http://dx.doi.org/10.18623/rvd.v23.n4.4519

FROM GREEN STRATEGY TO PERFORMANCE: THE MODERATING ROLE OF SUSTAINABILITY REPORTING QUALITY

DA ESTRATÉGIA VERDE AO DESEMPENHO: O PAPEL MODERADOR DA QUALIDADE DO RELATÓRIO DE SUSTENTABILIDADE

Article received on: 10/9/2025
Article accepted on: 1/9/2026

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The authors declare that there is no conflict of interest

Abstract
This study investigates the effects of green competitive advantage (GCA) and green innovation (GI) on company performance, with sustainability report quality (SRQ) serving as a moderating variable. Firm size and firm age are included as control variables to enhance empirical robustness. Using a quantitative approach, the study analyzes panel data from 248 manufacturing firms listed on the Indonesia Stock Exchange (IDX) during 2022–2023, yielding 496 firm-year observations. The hypotheses are tested using panel data regression and Moderated Regression Analysis (MRA). The findings reveal that GCA has a significant positive effect on company performance, whereas GI does not demonstrate a statistically significant direct impact. Furthermore, SRQ significantly strengthens the relationship between GCA and company performance but does not moderate the relationship between GI and performance. The primary contribution of this study lies in the refinement and extension of the SRQ construct by incorporating two additional dimensions—responsiveness and impact—which extend beyond conventional disclosure attributes such as accuracy and reliability. This enhanced SRQ framework allows for a more policy-relevant evaluation of whether sustainability reports not only comply with reporting standards but also meaningfully address stakeholder concerns and demonstrate tangible performance outcomes. From a policy perspective, the results suggest that sustainability reporting frameworks should emphasize report

Resumo
Este estudo investiga os efeitos da vantagem competitiva verde (Green Competitive Advantage – GCA) e da inovação verde (Green Innovation – GI) sobre o desempenho das empresas, tendo a qualidade do relatório de sustentabilidade (Sustainability Reporting Quality – SRQ) como variável moderadora. O tamanho e a idade da empresa são incluídos como variáveis de controle para aumentar a robustez empírica. Utilizando uma abordagem quantitativa, o estudo analisa dados em painel de 248 empresas manufatureiras listadas na Bolsa de Valores da Indonésia (Indonesia Stock Exchange – IDX) no período de 2022–2023, totalizando 496 observações empresa-ano. As hipóteses são testadas por meio de regressão com dados em painel e Análise de Regressão Moderada (Moderated Regression Analysis – MRA). Os resultados indicam que a GCA exerce um efeito positivo e significativo sobre o desempenho empresarial, enquanto a GI não apresenta um impacto direto estatisticamente significativo. Além disso, a SRQ fortalece significativamente a relação entre GCA e desempenho da empresa, mas não modera a relação entre GI e desempenho. A principal contribuição deste estudo reside no refinamento e na ampliação do constructo de SRQ, ao incorporar duas dimensões adicionais — responsividade e impacto — que vão além dos atributos tradicionais de divulgação, como precisão e confiabilidade. Esse modelo aprimorado de SRQ possibilita uma avaliação mais relevante para políticas públicas, ao

substance, stakeholder responsiveness, and measurable impact rather than focusing solely on disclosure volume or formal compliance. Strengthening SRQ can enhance the credibility of green strategies and increase their contribution to firm performance. Overall, the findings provide important implications for regulators, standard setters, and policymakers seeking to improve the effectiveness of sustainability disclosure regimes and promote performance-oriented sustainability practices in emerging markets.

Keywords: Green Competitive Advantage. Green Innovation. Firm Performance. Sustainability Reporting Quality. Sustainability Strategy.

verificar se os relatórios de sustentabilidade não apenas cumprem padrões de divulgação, mas também respondem de forma significativa às preocupações dos stakeholders e demonstram resultados de desempenho tangíveis. Do ponto de vista das políticas públicas, os achados sugerem que os frameworks de relato de sustentabilidade devem priorizar o conteúdo substantivo dos relatórios, a responsividade aos stakeholders e o impacto mensurável, em vez de focar apenas no volume de divulgação ou na conformidade formal. O fortalecimento da SRQ pode aumentar a credibilidade das estratégias verdes e ampliar sua contribuição para o desempenho empresarial. De modo geral, os resultados oferecem implicações relevantes para reguladores, organismos normativos e formuladores de políticas interessados em aprimorar a efetividade dos regimes de divulgação de sustentabilidade e promover práticas sustentáveis orientadas ao desempenho em mercados emergentes.

