

Drivers of CSR Disclosure in Mining Sector: Liquidity, Green Index, or Profitability?

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ABSTRACT

This study examines whether liquidity, green accounting, or profitability drives CSR disclosure in Indonesian mining companies, contributing first empirical evidence comparing mandatory PROPER ratings against financial metrics. Using panel data from nine mining firms listed on the Indonesia Stock Exchange over 2019–2022 (36 observations), CSR disclosure is measured via GRI-based index, green accounting by PROPER rating, and liquidity and profitability by current ratio and return on assets. The findings reveal that profitability has a positive and significant effect on CSR disclosure, while liquidity shows no significant effect. Contrary to expectations, PROPER rating does not significantly affect CSR disclosure, attributed to limited rating variation (all Red-Blue, no Green-Gold). The low explanatory power (14%) suggests unobserved factors dominate. Theoretically, these findings challenge legitimacy theory's assumption that mandatory environmental ratings automatically trigger voluntary disclosure, while supporting signaling theory where profitability serves as a credible signal. For regulators, the non-significant PROPER effect indicates mandatory ratings do not automatically encourage voluntary disclosure.

INTRODUCTION

The extractive industry occupies a paradoxical position in contemporary economic development. Mining activities generate substantial fiscal revenues and employment opportunities, yet they impose significant environmental costs including land degradation, water contamination, and biodiversity loss. This inherent tension positions mining companies under intense scrutiny from regulators, investors, and local communities.

In Indonesia, this scrutiny is particularly pronounced. As one of the world's largest coal, tin, copper, and gold producers, the mining sector contributes substantially to national GDP but has also been associated with numerous environmental controversies. Consequently, CSR disclosure has evolved from a voluntary initiative into a de facto requirement for maintaining operational legitimacy. The government has responded with regulatory frameworks, including Law No. 40 of 2007 mandating CSR reporting for natural resource-based companies, and the PROPER (Program Penilaian Peringkat Kinerja Perusahaan) rating system, a mandatory government-initiated environmental performance assessment that publicly classifies companies into five colors.

Despite these mandates, empirical evidence reveals a puzzling phenomenon: environmental information remains the least disclosed category within Indonesian mining reports. Gunawan (2021) conducted a content analysis of 39 Indonesian listed mining firms, finding that while companies demonstrated substantive CSR activities, environmental disclosure lagged significantly behind economic and social disclosures. The author identified three explanatory factors, difficulties in calculating environmental metrics, fear of NGO backlash if negative impacts are revealed, and a belief that PROPER participation is sufficient, leading to hesitancy in providing additional voluntary information. This finding underscores a critical tension, regulatory presence does not automatically translate into comprehensive disclosure.

This phenomenon raises fundamental questions about drivers of CSR disclosure. The literature proposes profitability, liquidity, and environmental performance as prominent candidates, albeit with conflicting results. Regarding profitability, Wang, Adouko, and Teye (2026) found that ESG performance affects firm value in coal mining, although profitability negatively moderates this relationship. Conversely, Dewi and Monita (2022) examined Indonesian mining companies and found that profitability measured by ROA did not significantly affect CSR disclosure, suggesting that financial performance alone does not determine CSR transparency in the Indonesian context. Regarding liquidity, Dewi and Monita (2022) also concluded that liquidity has no significant effect on CSR disclosure in their sample of mining firms. Similarly, Digdowiseiso (2023) investigated Indonesian mining companies and found that current ratio does not significantly affect CSR disclosure. Regarding environmental performance, Retnosari, Astutik, and Frimasika (2025) found that environmental disclosure has a significant positive effect on financial performance in Indonesian mining companies.

Despite substantial scholarly attention, three significant gaps persist. First, the comparative influence of mandatory environmental ratings versus traditional

financial metrics on CSR disclosure has received minimal empirical attention. Most studies examine either financial determinants or environmental performance separately, obscuring their relative explanatory power. Second, the Indonesian mining sector presents a unique institutional laboratory due to the mandatory PROPER rating system, yet no study has systematically tested whether PROPER ratings actually correlate with GRI-based CSR disclosure extent. Gunawan (2021) noted that PROPER participation might paradoxically reduce voluntary disclosure, but this relationship remains untested. Third, the existing literature exhibits a geographical bias toward developed economies, with limited evidence from Indonesia producing mixed results. This study contributes to knowledge enrichment by providing the first empirical test comparing liquidity, profitability, and PROPER ratings as drivers of CSR disclosure in Indonesian mining, thereby expanding the institutional scope of CSR disclosure research. The findings are expected to enrich legitimacy theory by demonstrating whether mandatory government ratings (PROPER) create imposed legitimacy that drives voluntary disclosure, while also extending signaling theory by revealing if profitable and environmentally-rated firms use CSR disclosure as a credible signal to differentiate themselves from lower-performing peers.

