Proceeding of International Conference Technology, Economics, and Social Science
Vol 1, No 1, January 2026, Page 403-410
ISSN 3124-6087 (Media Online)
https://journals.adaresearch.or.id/ictess

The Influence of Corporate Social Responsibility and Green Organizational Culture on Environmental Performance

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Submitted: **04/01/2026**; Accepted: **07/01/2026**; Published: **23/01/2026**

Abstract−This study examines the influence of Corporate Social Responsibility (CSR) and Green Organizational Culture (GOC) on Environmental Performance in food and beverage subsector companies listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period. The study is motivated by increasing environmental pressure, stricter regulations, and sustainability demands that require companies to manage their environmental impacts more effectively. A descriptive quantitative approach was employed using purposive sampling, involving 20 companies observed over four years, resulting in 80 observation units. Secondary data were obtained from sustainability reports, annual reports, and Corporate Performance Rating Program in Environmental Management (PROPER) ratings. The data were analyzed using multiple linear regression with SPSS version 25.0. Classical assumption tests were conducted to ensure the robustness of the regression results despite the clustered structure of the data. The results indicate that CSR has a significant but negative effect on Environmental Performance, suggesting that higher CSR disclosure is associated with lower PROPER ratings. This finding implies that CSR practices tend to be disclosure-oriented and are not yet aligned with the technical environmental requirements assessed by PROPER, potentially reflecting symbolic reporting behavior. Meanwhile, Green Organizational Culture does not have a significant effect on Environmental Performance, indicating that green values have not been effectively translated into measurable technical compliance. These findings suggest that improving environmental performance requires concrete technical actions, integrated environmental management systems, and alignment between sustainability reporting and PROPER indicators.

Keywords: Corporate Social Responsibility; Green Organizational Culture; Environmental Performance; Manufacturing Companies; PROPER

1. INTRODUCTION

Rapid global economic growth in recent years has been accompanied by increasing complexity of social and environmental challenges. Climate change, air pollution, increasing water consumption, and high volumes of industrial waste have become critical issues demanding serious attention from businesses and policymakers. The past few years have been the hottest period on record, requiring organizations to shift their operational strategies toward more environmentally friendly practices (Gazi et al., 2024). This situation emphasizes the importance of integrating sustainability aspects as part of the long-term business strategy of manufacturing companies. Accordingly, the United Nations (2020) encourages companies to ensure that their operations are sustainability-oriented to avoid endangering the ability of future generations to meet their needs.

The food and beverage sector is a manufacturing subsector that makes a significant contribution to the national economy. This subsector not only contributes significantly to Gross Domestic Product BPS RI., (2024) but also plays a crucial role in creating industrial added value and absorbing labor. However, despite its significant contribution, this subsector is also a significant contributor to environmental pollution. Data from the Ministry of Environment and Forestry shows that the industrial sector contributes approximately 45% to the total national water pollution burden (Greenlab Indonesia, 2025). Liquid waste from production processes, solid organic waste and packaging, and gas emissions from factory operations are common sources of pollution in this industry. Therefore, the food and beverage subsector is under strict scrutiny through the Corporate Performance Rating Program in Environmental Management (PROPER) (Suhendra et al., 2022). However, despite strict supervision through Corporate Performance Rating Program in Environmental Management (PROPER), many companies in this subsector still face difficulties in achieving optimal environmental performance.

This discrepancy between growing industrial activity and the quality of environmental management indicates the existence of a core problem namely, whether internal corporate mechanisms such as Corporate Social Responsibility and Green Organizational Culture can effectively improve environmental performance. Environmental performance is a crucial indicator for assessing a company's effectiveness in managing the environmental impacts of its operations. Environmental performance not only reflects a company's level of compliance with regulations but also measures its commitment to sustainability (Haleema Qureshi et al., 2025). Companies with good environmental performance tend to be preferred by investors, consumers, and other stakeholders because they are perceived as more responsible and have long-term sustainability prospects (Ye et al., 2022). CSR is a strategic concept that integrates social, economic, and environmental aspects into corporate activities (Rahmawati, Heni .Susilo, 2025). The implementation of environmental corporate social responsibility such as energy efficiency, the use of sustainable raw materials, and waste management can improve a company's reputation and environmental performance. This research supports previous findings, such as those by Khaddage-Soboh et al., (2024), who demonstrated that corporate social responsibility has a positive and significant effect on environmental performance in the Malaysian manufacturing industry. However, not all studies have found a

consistent relationship. Rehman et al., (2022) found that corporate social responsibility had no direct effect on environmental performance.

