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Gender Diversity Moderates the Effect of Green Accounting on Sustainability Corporate Budgeting

Sumaryo[1], Galuh Intan Pertiwi[2*], Purwanti[3], Khrisna Anggun Yuliana[4]
[1,2,3,4] Faculty of Economics and Business, Institut Putra Perdana Indonesia, Indonesia
E-mail: marytgl354@gmail.com[1], galuhtaa8@gmail.com[2], purwanti.stieppi@gmail.com[3], khrisna.anggun23@gmail.com[4]

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Abstract: *This study is motivated by inconsistencies in implementing sustainability practices, particularly sustainability corporate budgeting (SCB), in mining companies despite increasing regulatory pressure and environmental accountability. It examines the relationship between green accounting (GA) and SCB, with gender diversity (GD) as a moderating variable. The research focuses on mining firms listed on the Indonesia Stock Exchange during 2020–2024, using a quantitative panel data design. A purposive sampling technique produced 14 companies with 70 firm year observations. Panel regression and Moderated Regression Analysis (MRA) using EViews 12 were applied. The study integrates GA, SCB, and GD within the Quadruple Bottom Line framework. Results show that GA and GD negatively and significantly affect SCB, while GD positively strengthens the GA–SCB relationship. These findings suggest that sustainability initiatives may create short-term financial pressure, yet gender-diverse leadership improves their effectiveness. Thus, firms should integrate environmental accounting with inclusive governance to enhance sustainable budgeting practices effectively.*

INTRODUCTION

Corporate sustainability has become a central global priority for governments and business entities alike (Nikensari, Sri et al., 2019). Firms are increasingly expected not only to maximize financial performance but also to integrate sustainability oriented strategies grounded in their internal resources. The alignment between sustainability strategies and their practical implementation has emerged as a critical response to intensifying competition and the adverse environmental and social impacts of business operations.

A sustainable company is capable of generating value in both the short and long term. Such value extends beyond internal organizational benefits to encompass broader environmental, local, and global societal impacts. One strategic approach to achieving these outcomes is Sustainability Corporate Budgeting (SCB), which embeds sustainability considerations into financial planning and decision-making processes. The fundamental principles of SCB can be applied across all levels of business decision making.

SCB represents a sustainability oriented financial planning framework aimed primarily at reducing greenhouse gas emissions. It signifies an organization's early initiatives to establish environmental accountability by enhancing energy efficiency, minimizing waste generation, and carrying out socially sustainable programs. (Schaltegger et al., 2022). Furthermore, SCB demonstrates a clear commitment to balancing the interests of diverse stakeholders. It further represents a concrete contribution to advancing the Sustainable Development Goals (SDGs), particularly in fostering gender equality, encouraging responsible consumption and production patterns, and supporting initiatives to address climate change (Raper et al., 2022). As such, SCB is recognized as a key driver of sustainable growth (Schaltegger et al., 2022).

Although Indonesia has ratified the Kyoto Protocol through Law No. 17 of 2004, the adoption of SCB in the corporate sector especially within the mining industry continues to face various significant constraints. Many mining companies fail to allocate adequate post-mining reclamation funds in their financial statements, indicating weak integration of environmental considerations into budgeting practices (Prasetiyo et al., 2018; Kementerian Perindustrian, 2019; Komnas HAM, 2021). Moreover, the body of literature on SCB remains limited, suggesting that the topic is still underexplored in academic research (Amirshenava & Osanloo, 2021; Suhariyanto & Sumaryo, 2025, Lako, 2019). A substantial number of Mining Business Licenses (IUP) exceeding one hundred have been subjected to sanctions due to the absence of allocated funds for reclamation and post-mining activities. (Kementrian ESDM, 2025) contributing to ecological disasters in Sumatra at the end of 2025 (ANTARA News, 2025).