In light of these gaps, this study examines whether liquidity, green accounting (PROPER rating), or profitability serves as the primary driver of corporate social responsibility disclosure in Indonesian mining companies. Using panel data from nine mining firms listed on the Indonesia Stock Exchange from 2019 to 2022, the research tests the individual and relative effects of current ratio, PROPER rating, and return on assets on the extent of GRI-based CSR disclosure while controlling for firm size, leverage, and firm age. By comparing these three drivers within a unified empirical framework, the study seeks to provide evidence-based recommendations for regulators enhancing CSR transparency and for managers allocating resources toward sustainability reporting.

LITERATURE REVIEW

Theoretical Framework

This study is grounded in three complementary theories that explain corporate incentives for voluntary disclosure, legitimacy theory, stakeholder theory, and signaling theory. Legitimacy theory, as articulated by Suchman (1995), posits that organizations operate within a social contract whereby they must conform to societal norms and expectations to maintain their license to operate. When a gap exists between societal expectations and corporate performance, termed the legitimacy gap, firms face pressures to take corrective actions, including enhanced disclosure (Deegan, 2002). In the mining context, where environmental risks attract constant scrutiny, CSR disclosure serves as a tool to close perceived legitimacy gaps.

Stakeholder theory, pioneered by Freeman (1984), extends this logic by identifying specific stakeholder groups whose expectations firms must manage. Different stakeholders possess varying degrees of power, legitimacy, and urgency, and firms prioritize disclosure based on stakeholder salience (Mitchell,

Agle, and Wood, 1997). In the Indonesian mining sector, the government emerges as the most powerful stakeholder due to its role as licensor and regulator, particularly through the mandatory PROPER rating system. Signaling theory, derived from information economics (Spence, 1973), addresses information asymmetry between corporate insiders and external stakeholders. High-quality firms engage in costly signaling such as comprehensive GRI-based CSR disclosure, to distinguish themselves from low-quality firms. For a signal to be credible, it must be costly to produce and difficult to imitate. Together, these theories predict that profitability and PROPER ratings positively influence CSR disclosure, while liquidity, reflecting short-term solvency rather than strategic commitment, is unlikely to drive disclosure in the capital-intensive mining sector.

Profitability and CSR Disclosure

The relationship between profitability and CSR disclosure has received extensive empirical attention. The slack resource theory, which aligns with signaling theory, argues that profitable firms possess discretionary financial resources enabling investment in sustainability reporting (Waddock and Graves, 1997). Empirical support includes Wang, Adouko, and Teye (2026), who found that ESG performance positively affects firm value in coal mining, and Retnosari, Astutik, and Frimasika (2025), who demonstrated that environmental disclosure positively affects financial performance in Indonesian mining companies. Similarly, Al-Tuwaijri, Christensen, and Hughes (2004) found a positive relationship between environmental disclosure and economic performance, while Clarkson, Li, Richardson, and Vasvari (2008) demonstrated that superior environmental performers provide more extensive and credible disclosures. However, contrary evidence exists, Dewi and Monita (2022) found that profitability measured by ROA did not significantly affect CSR disclosure in Indonesian mining firms, and Brammer and Pavelin (2006) suggested that the relationship may be non-linear or context-dependent. Despite mixed findings, theoretical arguments for a positive relationship remain compelling. In the mining sector, where environmental risks attract stakeholder scrutiny, profitable firms have both the means and the motivation to disclose CSR information.

H1: Profitability has a positive and significant effect on CSR disclosure in Indonesian mining companies.

Liquidity and CSR Disclosure

Regarding liquidity, the theoretical case for its effect on CSR disclosure rests on financial flexibility arguments, firms with higher current ratios possess greater short-term financial slack for discretionary spending. However, empirical evidence challenges this assumption. Dewi and Monita (2022) concluded that liquidity has no significant effect on CSR disclosure in Indonesian mining firms. Digidowiseiso (2023) found that sustainability report disclosure does not affect the current ratio in state-owned mining companies. Extending this evidence, Chiu and Wang (2015) examined Taiwanese listed companies and found that liquidity does not drive CSR engagement, as CSR decisions are strategic rather than operational. Similarly, Uwuigbe, Jimoh, Uwuigbe, and Osazevbaru (2018)

investigated Nigerian oil and gas firms and reported no significant liquidity effect on environmental disclosure, attributing this to the mandatory nature of environmental reporting in extractive industries. Several theoretical reasons explain these findings, CSR disclosure is a strategic, long-term decision rather than an operational one mining companies operate in capital-intensive industries where short-term liquidity ratios are less salient indicators of corporate capacity for strategic investments and mandatory reporting requirements (Law No. 40 of 2007) override liquidity considerations.