In addition to corporate social responsibility, green organizational culture is also considered to play a crucial role in improving environmental performance. Green organizational culture reflects organizational values, norms, and behaviors that support sustainable environmental management (Pan et al., 2022). However, environmental performance in Indonesia is primarily assessed through the Corporate Performance Rating Program in Environmental Management (PROPER), which emphasizes technical and operational compliance, such as wastewater treatment, emission control, hazardous waste management, and resource efficiency. This creates a potential conceptual gap, as green organizational culture represents internal values and norms, while PROPER evaluates objective and measurable technical performance. The challenge lies in how abstract organizational values are translated into concrete operational practices that meet regulatory environmental standards. Without effective institutionalization through environmental management systems, standard operating procedures, and technological investment, green organizational culture may remain symbolic and fail to produce measurable improvements in environmental performance. Roespinoedji et al., (2019) found that green organizational culture has a positive effect on environmental performance in manufacturing companies. However, not all empirical findings demonstrate a significant effect. Prasetyo et al., (2024) reported that green organizational culture has no direct influence on environmental performance. These inconsistent findings indicate the presence of an empirical research gap. Although Corporate Social Responsibility and Green organizational culture have been widely studied, limited research specifically examines these variables within the food and beverage manufacturing subsector in Indonesia, particularly in the post-pandemic period of 2021–2024 when environmental regulations and Corporate Performance Rating Program in Environmental Management (PROPER) oversight have intensified. So that, further empirical investigation is needed to obtain more sector-specific and up-to-date evidence. This study is urgent because the food and beverage subsector is among the industries with the highest environmental impact, contributing significantly to national water pollution. Additionally, increasing stakeholder pressure for sustainability and stricter PROPER standards require companies to understand which internal factors can effectively enhance their environmental performance.

Therefore, this study aims to analyze the influence of Corporate Social Responsibility and Green Organizational Culture on Environmental Performance in food and beverage manufacturing companies listed on the Indonesia Stock Exchange for the 2021–2024 period. This research provides theoretical contributions to enrich the literature on sustainability and environmental management, as well as practical contributions for companies, investors, and regulators in improving environmental management in the manufacturing sector. Specifically, this study contributes by providing updated evidence on the roles of Corporate Social Responsibility and Green organizational culture in determining environmental performance under the Indonesian Corporate Performance Rating Program in Environmental Management (PROPER) framework. The findings are expected to help companies strengthen sustainability strategies that align with technical environmental requirements and offer regulators empirical insights for evaluating policy effectiveness in high-risk industrial sectors.

2. RESEARCH METHODS

2.1 Basic Research Framework

This study uses a descriptive quantitative approach to analyze the influence of Corporate Social Responsibility and Green Organizational Culture on Environmental Performance. Data were obtained through purposive sampling techniques from 20 manufacturing companies in the food and beverage subsector listed on the Indonesia Stock Exchange (IDX) during the 2021-2024 period, resulting in 80 observation units. Data analysis was conducted using classical assumption tests, multiple linear regression, and hypothesis testing to statistically evaluate the relationship between the independent and dependent variables.

This framework explains the relationship between several key variables, namely how Corporate Social Responsibility and Green Organizational Culture influence Environmental Performance. The following is an overview of the conceptual framework in this study:

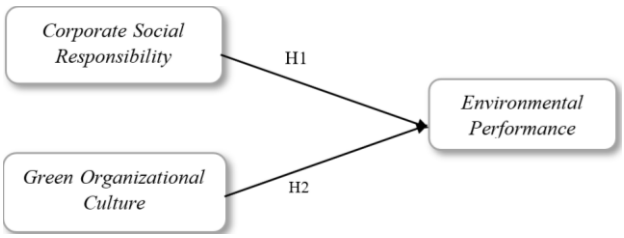

Figure 1. Conceptual Framework

Figure 1 presents the research framework illustrating the relationship between Corporate Social Responsibility, Green Organizational Culture, and Environmental Performance. CSR and GOC are proposed as independent variables that influence environmental performance, reflecting the company's commitment to sustainable and environmentally responsible practices.