Many mining firms perceive SCB as cost intensive, while non financial impacts are often not immediately observable in financial reports. This is further compounded by data limitations, verification challenges, and rapidly evolving government regulations (Suhariyanto & Sumaryo, 2025). Consequently, firms must continuously adapt, which complicates long term planning and budget allocation. This situation creates a gap between regulatory frameworks and their practical implementation in integrating sustainability into budgeting processes (N. T. Andini et al., 2023).

Both internal and external factors influence the implementation of SCB. From an internal perspective, the organization's ability to manage and mitigate risk is significantly influenced by the gender composition embedded within its corporate governance framework (Hasibuan, 2024; Jasni et al., 2021). The presence of gender diversity (GD) within corporate boards strengthens a firm's capacity to address financial, environmental, and social challenges. Empirical studies further indicate that GD plays a moderating role in the association between the quality of environmental accounting disclosures and a company's sustainability value (Julianto et al., 2025). It also contributes to more nuanced sustainability oriented decision making (Wahyuningrum et al., 2022) and improves Environmental, Social, and Governance (ESG) reporting quality (Chang et al., 2024). GD is therefore believed to strengthen oversight, increase sensitivity to socio environmental issues, and promote more inclusive decision making. Accordingly, its presence in leadership positions may reinforce corporate commitment to sustainable budgeting practices (Haryanto & Ong, 2024).

However, empirical findings on the moderating role of GD remain inconclusive. Tael Batak et al., (2025) report that GD on boards of commissioners does not enhance the linkage between governance attributes such as board size, the presence of independent commissioners, and audit committees and sustainability performance. Consistent evidence from related studies further indicates that GD fails to significantly moderate the association between sustainability reporting and firm value, implying that the impact of female board representation on sustainability outcomes remains inconclusive and lacks consistency (Tael Batak et al., 2025;

Suwarno & Hwihanus, 2024).

Beyond internal drivers, external forces especially regulatory pressure stemming from government initiatives such as the Corporate Environmental Performance Rating Program (PROPER) serve as a critical influence on the adoption and development of SCB practices within the mining industry. PROPER, regulated under the Ministry of Environment Regulation No. 3 of 2014, evaluates corporate performance in pollution control, environmental damage mitigation, and industrial waste management (Dilasari et al., 2022). The program categorizes firms into five ratings: black, red, blue, green, and gold (Primardiningtyas et al., 2025). Although its significance is widely recognized, in 2022 only three of the 103 mining firms listed on the Indonesia Stock Exchange attained a gold rating, indicating that advancements in environmental performance remain limited (Renata et al., 2024). Although PROPER is not yet embedded in formal accounting standards and remains mandatory in nature (Shodiq & Febri, 2015), it serves as a relevant proxy for measuring green accounting (GA) practices in Indonesian mining firms.

Empirical findings regarding the link between GA and sustainability performance remain inconclusive. Several studies report that GA, as proxied by PROPER ratings, exerts a positive effect on corporate sustainability outcomes (D. Andini et al., 2025; Julianto et al., 2025) while others report no significant effect or even negative impacts on firm value (Pesak & Miran, 2024; Alaika & Firmansyah, 2024). These divergent findings indicate the presence of a substantial research gap. In response, this study utilizes GA, proxied by PROPER, as the independent variable in the context of Indonesian mining companies, adopting the Quadruple Bottom Line (QBL) framework as its analytical foundation.

The Quadruple Bottom Line (QBL) framework builds upon the Triple Bottom Line (TBL) by adding governance and ethical purpose to the traditional dimensions of profit, people, and planet. (Elkington, 1997; Lee, (2003); Rob & Milne, (2004); Jahan, (2023).This framework is particularly relevant in the mining sector, where regulatory pressures, public expectations, and demands for transparency are substantial. Within this context, GA functions as an integrative mechanism that enables firms to embed economic, social, environmental, governance, and ethical considerations into sustainable planning and budgeting systems.

The originality of this study resides in its development of an integrated empirical model that simultaneously incorporates GA, SCB, and GD, framed within the QBL perspective in the context of Indonesia's mining sector. Unlike prior studies that examine these variables separately or rely primarily on legitimacy theory (Medianawati & Cahyonowati, 2025), this study integrates GD as a moderating factor that enhances the relationship between GA and SCB practices (A et al., 2025; Prasetyo et al., 2025). The QBL framework enables a more comprehensive understanding of profit, people, planet, and purpose orientations, particularly in industries with high environmental and social impacts.