H2: Liquidity has no significant effect on CSR disclosure in Indonesian mining companies.

Green Accounting (PROPER Rating) and CSR Disclosure

Regarding green accounting proxied by PROPER rating, legitimacy and stakeholder theories predict that higher ratings (indicating better environmental performance) will be associated with more extensive CSR disclosure. Retnosari, Astutik, and Frimasika (2025) found that environmental disclosure positively affects financial performance, suggesting tangible benefits from transparency. Iatridis (2013) demonstrated that firms with stronger environmental credentials provide more credible CSR disclosures in emerging markets. While Gunawan (2021) noted a potential paradox that PROPER participation might reduce voluntary disclosure, this remains untested.

H3: PROPER rating has a positive and significant effect on CSR disclosure in Indonesian mining companies.

The conceptual framework posits that profitability, liquidity, and green accounting (PROPER rating) serve as potential drivers of CSR disclosure in Indonesian mining companies.

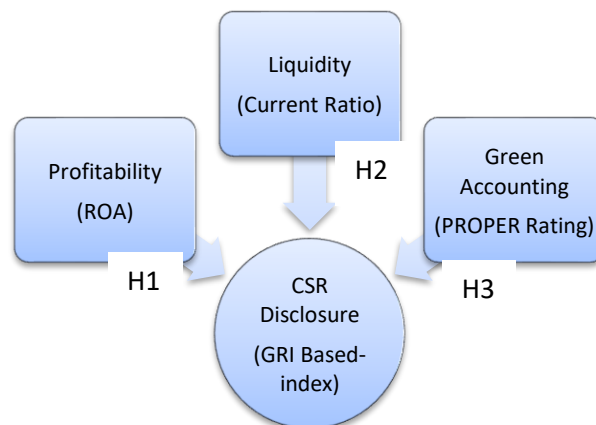


Figure 1. Conceptual Framework

METHODOLOGY

This study employs a quantitative causal research design to examine the effect of profitability, liquidity, and green accounting on corporate social responsibility disclosure. A panel data approach is utilized, combining cross-sectional and time-series data from multiple mining companies over several

observation periods. The causal design is appropriate as it allows the researcher to test hypothesized relationships between independent variables (profitability, liquidity, green accounting) and the dependent variable (CSR disclosure) while controlling for unobserved heterogeneity through panel data estimation techniques.

The population of this study comprises all mining companies listed on the Indonesia Stock Exchange (IDX) during the 2019 to 2022 period. The mining sector was selected purposively due to its high environmental impact and the mandatory nature of CSR disclosure under Indonesian regulations. The sampling method employed is purposive sampling, with the following criteria: (1) the company is listed on the IDX during the entire 2019–2022 period, (2) the company publishes complete annual reports for the 2019–2022 period, (3) the company has a PROPER rating issued by the Ministry of Environment and Forestry for each year of observation, and (4) the company presents complete financial data required to calculate profitability and liquidity ratios. Based on these criteria, a final sample of nine mining companies with four years of observation each was obtained, resulting in 36 firm-year observations.

This study employs four main variables, one dependent variable (CSR disclosure) and three independent variables (profitability, liquidity, and green accounting). CSR disclosure as the dependent variable is measured using a disclosure index developed from the Global Reporting Initiative (GRI) Standards, specifically the GRI 11 sector standard for mining, comprising 38 disclosure items covering economic, environmental, and social aspects. Content analysis is applied to annual reports and sustainability reports, where a score of 1 is assigned if an item is disclosed and 0 if not, then calculated as $CSRDI = (\text{number of items disclosed} / 38) \times 100\%$, with higher percentages indicating more comprehensive disclosure. Profitability is measured using Return on Assets (ROA), calculated as $(\text{Net Income} / \text{Total Assets}) \times 100\%$, reflecting how efficiently a company generates profit from its total assets. Liquidity is measured using the Current Ratio (CR), calculated as $(\text{Current Assets} / \text{Current Liabilities}) \times 100\%$, indicating the company's ability to meet short-term obligations. Green accounting is proxied by the PROPER rating issued annually by the Indonesian Ministry of Environment and Forestry, which classifies companies into five color categories, Gold (excellent), Green (very good), Blue (good), Red (poor), and Black (very poor), converted into numerical scores of 5, 4, 3, 2, and 1 respectively, where higher scores indicate better environmental performance.