2.2 Hypothesis

Based on the problem formulation and conceptual framework proposed and developed in this study, the following hypotheses are proposed:
H1: Corporate Social Responsibility has a positive influence on Environmental Performance
H2: Green Organizational Culture has a positive influence on Environmental Performance

2.3 Stakeholder Theory

Stakeholder theory, as proposed by Freeman & McVea, (2005), states that companies are not only obligated to meet the needs of shareholders but also must consider the various stakeholders affected by the company's activities. A company's long-term success depends on its ability to manage its influence with various stakeholders and meet their expectations in a balanced manner, including its responsibility for environmental sustainability.

2.4 Corporate Social Responsibility

Corporate social responsibility is a form of corporate accountability for the social and environmental impacts of its operational activities, demonstrated through the transparent delivery of information to stakeholders (Mellano, 2024; Pizzi et al., 2021). Corporate social responsibility disclosure allows companies to demonstrate their commitment to sustainable business practices while building public trust through reports that cover social and environmental activities. To measure Corporate social responsibility variables, this study will use the reporting standards developed by GRI 4 (Global Reporting Initiative). Although the Global Reporting Initiative (GRI) has transitioned from the GRI G4 framework to the GRI Standards since 2016, this study employs a GRI G4-based disclosure index to ensure consistency of measurement across the observation period. Several companies in the sample still present sustainability disclosures that are comparable to GRI G4 indicators, either explicitly or implicitly. Nevertheless, the use of a GRI G4-based index may not fully capture the structure of the latest GRI Universal Standards, which may lead to potential measurement limitations when assessing more recent sustainability reports.

$$CSRDIj = \frac{\sum Xij}{nj} \quad (1)$$

2.5 Green Organizational Culture

Green Organizational Culture is an organizational culture that focuses on environmental awareness and encourages companies to implement environmentally friendly business practices and support nature conservation (Pan et al., 2022). In this study, the green organizational culture measurement adopted four indicators developed by Chen et al., (2006): the use of low-pollution materials, the use of energy-efficient materials or products, the reduction of material use in the product development process, and the use of materials that can be recycled, reused, or decomposed. These were then converted into an index using the formula:

$$\text{GOC } Score = \frac{\text{Jumlah indikator yang terpenuhi}}{\text{Jumlah total indikator}} \text{X } 100 \quad (2)$$

2.6 Environmental Performance

Environmental Performance is a company's ability to manage its environmental impacts, including resource efficiency, emission control, and compliance with environmental regulations (Fang et al., 2022). This performance demonstrates the company's level of commitment to environmental conservation efforts. In this study, environmental performance was measured using the PROPER Program issued by the M inistry of Environment and Forestry (KLHK), an official government rating system that assesses companies' compliance with environmental management. The PROPER rating consists of Gold (5), Green (4), Blue (3), Red (2), and Black (1), as stipulated in Minister of Environment Regulation No. 7 of 2008. PROPER was selected based on its objective nature, government verification, and annual publication, thus providing a more relevant and reliable measure of environmental performance than other indicators such as ISO 14001.

3. RESULTS AND DISCUSSION

3.1 Results

3.1.1 Descriptive Statistics

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Corporate Social Responsibility	80	1.00	9.00	4.7750	3.84831
Green Organizational Culture	80	50.00	100.00	88.1250	15.39306
Environmental Performance	80	3.00	5.00	3.2875	.50801
Valid N (listwise)	80				

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Based on Table 1, the corporate social responsibility variable has an average of 4.78 with a standard deviation of 3.85, indicating a significant variation in corporate social responsibility disclosure across companies. The green organizational culture variable has an average of 88.12 and a standard deviation of 15.39, indicating that the level of green organizational culture implementation varies significantly across companies in the sample. Meanwhile, Environmental Performance shows an average of 3.29 with a low standard deviation of 0.51, indicating that companies' environmental performance is relatively homogeneous and at a fairly stable level. Overall, these descriptive results indicate that green organizational culture and corporate social responsibility practices still vary, while environmental performance tends to be consistent across companies.

3.1.2 Normality Test Results

Table 2. One-Sample Kolmogorov-Smirnov Test

N		80
Normal Parameters[a,b]	Mean	-2.7060470
	Std. Deviation	3.87230776
Most Extreme Differences	Absolute	.087
	Positive	.082
	Negative	-.087
Test Statistic		.087
Asymp. Sig. (2-tailed)		.200[c,d]

Based on the test results, the Asymp. Sig. (2-tailed) value was 0.200, which is greater than the alpha significance level of 0.05. Thus, it can be concluded that the residual data in the regression model is normally distributed. This indicates that the normality assumption has been met, so the regression model used in this study is feasible and valid for further analysis.