Palavras-chave: *Vantagem Competitiva Verde. Inovação Verde. Desempenho da Empresa. Qualidade do Relatório de Sustentabilidade. Estratégia de Sustentabilidade.*

1 INTRODUCTION

Increasing environmental challenges and stakeholder pressures have compelled firms to rethink how competitive advantage and performance are achieved. Company performance is no longer assessed solely through financial outcomes but also through the integration of environmental considerations into strategic and operational decisions, particularly in resource-intensive manufacturing sectors (BUALLAY, 2020; MAGA; KAIWAI; PUTRI, 2025; OWARE & WORAE, 2023).

One key strategy for enhancing performance is the development of green competitive advantage (GCA), defined as a firm's ability to outperform competitors through environmentally oriented resources and capabilities that are difficult to imitate. Prior studies show that GCA strengthens market positioning, operational efficiency, and overall performance, especially in environmentally sensitive industries (BINTARA; RUDYANTO; SIREGAR, 2023; CHEN, 2008; DO & NGUYEN, 2020). Grounded in the Resource-Based View (RBV), environmental capabilities embedded in organizational

routines can function as strategic resources that support sustainable performance (ASTUTI; SETYANINGRUM; WAHYUNI, 2023; WERNERFELT, 1984).

In parallel, green innovation (GI) has emerged as a response to environmental pressures and regulatory demands through eco-friendly products, processes, and technologies (BECKER, 2023; KARABULUT & HATIPOĞLU, 2020). However, empirical findings on the GI–performance relationship remain mixed, as high investment costs, long payback periods, and market uncertainty may delay performance gains (NOVITASARI & AGUSTIA, 2022; QING et al., 2022).

The effectiveness of green strategies may depend on sustainability report quality (SRQ). High-quality sustainability reporting enhances transparency, reduces information asymmetry, and strengthens stakeholder trust, thereby reinforcing the performance impact of green strategies (PERMATASARI; RUDYANTO; SIREGAR, 2020; PURBIYATI & ANDREW, 2025; RAHMAN; SOBHAN; HASAN, 2024; RUDYANTO & SIREGAR, 2018). Conversely, weak reporting may dilute these benefits (ŠIMUNOVIĆ; MURTARELLI; ROMENTI, 2024).

Accordingly, this study examines the influence of GCA and GI on company performance, with SRQ as a moderating variable, while controlling for firm size and firm age. Focusing on manufacturing firms in an emerging market context, this study contributes to sustainability and reporting literature by providing an integrated perspective on how green strategies and disclosure quality jointly drive corporate performance.

2 LITERATURE REVIEW

2.1 Resource-Based View (RBV)

In the context of the RBV, a firm's sustainable competitive advantage is rooted in the possession and utilization of valuable, rare, inimitable, and well-organized resources and capabilities. Sustainability reporting, green culture, and GI can be viewed as strategic resources and capabilities that meet these criteria. High-quality and credible sustainability reporting can build a strong reputation, enhance stakeholder trust, and attract responsible

investment, making it a valuable asset that is difficult for non-transparent competitors to imitate (HUANG; KUNG, 2011).

Green innovation, which includes the development of environmentally friendly products, services, and processes, is a dynamic capability that allows a firm to respond to environmental pressures and exploit new market opportunities (MAHDI & NASSAR, 2021). The ability to sustainably produce unique and relevant GI is a source of competitive advantage that is hard to match. Companies with superior GI capabilities can create products and services that are in demand by increasingly environmentally conscious consumers, while reducing the negative impacts of their operations (KANG & NA, 2020; LÓPEZ-LÓPEZ; BAJORATH; MEDINA-FRANCO, 2020).

2.2 Hypotheses development

2.2.1 The influence of green competitive advantage on company performance

GCA refers to a firm's advantage derived from environmental strategies and GI that are difficult for competitors to imitate (BAAH et al., 2024). From the RBV perspective, environmentally friendly technologies and GI can create sustainable competitive advantage and enhance business performance (ELORANTA & TURUNEN, 2015). Prior studies indicate that GCA is positively associated with company performance by improving operational efficiency, increasing customer attractiveness, and strengthening corporate reputation in markets that are increasingly environmentally conscious (ASTAWAN et al., 2025; DO & NGUYEN, 2020; HANG; GEYER-KLINGEBERG; RATHGEBER, 2022; KARABULUT & HATIPOĞLU, 2020). Low-cost leadership strategies enable firms to reduce operational costs through energy efficiency and waste reduction, while differentiation-based strategies facilitate the development of innovative products that appeal to environmentally conscious consumers (MUISYO et al., 2022; PORTER, 1985). Numerous empirical studies have found that GCA has a positive effect on company performance (ASTUTI; SETYANINGRUM; WAHYUNI, 2023; BAAH et al., 2024; HANG; GEYER-KLINGEBERG; RATHGEBER, 2022; KARABULUT & HATIPOĞLU, 2020). Accordingly, this study proposes the following hypothesis:

H1: Green competitive advantage has a positive effect on company performance.