Theoretically, this study advances the QBL framework by demonstrating that stronger implementation of GA leads to more effective sustainable budgeting practices, and that this relationship is further enhanced by gender diversity within corporate leadership as a form of inclusive governance. From a practical standpoint, these findings are intended to assist mining firms in formulating budgeting approaches that more effectively embed sustainability considerations. In addition, they offer valuable implications for regulators and relevant stakeholders to enhance environmental governance frameworks, thereby reducing the likelihood of recurring ecological damage linked to mining operations.

LITERATURE REVIEW

Quadruple Bottom Line

The Quadruple Bottom Line (QBL) theory represents an extension of the Triple Bottom Line framework introduced by Elkington, (1997) and further developed by Lee, (2003) and Rob & Milne, (2004). QBL is employed to assess corporate sustainability across four dimensions: profit, people, planet, and moral or spiritual values (Jahan, 2023; Wafiq et al., 2024). The ethical or spiritual dimension underscores human-oriented principles that direct the deliberate and systematic advancement of corporate sustainability (Schaltegger et al., 2022), particularly amid the evolving challenges posed by climate change (Raper et al., 2022).

QBL provides a holistic framework capable of guiding SCB toward sustainability objectives. Its multidimensional perspective enables firms to establish meaningful relationships with diverse stakeholders. Prior studies Agustiningrum et al., 2025 and Masruroh & Hasanah, (2025) suggest that environmental factors accelerate the adoption of structured sustainability practices through enhanced transition mechanisms and accountability (Agustiningrum et al., 2025; Wafiq et al., 2024). Within this framework, QBL serves as a moral foundation that links GA practices and GD to the implementation of SCB (Panneels & Panneels, 2023; Nworie & Orji-okafor, 2024; Suyudi, 2012).

Sustainability Corporate Budgeting

Sustainability Corporate Budgeting reflects the alignment among QBL dimensions. A systematic SCB approach enhances resource efficiency within organizations (Bank SMBC Indonesia, 2025), which is itself considered an ethical value within the QBL perspective (Portillo-tarragona et al., 2025; Putra et al., 2024). SCB enables management to accommodate the interests of various stakeholders in a transparent and accountable manner while fulfilling economic, social, and environmental responsibilities (Purvis, 2019). Furthermore, SCB is intrinsically linked to the goals of sustainable development and is shaped by the implementation of green accounting practices (Yuwono, 2025; Teh & Khan, 2024).

Green Accounting

Green Accounting constitutes a crucial instrument in enhancing the effectiveness of environmental management within corporate operations**.** (Sultan et al., 2024; Bank SMBC Indonesia, 2025). It provides a practical mechanism for measuring and managing the "planet" dimension within the QBL framework in a transparent manner (Masruroh et al., 2025; Murni & Malik, 2022; Toding & Alexander, 2024). GA practices serve as indicators of a firm's ability to balance QBL dimensions within SCB (Sundarasen et al., 2024; Zainuddin et al., 2025), and their implementation is reflected in corporate accounting (Safitriana et al., 2025).

Within the QBL framework, GD extends beyond mere compliance with representation quotas and instead functions as a strategic pillar that strengthens the "people" dimension while being rooted in organizational ethical values. QBL, encompassing profit, planet, people, and purpose (or culture), recognizes gender diversity as a critical factor for long-term organizational performance (Anggraini et al., 2025) rather than merely a matter of social equity (Fernández-Torres et al., 2025). This perspective suggests that GD enhances the firm's capacity to harmonize all QBL dimensions effectively (Haryanto & Ong, 2024).