Data analysis was performed using SPSS software through several stages. First, descriptive statistics were calculated to provide an overview of each variable's distribution, including mean, median, standard deviation, minimum, and maximum values for ROA, current ratio, PROPER rating, and CSRDI. Second, classical assumption tests were conducted to ensure the regression model was unbiased and efficient, consisting of normality test (Shapiro-Wilk), multicollinearity test (Variance Inflation Factor), heteroscedasticity test (Breusch-Pagan), and autocorrelation test (Durbin-Watson). Third, hypothesis testing was performed using the t-test (partial test) to examine the individual effect of each independent variable on CSR disclosure, and the F-test (simultaneous test) to

examine whether all independent variables jointly affect the dependent variable. Finally, the coefficient of determination (R-squared) was calculated to measure the proportion of variance in CSR disclosure explained by profitability, liquidity, and green accounting, where a value closer to 1 indicates greater explanatory power.

RESEARCH RESULT

Descriptive Statistics

Descriptive statistics provide an overview of the distribution and characteristics of each variable over the 2019–2022 period. Table 1 presents the mean, median, standard deviation, minimum, and maximum values for all variables based on 36 firm-year observations.

Table 1 Descriptive Statistics

Variable	N	Min	Median	Mean	Max	Std.Dev
CSRDI (%) - Y	36	0.23	0.46	0.47	0.75	0.14
ROA (%) - X1	36	-0.05	0.09	1.06	8.8	1.79
Current Ratio (x) - X2	36	0.27	1.75	2.01	5.65	1.19
PROPER Rating - X3	36	1.09	1.39	1.43	1.61	0.17

Source: SPSS output (2026)

The descriptive statistics reveal that the mean CSR disclosure index is 0.47 (47%), indicating that Indonesian mining companies disclose less than half of the 38 GRI-based items. The mean ROA is 1.06% with a range from -0.05% to 8.80%, indicating generally low profitability. The mean current ratio of 2.01 suggests adequate short-term solvency. The most striking finding concerns the PROPER rating, which has a mean of 1.43 and ranges only from 1.09 to 1.61, indicating that all observations fell within Red to Blue categories, with no Green or Gold ratings during the 2019–2022 period.

Classical Assumption Tests

Prior to hypothesis testing, classical assumption tests were conducted to ensure the regression model produces unbiased and efficient estimators. Table below summarizes the results.

Table 2 Classical Assumption Test Results

Test	Variable	Statistic / Value	p-value	Criterion	Conclusion
Normality	Residual	<i>Shapiro-Wilk</i>	0.84	$p > 0.05$	Normal
Multicollinearity	X1 (ROA)	VIF = 1.12	-	VIF < 10	No multicollinearity
Multicollinearity	X2 (Current Ratio)	VIF = 1.02	-	VIF < 10	No multicollinearity

Multicollinearity	X3 (PROPER)	VIF = 1.11	-	VIF < 10	No multicollinearity
Heteroscedasticity	Residual	<i>Breusch-Pagan</i>	0.88	p > 0.05	Homoscedastic
Autocorrelation	Residual	Durbin-Watson	0.21	p > 0.05	No autocorrelation

Source: SPSS output (2026)

The normality test using Kolmogorov-Smirnov yielded a p-value of 0.84 (0.05), indicating that residuals are normally distributed. This satisfies the normality assumption required for valid hypothesis testing. The multicollinearity test using Variance Inflation Factor (VIF) produced values of 1.12 for ROA (X1), 1.02 for Current Ratio (X2), and 1.11 for PROPER rating (X3). All VIF values are well below the threshold of 10, confirming that no multicollinearity exists among the independent variables. This indicates that each predictor measures a distinct construct and can be interpreted separately without distortion.

The heteroscedasticity test using the Glejser method produced a p-value of 0.88 (0.05), indicating that the null hypothesis of homoscedasticity cannot be rejected. Therefore, the residuals have constant variance, and heteroscedasticity is not present in the model. The autocorrelation test yielded a p-value of 0.21 (0.05), indicating no significant autocorrelation in the residuals. This satisfies the assumption that observations are independent of each other, which is particularly important given the panel structure of the data. In summary, all classical assumption tests were satisfied, confirming that the regression model is unbiased, efficient, and suitable for hypothesis testing.