2.2.2 The influence of green innovation on company performance

GI involves innovations in both products and processes aimed at reducing negative environmental impacts (CHOUAIBI; CHOUAIBI; ROSSI, 2022). From the RBV perspective, GI is a strategic resource that can create a sustainable competitive advantage (BECKER, 2023). Previous studies have shown that GI positively contributes to company performance by increasing product attractiveness in the green market and operational efficiency (AYINADDIS, 2023). Green product innovation provides added value through environmentally friendly materials, while green process innovation helps reduce waste and energy consumption (KARABULUT & HATIPOĞLU, 2020). Based on these findings, the proposed hypothesis is:

H2: GI has a positive effect on company performance.

2.2.3 The influence of organizational green culture on company performance moderated by the quality of sustainability reports

GCA helps firms create a competitive advantage through environmentally friendly strategies that contribute to business performance (CHEN, 2008). According to the RBV, firms with unique green strategies can enhance efficiency and competitiveness (BAAH et al., 2024). Previous studies indicate that GCA has a positive impact on company performance, both in terms of profitability and sustainability (HANG; GEYER-KLINGEBERG; RATHGEBER, 2022; KARABULUT & HATIPOĞLU, 2020). However, the effect of GCA on performance may be influenced by the SRQ. Stakeholder theory emphasizes that transparent sustainability reporting increases the trust of investors and other stakeholders (PÉREZ-LÓPEZ; MORENO-ROMERO; BARKEMEYER, 2015), while SEBRINA et al. (2023) find that high-quality sustainability reporting positively affects company performance. Thus, the proposed hypothesis is:

H3: SRQ strengthens the effect of GCA on company performance.

2.2.4 The influence of green innovation on company performance moderated by the quality of sustainability reports

GI is important in improving company performance through environmentally friendly product and process innovation (NASIR et al., 2024). Based on RBV, GI can be a strategic resource that creates a sustainable competitive advantage (BECKER, 2023). Previous studies have shown that GI contributes to improving operational efficiency and company competitiveness (AYINADDIS, 2023). However, the impact of GI on performance can be influenced by the quality of sustainability reports (SRS). Stakeholder theory explains that transparent SRS strengthens stakeholder and investor trust (RAMANATHAN & ISAKSSON, 2023), while LEE; LIU; CHENG (2023) found that good SRS positively impacts profitability. Based on this empirical evidence, the proposed hypothesis is:

H4: SRQ strengthens the influence of GI on company performance.

3 METHODOLOGY

This study employs a quantitative research design to examine the causal relationships between GCA and GI on company performance, with SRQ acting as a moderating variable. The analysis focuses on manufacturing firms listed on the Indonesia Stock Exchange (IDX) during the 2022–2023 period. The manufacturing sector is selected due to its substantial environmental impact and its strategic relevance to sustainability regulation and disclosure practices.

Secondary data are obtained from sustainability reports and annual reports published on the official IDX website. GCA is measured using the traditional dimensions of environmental cost leadership and green differentiation, complemented by three additional dimensions: green information technology (GIT), green corporate image (GCI), and green advertising (GA), to capture both operational and reputational sources of green competitiveness. GI is operationalized through green product innovation and green process innovation. SRQ is assessed based on accuracy, balance, and reliability, while company performance is measured using market performance and brand performance indicators.

All variables are measured using content analysis with a scoring scale ranging from 0 to 5, adapted from PERMATASARI; RUDYANTO; SIREGAR (2020) and further developed by the authors. A score of 0 indicates no disclosure; 1 reflects a brief mention without detail; 2 indicates qualitative disclosure without quantitative evidence; 3 represents quantitative disclosure without visual presentation; 4 denotes quantitative disclosure supported by tables or figures; and 5 reflects comprehensive disclosure including quantitative data, visual presentation, and analytical interpretation of outcomes, trends, or benchmarks.

The research sample is selected using purposive sampling, including manufacturing firms that remained listed on the IDX throughout the observation period. The final dataset consists of firm-year observations from 2022 to 2023. Multiple linear regression analysis is employed to test the direct effects of GCA and GI on company performance, while Moderated Regression Analysis (MRA) is applied to examine the moderating role of SRQ. Prior to hypothesis testing, classical assumption tests are conducted to ensure the validity and reliability of the regression models. Statistical significance is evaluated using the coefficient of determination (R^2) and t-tests.