The relationship between GA and SCB becomes evident when firms systematically and comprehensively record and report environmental information. Such practices provide management with more accurate and relevant data, thereby supporting more effective SCB

implementation (Arianto & Sari, 2025). This is consistent with findings by Pelupessy, (2025) which highlight the importance of GA information in shaping SCB practices. These insights enable management to uphold ethical principles while maintaining balance across economic, social, and environmental dimensions (Purvis, 2019). Ethical considerations further reinforce managerial commitment to long term sustainability (Portillo-tarragona et al., 2025; Putra et al., 2024).

The integration of GA into corporate processes also enhances SCB practices in ways that are valuable to stakeholders (Arianto & Sari, 2025; Talapessy et al., 2025). GA increasingly attracts attention and pressure from investors, regulators, and society, thereby reinforcing its role as a foundation for SCB implementation (Sultan et al., 2024). These external pressures influence how firms utilize GA to improve sustainable budgeting practices (Utari et al., 2023).

From a theoretical standpoint, GA and SCB are integral components of the QBL framework. GA supports the "planet" and "purpose" dimensions by facilitating environmental cost management and enhancing transparency in sustainability objectives (Mujahidi et al., 2025). Its implementation contributes not only to operational efficiency but also to the effectiveness of SCB SCB (Affandhy et al., 2025).

Gender Diversity

Gender Diversity in corporate leadership is positively associated with SCB, particularly in environmental and social dimensions that align with the QBL framework (Puspariani et al., 2026). Female representation in decision making structures is believed to introduce broader perspectives in corporate governance, especially regarding social and environmental responsibilities (Wahyuningrum et al., 2022).

Within the QBL perspective, corporate sustainability extends beyond profit maximization to include people, planet, and moral values (Jahan, 2023). Female participation in management is often associated with higher sensitivity to social and environmental issues, which may encourage firms to strengthen sustainability practices, including SCB allocation (Swari & Sari, 2023). Prior studies Chang et al., (2024) and Pernamasari, (2025) indicate that gender diversity enhances managerial attention to sustainability issues. Accordingly, higher levels of GD are expected to increase corporate commitment to sustainability budgeting.

Within the QBL framework, GD is posited as a moderating factor that can enhance the linkage between GA and SCB (Manta et al., 2020; Putri & Nasih, 2022; Trianto & Anggraini, 2025). A more heterogeneous board structure enables the incorporation of wider perspectives on ESG concerns (Affandhy et al., 2025) and reinforce organizational commitment to sustainability (Chang et al., 2024; Putra et al., 2024; Rahi, 2025), while simultaneously strengthening the organization's commitment to sustainability-oriented objectives (Manta et al., 2020; Putri & Nasih, 2022).

Women in corporate governance roles tend to exhibit greater sensitivity to social, environmental, and ethical issues (Haryanto & Ong, 2024). Their presence at strategic levels can intensify the implementation of sustainability policies. This characteristic enhances managerial responsiveness to GA generated information in designing SCB (Ahmed et al., 2021; Bisogno et al., 2025).

GD also promotes long term sustainability orientation (OECD, 2021) and supports early identification of environmental risks (Rahmat, 2024). Organizations characterized by greater GD are generally associated with more robust and accountable decision-making practices in SCB (Swari & Sari, 2023). Furthermore, GD enhances governance integrity, transparency, and

regulatory compliance, which aligns with the "purpose" dimension of QBL emphasizing corporate commitment to sustainability and social responsibility (Trianto & Anggraini, 2025)

Theoretically, GD strengthens the effectiveness of GA, as women in managerial positions are more likely to support environmentally friendly and sustainability oriented policies (Fernández-Torres et al., 2025; Khanna, 2020). When GA information is utilized within an inclusive and diverse managerial environment, its impact on budgeting processes becomes more substantial (Yuwono, 2025). GD encourages the adoption of stricter and more consistent environmental reporting standards, thereby reinforcing the relationship between GA and SCB.

RESEARCH METHODS

This study adopts a quantitative research design to investigate the influence of GA on SCB, while incorporating GD as a moderating factor. The analysis is conducted on mining companies listed on the Indonesia Stock Exchange (IDX), with a total population of 42 firms observed over the 2020–2024 period.