3.1.3 Multicollinearity Test Results

Table 3. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.428	.346		9.904	.000		
	Corporate Social Responsibility	-.040	.015	-.306	-2.771	.007	.962	1.040
	Green Organizational Culture	.001	.004	.018	.164	.870	.962	1.040

a. Dependent Variable: Environmental Performance

Based on the data processing results, the tolerance value for the corporate social responsibility and green organizational culture variables is 0.962, while the VIF value for both variables is 1.040. Since all tolerance values are > 0.10 and the VIF value is < 10, it can be concluded that the regression model does not experience multicollinearity.

3.1.4 Heteroscedasticity Test Results

Table 4. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.901	.907		3.199	.002
	Corporate Social Responsibility	-.060	.038	-.177	-1.570	.120
	Green Organizational Culture	-.017	.010	-.204	-1.810	.074

a. Dependent Variable: ABS

The significance value for the corporate social responsibility variable is 0.120 and for the green organizational culture variable is 0.074. All significance values are greater than 0.05, thus it can be concluded that there are no symptoms of heteroscedasticity in the model.

3.1.5 Autocorrelation Test Results

Table 5. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.310[a]	.096	.073	.48918	.762

Based on the Model Summary table, it shows that the Durbin–Watson (DW) value is 0.762 with a significance level of 0.05. The number of samples used is 80 (n = 80) and the number of independent variables (k = 2). Based on the Durbin–Watson table, the dU value (upper limit) is 1.68. Thus, the test criteria are obtained Du < DW < 4 − dU or 1.68 < 0.762 < 2.32. Because the DW value of 0.762 is not within this range, it can be concluded that the regression model in this study contains positive autocorrelation.

3.1.6 Multiple Linear Regression Analysis Results

Table 6. Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.428	.346		9.904	.000		
	Corporate Social Responsibility	-.040	.015	-.306	-2.771	.007	.962	1.040
	Green Organizational Culture	.001	.004	.018	.164	.870	.962	1.040

a. Dependent Variable: Environmental Performance

Y = 3.428 + -0.040 X1 + 0.001 X2 + e

Based on the equation above, the constant is 3.428. If the values of corporate social responsibility and green organizational culture are zero, then Environmental Performance (Y) is 3.428. The corporate social responsibility regression coefficient is -0.040, meaning that every one-unit increase in corporate social responsibility will decrease environmental performance by 0.040. Meanwhile, the green organizational culture coefficient of 0.001 indicates that every one-unit increase in green organizational culture will increase Environmental Performance by 0.001.

The partial test results (t-test) indicate that corporate social responsibility has a significant effect on environmental performance, with a significance value of 0.007 <0.05 and a negative coefficient. Therefore, an increase in corporate social responsibility is actually associated with a decrease in environmental performance in this model. Meanwhile, green organizational culture does not have a significant effect on environmental performance, as evidenced by a significance value of 0.870 > 0.05, although the regression coefficient is positive but not statistically significant.

Table 7. Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.310[a]	.096	.073	.48918

The Model Summary table shows an Adjusted R Square value of 0.073, or 7.3%. This means that the corporate social responsibility and green organizational culture variables influence Environmental Performance by 7.3%, while the remaining 92.7% is explained by other variables not examined in this study.

3.2 Discussion

In addition, the Durbin–Watson statistic of 0.762 indicates the presence of positive autocorrelation, suggesting that environmental performance tends to persist over time. In the context of the 2021–2024 observation period, this implies that a company's PROPER rating in a given year is influenced by its performance in previous years. Consequently, the t-statistics and p-values generated from ordinary least squares (OLS) regression may be inefficient, and the estimated relationships should therefore be interpreted with caution rather than as definitive causal effects. Furthermore, the low adjusted R^2 value of 0.073 indicates that Corporate Social Responsibility and Green Organizational Culture explain only a small proportion of the variation in environmental performance. This suggests that PROPER ratings are primarily driven by technical and operational factors, such as wastewater treatment facilities, emission control systems, hazardous waste management, and compliance with environmental engineering standards, rather than by managerial or symbolic factors such as CSR disclosure or organizational culture.