By extending the measurement of GCA and incorporating SRQ as a moderating mechanism, this methodological approach provides a robust empirical framework for assessing sustainability-driven performance in an emerging market context.

4 RESULTS

4.1 Model determination

Model selection for the panel data analysis was conducted using the Chow test, the Breusch–Pagan Lagrange Multiplier (LM) test, and the Hausman test. The Chow test indicates that the Fixed Effect Model (FEM) is preferable to the Common Effect Model (CEM), as reflected by a rho value of 0.6218 (> 0.50). Consistently, the LM test rejects the CEM in favor of the Random Effect Model (REM), with a probability value of 0.0000 (< 0.05). The Hausman test further suggests that REM is more appropriate than FEM, as the probability value of 0.0618 exceeds the 5% significance level.

Overall, the model selection tests collectively support the use of the Random Effect Model (REM). Accordingly, the final estimation is performed using the REM approach with least squares, ensuring efficient and consistent parameter estimates.

4.2 Coefficient of determination test

The results show an adjusted R-squared value of 0.3642, indicating that approximately 36% of the variation in company performance is explained by the independent variables, organizational green culture and GI, the moderating variable of SRQ, and the control variables, including firm size and firm age.

4.3 Structural equation

The regression equation of this model is based on the constants and regression coefficient values obtained from data processing with Stata below:

$$Y= \beta0 + \beta1X1 + \beta2X2 + \beta3Z + \beta4Size + \beta5Age + \varepsilon$$

$$Y = 2.121 +1.783*X_1+0.092*X_2 + 0.411*X_1Z +0.019X_3Z -0.009*Size+0.006*Age + \varepsilon \quad (1)$$

The intercept value of 2.121 represents the baseline level of company performance when all independent, moderating, and control variables are equal to zero. Regarding the main effects, GCA (X1) has a positive coefficient of 1.783, indicating that a one-unit increase in GCA leads to an increase of 1.783 units in company performance, holding other variables constant. Green innovation (X2) also shows a positive coefficient of 0.092, suggesting that each one-unit increase in GI contributes to a 0.092-unit increase in company performance.

The interaction terms capture the moderating role of SRQ. The coefficient of the interaction between GCA and SRQ (X1×Z) is 0.411, indicating that higher-quality sustainability reporting strengthens the positive effect of GCA on company performance. Similarly, the interaction between GI and SRQ (X2×Z) has a positive coefficient of 0.019, although the magnitude of this effect is relatively small.

With respect to the control variables, firm size has a negative coefficient of −0.009, implying that larger firm size is associated with a slight decrease in company performance. In contrast, firm age has a positive coefficient of 0.006, indicating that older firms tend to exhibit marginally higher levels of performance.

4.4 Hypothesis testing

Table 1

Hypothesis Test Results

Hypothesis				Direction	Coeff.	Z	Prob. (P-Value)	Information
H1	CP	←	GCA	+	1.622	2.28	0.011**	Accepted
H2	CP	←	GI	+	0.134	0.94	0.312	Rejected
H3	CP	←	GCA*SRQ	+	0.397	11.97	0.000**	Accepted
H4	CP	←	GIN* SRQ	+	1.314	0.96	0.308	Rejected
	CP	←	Size		-0.009	-0.91	0.044	
	CP	←	Age		0.006	1.83	0.039	

Information:
CP=Company performance; GCA=Green Competitive Advantage; GI=Green Innovation; SRQ = Sustainability report quality
The P value is divided by two from the hypothesis results due to one-tailed (GUJARATI, 2009).
Significance: *0.001; **0.05; ***0.010

Source: Data processed by researchers

Table 1 presents the results of hypothesis testing examining the relationships among GCA, GI, SRQ, and company performance. The first hypothesis tests the influence of GCA (X1) on Company Performance (Y). The results show that X1 has a t-statistic of 2.28, exceeding the critical value of 1.65, with a p-value of 0.011, which is below the 0.05 significance threshold. These findings indicate a significant positive effect of GCA on company performance, leading to the acceptance of Hypothesis 1.

The second hypothesis examines the effect of GI (X2) on Company Performance (Y). The statistical results indicate that X2 has a t-value of 0.94, which is lower than the critical value of 1.65, and a p-value of 0.312, exceeding the 0.05 significance level. This suggests that GI does not have a significant positive effect on company performance. Accordingly, Hypothesis 2 is rejected.