The sample selection was carried out using a purposive sampling method, guided by the following criteria: (1) firms that remained continuously listed on the IDX throughout 2020–2024; (2) firms that consistently published complete annual financial statements and sustainability reports during the observation period; (3) availability of environmental cost data (including PROPER ratings, long-term restoration and rehabilitation provisions, and reclamation or mine closure guarantees), total assets, and board of directors composition; and (4) companies not delisted during the observation period. The procedure used to determine the research sample is presented in Table 1.

Table 1. Sampling Criteria

No	Sample Criteria	Total
1	Mining companies listed on the IDX in 2024	42
2	Companies not consistently listed during 2020–2024	(8)
3	Companies without complete PROPER data for 2020–2024	(14)
4	Companies lacking annual reports, sustainability reports, environmental cost data (restoration provisions, reclamation guarantees), total assets, or board data for 2020–2024	(6)
	Final sample	14
	Observation period (2020–2024)	*5
	Total observations	70

Sources: Data processed 2025

Sustainability Corporate Budgeting is defined as sustainability oriented corporate financial planning (Schaltegger et al., 2022). SCB is operationalized as the proportion of environmental expenditures relative to total assets, following the measurement approach proposed by Tullah et al., (2025), where environmental costs are proxied by long-term restoration and rehabilitation provisions, as well as reclamation or mine closure guarantees. The ratio is calculated as: $SCB = Ln\ (Environmental\ Cost\ /\ Total\ Assets)$. This metric indicates the degree to which a company incorporates sustainability considerations into its budgeting framework.

Green accounting can be understood as a systematic approach to recognizing, quantifying, and disclosing environmental expenditures and impacts within a firm's accounting framework. In this study, GA is operationalized using the PROPER administered by the Ministry of

Environment and Forestry of the Republic of Indonesia (Sánchez-Hernández et al., 2025). The PROPER assessment employs an ordinal scale consisting of gold (5), green (4), blue (3), red (2), and black (1), where higher ratings reflect a more advanced level of GA implementation**.**

Gender Diversity represents the proportion of female members on the board of directors (Adji & Wirama, 2022). It is measured either by the number of female directors or by the ratio of female directors to the total board size (Fernández-Torres et al., 2025; Khanna, 2020).

Table 2. The Operationalization Variable

Variable	Definition	Indicator	Source
Green accounting	PROPER	PROPER score: Gold = 5 Green = 4 Blue = 3 Red = 2 Black = 1	(Sánchez-Hernández et al. 2025)
Sustainability Corporate Budgeting	Allocation of environmental costs	*Ln* (Environmental C / Total Assets)	(Tullah et al. 2025; Schaltegger et al., 2022).
Gender Diversity	Female composition on board of directors	Number of female directors / Total board size	(Adji & Wirama, 2022)

Source: Author's compilation

The data were analyzed using panel data regression techniques implemented in EViews version 12. Three alternative estimation approaches were employed, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The optimal model specification was identified through a sequence of statistical procedures: the Chow test to distinguish between CEM and FEM, the Hausman test to evaluate the choice between FEM and REM, and the Lagrange Multiplier test to determine the suitability of CEM versus REM.

When the REM is employed, the application of classical assumption tests becomes unnecessary, as REM utilizes the Generalized Least Squares (GLS) method, which is considered to inherently fulfill the properties of the Best Linear Unbiased Estimator (BLUE). Conversely, the FEM and CEM are based on the Ordinary Least Squares (OLS) technique, which necessitates the verification of classical assumptions (Sumaryo et al., 2024).

In addition, this study adopts Moderated Regression Analysis (MRA) with the following model specification:

$$SCB = \alpha + \beta_1 GA + \beta_2 GD + \beta_3 (GA * GD) + \varepsilon \ldots (1)$$

RESULT AND ANALYSIS

Descriptive Statistics Analysis

Descriptive Statistics Analysis. The results of the descriptive statistical analysis for the sample companies are presented in Table 3.