Hypothesis Testing

Simultaneous Test (F-test)

The F-test examines whether all independent variables jointly affect the dependent variable. Table 3 presents the results.

Table 3 Simultaneous Test (F-test) Results

	Sum of Squares	d.f.	Mean Square	F	p-value
Regression	-	3	-	1.82	0.16
Residual	-	32	-		
Total	-	35			

Source: SPSS output (2026)

The F-statistic is 1.82 with a p-value of 0.16 (0.05). This indicates that profitability, liquidity, and green accounting simultaneously do not have a significant effect on CSR disclosure at the 5% significance level. Therefore, the

regression model is not statistically feasible for interpretation, and the independent variables jointly fail to explain CSR disclosure.

Partial Test (t-test)

The t-test examines the individual effect of each independent variable on CSR disclosure. Table 4 presents the regression coefficients and t-test results.

Table 4 Partial Test (t-test) Results

Variable	Coefficient (B)	Std. Error	p-value	Conclusion ($\alpha=0.05$)
Intercept	0.13	-	0.51	Not significant
X1 (ROA)	0.02	-	0.04	Significant
X2 (Current Ratio)	0.01	-	0.42	Not significant
X3 (PROPER Rating)	0.19	-	0.15	Not significant

Source: SPSS output (2026)

The regression equation is:

$$CSRDI = 0.13 + 0.02(ROA) + 0.01(Current\ Ratio) + 0.19(PROPER) + \varepsilon$$

The interpretation of each variable is as follows:

1. Profitability (ROA / X1) has a coefficient of 0.02 with a p-value of 0.04 (0.05). This indicates that ROA has a positive and significant effect on CSR disclosure. For every 1% increase in ROA, CSR disclosure increases by 0.02 (2 percentage points), holding other variables constant. Therefore, H1 is supported.
2. Liquidity (Current Ratio / X2) has a coefficient of 0.01 with a p-value of 0.42 (0.05). This indicates that the current ratio has no significant effect on CSR disclosure. Therefore, H2 is supported (the hypothesis that liquidity has no significant effect is accepted).
3. Green Accounting (PROPER Rating / X3) has a coefficient of 0.19 with a p-value of 0.15 (0.05). This indicates that PROPER rating does not have a statistically significant effect on CSR disclosure. Therefore, H3 is not supported at $\alpha = 0.05$.

Coefficient of Determination (R-squared)

The R-squared value indicates the proportion of variance in the dependent variable explained by the independent variables.

Table 4.6 Coefficient of Determination (R²)

Model	R	R-squared	Adjusted R-squared
Common Effect	0.374	0.14	-

Source: SPSS output (2025)

The R-squared value is 0.14, meaning that only 14% of the variance in CSR disclosure is explained by profitability, liquidity, and green accounting jointly. The remaining 86% is explained by other factors outside the model. This very low explanatory power, combined with the non-significant F-test ($p=0.16$), indicates that the model has poor fit.

DISCUSSION

The finding that profitability has a positive and significant effect on CSR disclosure supports the first hypothesis and aligns with slack resource theory. Profitable Indonesian mining companies possess discretionary financial resources that enable investment in comprehensive sustainability reporting, consistent with signaling theory where profitable firms use CSR disclosure as a costly signal to differentiate themselves from less profitable peers. This result corroborates previous evidence from Wang, Adouko, and Teye (2026) in coal mining and Retnosari, Astutik, and Frimasika (2025) in Indonesian mining companies. Despite the generally low mean profitability (ROA of only 1.06%) and low mean CSR disclosure (47%) in the sample, the relationship remains detectable, indicating that even modest improvements in profitability translate into measurable increases in CSR transparency.

The finding that liquidity has no significant effect on CSR disclosure supports the second hypothesis, consistent with prior evidence from Dewi and Monita (2022) and Digidowiseiso (2023) in Indonesia. This result held despite wide variation in current ratios (0.27 to 5.65), indicating that short-term financial flexibility does not drive CSR transparency. Three theoretical explanations account for this finding: CSR disclosure represents a strategic long-term investment rather than an operational expense, the mining industry's capital-intensive nature makes current ratio less salient for strategic decisions, and Indonesia's mandatory CSR reporting requirement (Law No. 40 of 2007) creates a compliance floor that applies regardless of liquidity position.