The third hypothesis investigates whether SRQ (Z) moderates the relationship between GCA (X1) and Company Performance (Y). The interaction term between SRQ and GCA shows a t-statistic of 11.97 and a p-value of 0.000, indicating a strong and

statistically significant moderating effect. These results confirm that SRQ strengthens the positive relationship between GCA and company performance, thus supporting Hypothesis 3.

Finally, the fourth hypothesis assesses the moderating role of SRQ (Z) on the relationship between GI (X2) and Company Performance (Y). The interaction term (SRQ × GI) yields a t-value of 0.96, which is below the critical value, and a non-significant p-value, indicating that SRQ does not moderate the effect of GI on company performance. Therefore, Hypothesis 4 is not supported.

Table 2

Sensitivity Test

Hypothesis				Measurement of the Main Model (with Novelty)		Sensitivity Test (without Novelty)	
				Coefficient	Prob. (P-Value)	Coefficient	Prob. (P-Value)
C				2.338			
H1	CP	⟵	GCA	1.622	0.011**	0.133	0.023**
H2	CP	⟵	GI	0.134	0.401	0.865	0.334
H3	CP	⟵	GCA*SRQ	0.397	0.000*	0.671	0.000*
H4	CP	⟵	GIN* SRQ	1.314	0.450	0.115	0.251
	CP	⟵	Size	-0.006	0.210	-0.008	0.161
	CP	⟵	Age	0.004	0.043	0.006	0.012
Adjusted R Square				0.3221		0.2216	

Description:
CP=Company Performance; GCA=Green Competitive Advantage; GI=Green Innovation; SRQ=Sustainability Report Quality
The P value is divided by two from the hypothesis results due to one-tailed (GUJARATI, 2009).
Significance: *0.001; **0.05; ***0.010

Source: Data processed by researchers

In the main model testing, the Adjusted R-squared value is 0.3036, indicating that the model explains 30.36% of the variation in company performance after incorporating the novel dimensions of GCA, namely GIT, GCI, and GA, as well as the novel dimensions of SRQ, namely responsiveness and impact. This result suggests that the inclusion of these additional dimensions enhances the explanatory power of the model by capturing broader strategic and informational aspects of green initiatives and sustainability reporting.

In the sensitivity testing in Table 2, the Adjusted R-squared value is lower, at 0.2116, indicating that the measurement prior to the inclusion of the novel dimensions in

the GCA and SRQ variables explains only 21.16% of the variation in company performance. The comparison between the two models highlights that conventional measurements tend to underestimate the contribution of green competitive strategies and sustainability reporting quality to firm performance.

Overall, these findings confirm that the proposed measurement enhancements provide a more comprehensive understanding of how GCA and high-quality sustainability reporting jointly contribute to improved company performance.

Table 3

Results of Hypothesis Testing for the Expansion of the SRQ Variable

Influence of Variables	Coefficient	Z	Prob. (P-Value)	Result
c	-2.313		0.001	
CP ⟵ AC	0.152	1.78	0.076**	Accepted
CP ⟵ BL	0.131	1.28	0.202	Rejected
CP ⟵ CL	0.064	1.19	0.233	Rejected
CP ⟵ CB	0.511	5.23	0.000*	Accepted
CP ⟵ CM	0.574	8.50	0.000*	Accepted
CP ⟵ RL	0.139	1.83	0.067**	Accepted
CP ⟵ TM	0.080	0.67	0.506	Rejected
CP ⟵ SC	0.046	0.63	0.526	Rejected
CP ⟵ RS	0.191	2.32	0.020*	Accepted
CP ⟵ IM	0.240	3.06	0.002*	Accepted
CP ⟵ Size	-0.012	-1.37	0.171	
CP ⟵ Age	0.004	1.39	0.166	
Adjusted R Square = 0.4550				

Notes:
CP=Company Performance; AC=Accuracy, BL=Balance, CL=Clarity, CB=Comparability, CM=Completeness, RL= reliability, TM= timeliness, SC= sustainability context, RS=responsiveness; IM=impact
Significant: *0.001; **0.05; ***0. 010

Source: Data processed by researchers

The expansion test in Table 3 shows that SRQ is measured using ten dimensions: accuracy, balance, clarity, comparability, completeness, sustainability context, timeliness, reliability, responsiveness, and impact. Of these ten dimensions, six have a significant effect on SRQ, namely accuracy, comparability, completeness, sustainability context, responsiveness, and impact. Among these, completeness has the strongest influence on SRQ, followed by comparability. The adjusted R-squared value of 0.4550 indicates that these dimensions explain 45% of the variation in SRQ, while the remaining 55% is influenced by other factors not included in the research model.