Table 3. Descriptive Statistics Analysis

	GA	SCB	GD	GA*GD
Mean	0.8143	-1.7904	1.0619	0.8683
Median	0.8000	-1.7795	1.0000	0.8000

	GA	SCB	GD	GA*GD
Maximum	1.0000	-1.0333	1.4000	1.4000
Minimum	0.6000	-2.6731	1.0000	0.6000
Std. Dev.	0.1497	0.3616	0.0977	0.2001
Observations	70	70	70	70

Source: Data processed using EViews, 2026

Drawing on the summary presented in Table 3, which encompasses 70 observations, the descriptive statistics can be explained as follows.

The GA variable (X) records an average value of 0.8143 with a standard deviation of 0.1497. This relatively high mean suggests that, overall, the sampled mining firms have implemented GA at a satisfactory level. The smaller dispersion compared to the mean indicates a fairly uniform distribution, implying that differences in GA practices among firms are not substantial. Furthermore, the observed range, from 0.6000 to 1.0000, reinforces the notion of consistent GA application across the sample.

For SCB (Y), the mean value is −1.7904, accompanied by a standard deviation of 0.3616. The mean reflects the general extent to which firms allocate budgets toward sustainability during the study period. The modest level of variation suggests that SCB practices are relatively similar across companies. Although the values span from −2.6731 to −1.0333, the spread remains within a manageable range, indicating controlled differences in allocation levels.

The GD variable (Z) yields an average of 1.0619 and a standard deviation of 0.0977. The low variability relative to the mean implies that board gender composition is broadly similar among the observed firms. The minimum and maximum values, 1.0000 and 1.4000 respectively, further indicate that variation in gender diversity is limited within the sample.

Regarding the interaction term between GA and GD (XZ), the mean is 0.8683 with a standard deviation of 0.2001. The relatively small dispersion suggests that the moderating role of GD in the relationship between GA and SCB does not differ markedly across firms. The values range from 0.6000 to 1.4000, reflecting moderate yet stable variation.

Test Model

Panel Data Model Selection. The determination of the most appropriate panel regression specification was carried out using the Chow test, Hausman test, and Lagrange Multiplier (LM) test.

Table 4. Panel Data Diagnostic Tests

Model	p-value	Decission
Chow Test	0.0022	FEM
Hausman Test	0.8181	REM
LM Test	0.0000	REM

Source: Data processed using EViews, 2026

Based on Table 4, the Chow test yields a probability value below 0.05, indicating that the Fixed Effect Model (FEM) is preferred over the Common Effect Model (CEM), suggesting the presence of firm-specific heterogeneity. However, the Hausman test produces a probability value of 0.8181 (> 0.05), indicating that the Random Effect Model (REM) is more appropriate than FEM. The LM test further supports the selection of REM over CEM, with a probability value of 0.0000. Therefore, REM is selected as the final estimation model.

The use of REM implies the application of the Generalized Least Squares (GLS) approach,

which satisfies the Best Linear Unbiased Estimator (BLUE) assumptions; thus, classical assumption tests are not required.

Random Effect Model (REM) Estimation Results. The results of the REM estimation will be displayed in Table 5.

Table 5. REM Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.9442	1.9887	1.9832	0.0515
GA	-6.0389	2.2430	-2.6923	0.0090
GD	-5.4820	1.9402	-2.8255	0.0062
GA*GD	5.7629	2.1839	2.6388	0.0104

Source: Data processed using EViews, 2026

The estimation findings reveal that GA yields a coefficient of −6.0389 with a probability value of 0.0090 ($p < 0.05$), indicating a statistically significant negative association with SCB. Likewise, GD demonstrates a coefficient of −5.4820 with a probability of 0.0062, also reflecting a significant negative effect on SCB.