3.2.1 Corporate Social Responsibility Has a Negative and Significant Effect on Environmental Performance

The results show that corporate social responsibility has a significant effect on environmental performance, with a t-value of -2.771 and a significance level of 0.007. However, the direction of the effect is negative, as indicated by the regression coefficient of -0.040. This means that the higher the level of corporate social responsibility disclosure based on the GRI 4 indicators, the lower the company's environmental performance as measured using corporate performance rating assessment program in environmental management (PROPER). This finding indicates that high corporate social responsibility disclosure does not always reflect improved environmental performance, as corporate social responsibility practices in some manufacturing companies are more symbolic disclosures and have not been integrated into operational activities that directly impact Corporate Performance Rating Program in Environmental Management (PROPER) ratings.

Furthermore, companies may disclose numerous social or economic corporate social responsibility items without following up with strong environmental management, thus not improving Corporate Performance Rating Program in Environmental Management (PROPER) scores.

Many manufacturing companies may have implemented general policies supporting environmentally friendly values, such as reducing the use of hazardous materials, energy efficiency efforts, recycle-reuse-reduce campaigns, or environmental awareness training for employees. However, these values are often normative or declarative in nature and are not accompanied by operational actions that meet PROPER technical indicators, such as hazardous waste management, compliance with emission quality standards, production process efficiency, wastewater management, or environmentally friendly innovation. As a result, even though a green culture has been introduced, its impact has not been able to improve environmental performance in an objective and measurable manner.

These results align with several previous studies, such as Kraus et al., (2020), which states that corporate social responsibility does not always have a direct impact on environmental performance when it focuses solely on reporting aspects, rather than actual environmental performance. This confirms that corporate social responsibility that focuses solely on disclosure does not necessarily result in high environmental performance. Furthermore, the findings of this study align with those of (Rehman et al., 2022), found that corporate social responsibility can fail to improve environmental performance if it is not mediated by factors such as environmental strategy, green innovation, or robust environmental management practices. This indicates that corporate social responsibility in the form of disclosure requires supporting mechanisms capable of translating social commitments into operational actions that impact environmental performance. However, this finding contradicts the research of Khaddage-Soboh et al., (2024), who found that corporate social responsibility has a significant positive effect on environmental performance in the manufacturing industry in Malaysia. This difference may be influenced by the different regulatory context. In Indonesia, PROPER strictly assesses technical environmental aspects and focuses on objective achievements, rather than narrative or declarative corporate social responsibility commitments. This may explain why companies with high levels of corporate social responsibility disclosure in Indonesia do not necessarily demonstrate good environmental performance.

Theoretically, the results of this study align with Stakeholder Theory, which explains that companies disclose corporate social responsibility in response to pressure from various stakeholders, such as the public, government, and investors (Freeman & McVea, 2005) . However, these findings also broaden the understanding that such responses do not always reflect substantive actions that improve environmental performance. In other words, companies may meet stakeholder demands through publicizing corporate social responsibility activities, but not necessarily translate these into concrete and measurable environmental management practices.

In this regard, the results of this study reinforce the notion that corporate social responsibility alone is insufficient to improve environmental performance, especially if it is not supported by concrete operational practices aligned with technical environmental standards. These findings suggest that companies can strategically utilize corporate social responsibility disclosure as a communication tool to meet stakeholder expectations, but this approach does not necessarily result in substantial improvements in their environmental outcomes. Thus, this study underscores the importance of shifting corporate social responsibility efforts from symbolic disclosures to more action-oriented and performance-based environmental initiatives to achieve measurable improvements in environmental performance.

3.2.2 Green Organizational Culture Has No Impact on Environmental Performance

Partial test results indicate that green organizational culture has no significant effect on environmental performance, as indicated by a t-value of 0.164 and a significance level of 0.870 (>0.05). Although the regression coefficient is positive (0.001), this effect is not statistically strong enough to influence environmental performance as measured by Corporate Performance Rating Program in Environmental Management (PROPER). This finding indicates that companies' green organizational culture has not been fully internalized in operational practices, thus not directly contributing to improved environmental performance. Many companies may have policies or statements emphasizing the use of environmentally friendly materials, energy reduction, or the principle of recycle-reuse-reduce, but their technical implementation is inconsistent or does not meet the standards assessed by Corporate Performance Rating Program in Environmental Management (PROPER). Therefore, a normative organizational culture is not sufficient to influence these technical assessments if it is not supported by concrete actions.

This research finding aligns with several previous studies. Prasetyo et al., (2024) which shows that green organizational culture does not have a direct influence on environmental performance, unless mediated by factors such as environmental strategy that transforms cultural values into operational policies and procedures. Furthermore, research by Li et al., (2025) also found that green organizational culture does not directly improve environmental performance, as this influence usually arises through green commitment and a green organizational identity that can encourage pro-environmental behavior from employees. This suggests that cultural values alone are not sufficient; they must be transformed into measurable operational practices and systems before they can influence environmental performance.