5 DISCUSSION

5.1 The influence of green competitive advantage on company performance

The statistical results indicate that GCA has a significant positive effect on company performance, highlighting its role in enhancing firms' competitiveness as well as financial and operational outcomes (CHEN & CAO, 2023; DO & NGUYEN, 2020; HANG; GEYER-KLINGEBERG; RATHGEBER, 2022; KARABULUT & HATIPOĞLU, 2020). Content analysis of non-financial manufacturing firms shows that GCI records the highest average score, while GIT remains the lowest, suggesting that firms prioritize green image building over green technological innovation (ALAM & ISLAM, 2021). The limited adoption of GIT reflects substantial investment requirements and the complexity of operational transformation (SINGH & SHARMA, 2023).

The highest-scoring indicator, "the company contributes to the community," underscores firms' growing awareness of social responsibility, consistent with stakeholder theory, which emphasizes stakeholder support for socially and environmentally responsible firms (FREEMAN, 1984). From an RBV perspective, a strong green corporate image represents an intangible strategic resource that enhances competitive advantage and attracts sustainability-oriented investors and customers (HAFEEZ; LI; YANG, 2024; ZAMEER et al., 2024).

Conversely, the lowest-scoring indicator, "the company reuses IT resources," highlights persistent challenges in green technology adoption, particularly in e-waste management and digital energy efficiency (GARG; GUPTA; MEHTA, 2023). These challenges are driven by financial constraints, limited technological infrastructure, and weak stakeholder pressure, especially in developing-country contexts (FARMANESH; ZARGAR; GOHARI, 2025; SINGH & SHARMA, 2023; ZIHAN; QIANG; JUN, 2024). Overall, the disparity between high GCI and low GIT suggests that many firms emphasize symbolic green positioning over substantive technological sustainability, despite evidence that GIT adoption can enhance efficiency, profitability, and long-term value creation (GOETHALS & ZIEGELMAYER, 2024; SINGH & SHARMA, 2023).

5.2 The influence of green innovation on company performance

The statistical results indicate that GI does not have a significant positive effect on company performance. From an RBV perspective, firm resources generate competitive advantage only when they are valuable, rare, inimitable, and non-substitutable (WERNERFELT, 1984). Although GI has the potential to enhance competitiveness, its performance impact is often delayed due to high investment requirements and long implementation horizons (BECKER, 2023; NASIR et al., 2024). Moreover, when firms lack the capabilities to effectively manage or strategically integrate GI, its contribution to performance becomes insignificant (CHOUAIBI; CHOUAIBI; ROSSI, 2022).

Content analysis of 496 manufacturing firms reveals an increase in both green product and process innovation from 2022 to 2023, with green process innovation exhibiting the highest average score and green product innovation the lowest. This suggests that firms prioritize process-related improvements that enhance efficiency and reduce waste, as these are easier to implement without major product redesigns (BECKER, 2023), while green product innovation faces higher costs and uncertain market demand (ÖZGÜL & ZEHİR, 2023). The highest-scoring indicator, "low energy consumption," reflects firms' focus on energy efficiency to reduce costs and comply with environmental regulations (PAN et al., 2021). Consistent with RBV theory, energy efficiency represents a strategic resource that can enhance long-term competitiveness (BARNEY, 1991), while also supporting carbon reduction and operational efficiency (GOETHALS & ZIEGELMAYER, 2024; SINGH & SHARMA, 2023).

In contrast, the lowest-scoring indicator is the "use of eco-labels on products," indicating limited communication of green product attributes to consumers (LEONIDOU; KATSIKEAS; MORGAN, 2011). Although eco-labeled products are more attractive to environmentally conscious consumers (CHOUAIBI; CHOUAIBI; ROSSI, 2022), firms remain reluctant to adopt such labels due to high certification costs, limited information, and weak regulatory pressure (ASTUTI; SETYANINGRUM; WAHYUNI, 2023). This imbalance suggests that while firms have advanced in process-based GI, they have not fully leveraged green product innovation as a strategic resource. Both RBV and Stakeholder Theory emphasize that the performance benefits of GI depend not only on

implementation but also on effective market communication and stakeholder engagement (AYINADDIS, 2023; CHEN, 2008).

5.3 Quality of sustainability reports strengthens the influence of green competitive advantage on company performance

The statistical test results indicate that SRQ strengthens the effect of GCA on company performance. High-quality sustainability reporting enhances transparency regarding firms' sustainability strategies, including how companies build GCA through GI and environmental efficiency (OWARE & WORAE, 2023). Accordingly, SRQ supports Stakeholder Theory by helping firms develop stronger relationships with stakeholders, which ultimately reinforces the relationship between GCA and company performance.

