resource-Based View and Signaling Theory, as they suggest that the combination of profitability and green investment generates a unique competitive edge that is hard to imitate, while also enhancing investors' confidence in a company's long-term outlook.

Practically, companies particularly those in carbon-intensive sectors must treat GIP as a mandatory strategy rather than a mere complement to ESG reporting. The combination of profitability and GIP forms a value signal that the market appreciates, making GIP both a reputational safeguard and a lever for long-term value creation. Management should integrate GIP into strategic decision-making and performance reporting. For regulators, these findings support the importance of standardizing ESG reporting and highlight the urgency of strengthening green investment disclosures in preparation for the implementation of IFRS S1 and S2, which will evolve into the Indonesian Sustainability Disclosure Standards (PSPK).

List of Abbreviations

GIP = Green Investment Policy
IDX = Indonesia Stock Exchange
MRA = Moderated Regression Analysis
RSE = Robust Standard Errors
ESG = Environmental, Social, and Governance
IFRS = International Financial Reporting Standards
IAI = Indonesian Institute of Accountants
PSPK = Indonesian Sustainability Disclosure Standards

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Authors' Contribution

FR conceptualized the research idea, structured the theoretical framework, and conducted data collection and initial statistical analysis. MFA refined the research design, performed robustness and diagnostic tests, and reviewed the methodology. FR drafted the initial manuscript. Both FR and MFA collaboratively revised and approved the final version of the manuscript.

Conflict of Interest

FR and MFA declare no financial or non-financial competing interests related to the content of this manuscript.

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Availability of Data and Materials

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