On the other hand, the results of this study are inconsistent with the findings of Roespinoedji et al., (2019), who stated that green organizational culture has a positive effect on environmental performance in manufacturing companies. This study explained that a strong green organizational culture can encourage pro-environmental employee behavior, thereby increasing efficiency in energy, waste, and resource management. The differences in results between this study and previous research may be due to the industry context, the level of green culture implementation, and the varying operational characteristics of companies. Therefore, the findings of this study reinforce that the existence of a green

organizational culture is not sufficient to directly drive improvements in environmental performance, particularly in companies in the food and beverage subsector, which face high operational complexity and stringent environmental regulatory demands. green organizational culture implementation needs to be accompanied by an integrated environmental management system to have a tangible impact on environmental performance.

Theoretically, these findings can also be explained through Stakeholder Theory. From this theoretical perspective, companies build a green organizational culture in response to stakeholder pressure, such as increasingly environmentally conscious consumers, governments, local communities, or investors demanding sustainable practices (Donaldson & Preston, 1995). However, the findings of this study indicate that meeting stakeholder expectations through the formation of a green culture has not yet been fully translated into concrete actions that objectively impact environmental performance. In other words, a green organizational culture is still at the value declaration level and has not yet reached the value enactment stage, thus not having a direct effect on Corporate Performance Rating Program in Environmental Management (PROPER) assessments. This emphasizes that to substantially meet stakeholder expectations, companies need to transform their green culture into an integrated environmental management system, measurable technical procedures, and tangible operational innovations.

The results of this study confirm that the existence of a green organizational culture is not sufficient to directly drive improvements in environmental performance, especially in companies in the food and beverage subsector, which face strict environmental regulations and high operational complexity. The implementation of a green organizational culture needs to be strengthened through a consistent environmental management system, operational policies, and technical measures to generate a tangible impact on environmental performance and substantially meet stakeholder demands.

4. CONCLUSION

This study shows that corporate social responsibility has a significant influence on environmental performance; however, the direction of the relationship is negative, indicating that the first hypothesis is not fully supported as initially predicted. This finding confirms that increased corporate social responsibility disclosure is not always followed by improved environmental performance, as corporate disclosures tend to be symbolic and do not yet fully reflect the technical environmental practices assessed through the Corporate Performance Rating Program in Environmental Management (PROPER). Meanwhile, green organizational culture does not have a significant effect on environmental performance, leading to the rejection of the second hypothesis. This result suggests that green values and cultural commitments within organizations have not been consistently translated into operational practices that directly affect environmental performance assessments. Furthermore, the explanatory power of the model is relatively low, indicating that corporate social responsibility and green organizational culture explain only a small proportion of the variation in environmental performance. This implies that environmental performance, as measured by PROPER, is more strongly driven by technical and operational factors, such as production technology, environmental engineering systems, waste and emission control mechanisms, sustainability strategies, and regulatory compliance, rather than by managerial or disclosure-oriented factors alone. Despite its contributions, this study has several limitations. The Durbin–Watson value of 0.762 indicates the presence of positive autocorrelation, suggesting that environmental performance tends to be path-dependent over time, where a company's PROPER rating in a given year is influenced by its performance in previous periods. This condition implies that statistical estimates derived from ordinary least squares regression may be inefficient. In addition, the study is limited to the food and beverage subsector and a relatively short observation period. Furthermore, the use of a GRI G4-based disclosure index for the 2021–2024 period may introduce measurement limitations, as some companies have adopted the updated GRI Universal Standards, potentially affecting the comparability of CSR disclosure measurement. Therefore, future research is encouraged to employ panel data analysis or longitudinal modeling approaches, expand the scope of industrial sectors, extend the observation period, and incorporate additional variables to improve statistical robustness and explanatory power. From a practical perspective, the findings indicate that efforts to improve environmental performance cannot rely solely on corporate social responsibility disclosure or the existence of green organizational values. Companies are encouraged to undertake concrete actions by aligning GRI-based sustainability reporting with the technical indicators used in the PROPER assessment, such as wastewater treatment systems, emission control technologies, hazardous waste management, and other forms of environmental engineering. Strengthening this alignment may help reduce the gap between sustainability disclosure and actual environmental performance, leading to more substantive and measurable environmental improvements.

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