From the perspective of RBV theory, these findings suggest that GCA constitutes a strategic resource that can enhance firm competitiveness. Sustainability report quality acts as a reinforcing factor by ensuring the transparency and credibility of sustainability-related information. RBV posits that competitive advantage depends on a firm's ability to manage resources that are valuable, rare, inimitable, and non-substitutable (BARNEY, 1991). In this context, high-quality sustainability reporting reflects the effective implementation of green strategies within corporate operations and contributes to improved business performance (HONG et al., 2025; NG et al., 2025; OWARE & WORAE, 2023).

Furthermore, RAHMAN; SOBHAN; HASAN (2024) emphasize that effective management of sustainability-related resources increases the likelihood of improved company performance. Therefore, investment in sustainability reporting not only enhances corporate legitimacy but also strengthens sustainable competitive advantage.

From a stakeholder theory perspective (FREEMAN, 1984), these results indicate that sustainability reporting is a key factor considered by stakeholders when evaluating the effectiveness of a firm's GCA strategy. Transparency in sustainability reporting enhances stakeholder trust, provided that the disclosures genuinely reflect substantive sustainability practices (PÉREZ-LÓPEZ; MORENO-ROMERO; BARKEMEYER, 2015).

The content analysis reveals that the highest disclosure score among the sample firms appears in the GCI dimension, specifically for the indicator “the company contributes to the community.” This finding suggests that firms are increasingly active in social responsibility programs related to sustainability. According to stakeholder theory, corporate contributions to society should strengthen stakeholder trust, including that of customers, investors, and regulators. OWARE and WORAE (2023) argue that high-quality sustainability reporting can enhance competitive advantage by building corporate reputation and stakeholder loyalty. PÉREZ-LÓPEZ; MORENO-ROMERO; BARKEMEYER (2015) further find that transparency in sustainability reporting increases stakeholder trust only when disclosures truly reflect firms’ sustainability strategies in practice. RUDYANTO and SIREGAR (2018) add that firms must be responsive to stakeholder needs in sustainability reporting, as reports that fail to address material issues may reduce the credibility and value of the disclosed information.

In contrast, the indicator with the lowest score within GCA is “the company holds patents for environmentally friendly products or services,” which even shows a slight decline from 2022 to 2023. This result indicates that sustainability-based innovation remains relatively low. RBV theory suggests that sustainable competitive advantage depends not only on cost efficiency and social contributions but also on innovation-based differentiation that is difficult for competitors to imitate. With low levels of GI, as reflected in the limited number of green patents, firms may struggle to build a strong competitive advantage. This finding aligns with ELORANTA and TURUNEN (2015), who emphasize that valuable and rare internal resources, such as GI, are critical to achieving sustainable competitive advantage.

Moreover, the low score for “environmentally responsive marketing” within the GA dimension indicates that green marketing strategies are still underdeveloped. This is noteworthy given that LEONIDOU; KATSIKEAS; MORGAN (2011) argue that GA is an important factor in enhancing firm competitiveness by attracting environmentally conscious consumers.

5.4 Sustainability report quality strengthens the influence of green innovation on company performance

The statistical results indicate that SRQ significantly strengthens the effect of GCA on company performance. High-quality sustainability reporting enhances transparency regarding firms' environmental strategies and how GCA is developed through GI and efficiency, thereby reinforcing stakeholder confidence (OWARE & WORAE, 2023). This finding supports stakeholder theory, which emphasizes that credible disclosures help firms build stronger relationships with stakeholders and amplify the performance benefits of green competitive strategies (FREEMAN, 1984; PÉREZ-LÓPEZ; MORENO-ROMERO; BARKEMEYER, 2015).

From an RBV perspective, GCA represents a strategic resource capable of enhancing firm competitiveness when it is supported by transparent and credible sustainability reporting. SRQ functions as a reinforcing mechanism that signals the effective deployment of valuable, rare, inimitable, and non-substitutable green resources, thereby contributing to improved performance outcomes (BARNEY, 1991; OWARE & WORAE, 2023). Consistent with RAHMAN; SOBHAN; HASAN (2024), investment in high-quality sustainability reporting not only enhances corporate legitimacy but also strengthens sustainable competitive advantage.