The finding that PROPER rating does not have a statistically significant effect on CSR disclosure ($p=0.15$) represents the most unexpected result and fails to support the third hypothesis. Several explanations account for this finding. First, limited variation in PROPER ratings (range 1.09-1.61, mean 1.43) indicates all observations fell within Red to Blue categories with no Green or Gold ratings, creating range restriction that attenuates correlation. Second, the paradox noted by Gunawan (2021) may be operating, companies consider the government-issued PROPER rating sufficient for demonstrating environmental compliance, leading to hesitancy in providing additional voluntary GRI-based disclosures that might trigger NGO scrutiny. Third, weak institutional enforcement of voluntary GRI reporting means companies perceive little incentive to align their disclosures with PROPER ratings, especially when ratings are mediocre or poor.

The very low explanatory power of the model (R-squared=14%, F-test $p=0.16$) indicates that profitability, liquidity, and PROPER jointly explain little of the variation in CSR disclosure, with 86% attributable to unobserved factors such as firm size, leverage, board characteristics, and ownership structure. Theoretically, legitimacy theory receives partial support from the profitability finding but is challenged by the non-significant PROPER effect, suggesting that

PROPER itself may serve as the primary legitimacy mechanism, rendering additional voluntary disclosure redundant. For regulators, the non-significant PROPER effect indicates that the current system does not effectively encourage GRI-based voluntary disclosure. For managers, the significant profitability effect suggests that improving financial performance remains the most reliable pathway to enhanced CSR disclosure.

CONCLUSIONS AND RECOMMENDATIONS

This study examined whether liquidity, green accounting (PROPER rating), or profitability serves as the primary driver of CSR disclosure in Indonesian mining companies from 2019 to 2022. The findings reveal that profitability has a positive and significant effect on CSR disclosure, confirming that financially profitable firms possess the slack resources to invest in comprehensive sustainability reporting. Liquidity, conversely, has no significant effect, indicating that short-term financial flexibility does not drive CSR transparency, consistent with the strategic rather than operational nature of disclosure decisions. Most notably, PROPER rating, the government-mandated environmental performance index, does not have a statistically significant effect on CSR disclosure, a finding attributed to limited rating variation in the sample (all observations fell within Red to Blue categories with no Green or Gold ratings) and the possibility that companies consider PROPER rating sufficient for demonstrating environmental compliance, reducing incentives for additional voluntary GRI-based disclosure. The overall model explains only 14% of CSR disclosure variance, indicating that unobserved factors such as firm size, leverage, board characteristics, and ownership structure play substantial roles.

The implementation of these findings carries several practical implications. For regulators at the Ministry of Environment and Forestry, the non-significant PROPER effect suggests that the current rating system does not effectively encourage voluntary GRI-based disclosure, linking PROPER ratings to mandatory reporting requirements, such as requiring Red and Black-rated firms to publish detailed remediation plans, could enhance transparency. For corporate managers, the significant profitability effect indicates that improving financial performance remains the most reliable pathway to enhanced CSR disclosure, while investment in CSR reporting infrastructure should be prioritized when profitability allows. For investors, the low explanatory power of the model (14%) suggests that GRI-based disclosures in Indonesian mining companies are poorly explained by observable financial characteristics, and direct examination of PROPER ratings may provide more reliable environmental performance information than voluntary sustainability reports.

ADVANCED RESEARCH

This study has several limitations that should be acknowledged. First, the sample size is relatively small (36 firm-year observations from nine companies) due to the requirement of complete PROPER ratings and financial data over the 2019–2022 period, which reduces statistical power and increases the risk of Type II errors. Second, the narrow range of PROPER ratings in the sample (1.09–1.61,

all within Red to Blue categories with no Green or Gold ratings) restricted the ability to detect the full effect of environmental performance on CSR disclosure. Third, the exclusion of control variables such as firm size, leverage, board characteristics, and ownership structure means that omitted variable bias may affect the estimates, as evidenced by the very low R-squared (14%). Fourth, the study period includes the COVID-19 pandemic, which may have distorted both profitability and CSR disclosure practices. For future research, it is recommended to expand the sample period to include years with greater PROPER rating variation (including Green and Gold-rated firms), incorporate relevant control variables such as firm size and board diversity to improve explanatory power, employ weighted CSR disclosure indices based on materiality to better capture stakeholder priorities, and conduct comparative studies across different emerging economies with mandatory environmental rating systems to determine the generalizability of these findings.

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