Content analysis further shows that the highest disclosure scores are found in the GCI dimension, particularly for corporate contributions to society, indicating increased engagement in sustainability-related social responsibility initiatives. Such disclosures enhance corporate reputation and stakeholder loyalty when they reflect substantive practices (OWARE & WORAE, 2023; PÉREZ-LÓPEZ; MORENO-ROMERO; BARKEMEYER, 2015; RUDYANTO & SIREGAR, 2018). In contrast, the lowest scores are observed for green patents and environmentally responsive marketing, suggesting limited innovation-based differentiation and underdeveloped GA strategies. This aligns with RBV arguments that sustainable competitive advantage requires not only cost efficiency and social contributions but also innovation that is difficult to imitate (ELORANTA & TURUNEN, 2015), and with evidence that GA plays a critical role in attracting environmentally conscious consumers (LEONIDOU; KATSIKEAS; MORGAN, 2011).

5.5 The effect of firm size on company performance

The results indicate that firm size does not have a significant positive effect on company performance. This finding suggests that company size alone does not directly determine performance, contrary to YUSUF et al. (2023), who argue that larger firms tend to possess higher competitive advantage. Although larger firms generally have greater access to capital and resources, such advantages do not necessarily translate into superior performance when resource management and strategic deployment are suboptimal (ANDRIES & STEPHAN, 2019).

From an RBV perspective, competitive advantage is driven more by the effective utilization of unique internal resources and capabilities, such as innovation, strategic orientation, and human resource management, than by firm size (BENEVENE & BUONOMO, 2020).

5.6 Effect of firm age on company performance

The results show that company age has a significant positive effect on company performance. Older companies tend to have more experience in dealing with market dynamics, which allows them to achieve more stable and efficient performance (CHATTERJEE; RANA; DWIVEDI, 2022). New companies can learn best practices from older companies to accelerate their growth. Companies that have been operating for a long time are generally better known and trusted by consumers, investors, and business partners, which can increase customer loyalty and attract new investment (BEHMIRI et al., 2019) Company age serves as an indicator of experience and generational stage in a company, which helps them leverage external networks and knowledge to increase productivity (AIELLO; PUPO; RICOTTA, 2024).

6 CONCLUSION

This study provides robust empirical evidence that GCA significantly enhances company performance, whereas GI does not exert a direct performance effect. The findings suggest that firms derive greater performance benefits from strategically

embedded GCA, particularly those related to green corporate image, than from GI initiatives that typically demand substantial investment and longer time horizons before yielding measurable outcomes.

Importantly, SRQ is shown to strengthen the relationship between GCA and company performance, underscoring the pivotal role of transparent, credible, and decision-useful sustainability disclosures in amplifying the strategic value of green initiatives. In contrast, SRQ does not moderate the GI–performance relationship, indicating that GI alone is insufficient unless it is more effectively integrated into core business strategies and clearly communicated to the market.

With respect to the control variables, firm size does not significantly influence performance, while firm age has a positive effect, highlighting the value of organizational experience and established stakeholder relationships in supporting sustained performance. Overall, the study demonstrates that superior corporate performance is more likely to be achieved through substantive green competitive strategies supported by high-quality sustainability reporting, rather than through symbolic or weakly integrated GI efforts.

The findings of this study support the RBV by demonstrating that internal resources, particularly organizational green culture, play a crucial role in enhancing company performance. From a managerial perspective, firms should prioritize the development of a strong green culture that fosters innovation and operational efficiency, strengthen environmental training programs for employees, and actively protect GI through mechanisms such as patent rights. In addition, improving the quality of sustainability reports by incorporating responsiveness and impact dimensions can enhance transparency and accountability to stakeholders. From a policy perspective, continued governmental support is essential, including the provision of incentives such as tax relief for green investments to encourage corporate sustainability initiatives. Furthermore, regulatory bodies, including the Financial Services Authority, the Ministry of Environment and Forestry (KLHK), and the Investment Coordinating Board (BKPM), should strengthen sustainability reporting standards to ensure greater corporate accountability for environmental and social impacts.

6.1 Limitation

The content analysis method allows for subjective interpretation of the data. Although standardized guidelines such as the ACCOUNTABILITY (2020) and Global Reporting Initiative (GRI, 2021) were applied, the assessment still relies on the researcher's interpretation, which may introduce bias in scoring and disclosure categorization. For further research, using AI-based technology, a qualitative approach, and exploring other moderating variables such as stakeholder pressure or government policy incentives is recommended.

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Authors' Contribution

All authors contributed equally to the development of this article.

Data availability

All datasets relevant to this study's findings are fully available within the article.

How to cite this article (APA)

Lativa, Murwaningsari, E., & Gunawan, J. (2026). FROM GREEN STRATEGY TO PERFORMANCE: THE MODERATING ROLE OF SUSTAINABILITY REPORTING QUALITY. *Veredas Do Direito*, 23(4), e234519. https://doi.org/10.18623/rvd.v23.n4.4519