Conversely, the interaction term between GA and GD (GA × GD) produces a positive coefficient of 5.7629 with a probability value of 0.0104, suggesting that GD acts as a significant positive moderator in the relationship between GA and SCB. The panel regression model can be formulated as follows:

$$SCB = 3.9442 - 6.0389GA - 5.4820GD + 5.7629(GA * GD)$$

In this equation, SCB denotes sustainability corporate budgeting, GA refers to green accounting, GD represents gender diversity, and GA × GD captures the interaction effect between GA and GD. Model Feasibility and Goodness of Fit. The results of the F-test are presented in Table 6.

Table 6. F-Test Results

F-statistic	3.2067
Prob(F-statistic)	0.0287

Source: Data processed using EViews, 2026

The F-test yields a probability value of 0.0287 (less than 0.05), indicating that the regression model is statistically significant and suitable for explaining the variation in SCB.

Coefficient of Determination (R^2): The outcomes of the coefficient of determination analysis are presented in Table 7.

Table 7. R^2 Results

R-squared	0.1272
Adjusted R-squared	0.0875

Source: Data processed using EViews, 2026

An R^2 value of 0.1272 suggests that approximately 12.72% of the variability in SCB can be accounted for by GA, GD, and their interaction term. The remaining 87.28% is explained by other determinants not incorporated into the model, indicating that SCB is likely affected by additional factors beyond those analyzed in this study.

Random Effects Analysis. The results of the random effects analysis are presented in Table 8.

Table 8. Random Effects

Variance Components	S.D.	Rho
Cross-section random	0.3616	0.8624
Idiosyncratic random	0.1445	0.1376

Source: Data processed using EViews, 2026

The results indicate that the majority of variation (86.24%) originates from differences across firms (cross-sectional effects), while only 13.76% is attributed to idiosyncratic error. This suggests that firm-specific characteristics play a dominant role in explaining variations in SCB.

Gender diversity has a positive effect on sustainability corporate budgeting

Hypothesis 1 (H1) proposes that GA positively influences SCB. Nevertheless, the REM estimation reported in Table 5 indicates a GA coefficient of −6.0389 with a significance level of 0.0090 (< 0.05). These results demonstrate a statistically significant negative relationship, thereby providing evidence to reject H1. These findings indicate that GA practices, as measured by the PROPER rating, are associated with a decline in SCB performance within Indonesian mining companies. This condition is relatively weak, as only six firms achieved PROPER scores above the sample average out of 70 observations (PT AEI, PT BR, PT GEM, PT IE, PT MEI, and PT BA).

The relatively low implementation of GA, as reflected in PROPER ratings, exerts a negative effect on SCB within the QBL framework, particularly from the profit dimension. In practice, PROPER achievement is often perceived by mining firms as a cost burden rather than a long term investment. It is treated primarily as regulatory compliance, with associated costs exceeding perceived efficiency gains. Investors may also interpret PROPER related expenditures negatively, as they are assumed to reduce dividend potential. Furthermore, GA practices require complex processes of identifying, measuring, and disclosing environmental costs, thereby increasing administrative and operational burdens and potentially crowding out other SCB allocations. Consequently, GA compels firms to recognize and quantify environmental costs associated with PROPER, directly exerting downward pressure on the profit (economic) pillar, which explains its negative accounting impact on SCB.

From a short term perspective, a firm's focus on the *planet* dimension may conflict with profit-oriented budget efficiency, resulting in a trade-off reflected in financial reporting. Within the *people* dimension of QBL, companies are expected to allocate resources toward employee welfare and community development. Nevertheless, allocating significant financial resources to environmental initiatives such as the implementation of advanced waste management systems to meet PROPER requirements can potentially constrain the budget available for social programs, including employee development, welfare provision, and community engagement activities.This creates a substitution effect in which increased environmental spending limits social investment capacity.

From a moral or ethical (*purpose*) perspective, GA encourages extensive disclosure in sustainability and annual reports, signaling a firm's commitment to environmental and social

responsibility. Achieving higher PROPER ratings reflects efforts to balance economic performance with environmental stewardship and community responsibility. Thus, firms are not solely oriented toward internal interests but also demonstrate moral accountability to broader stakeholders.

Theoretically, the negative relationship can be explained by the high costs associated with implementing GA systems and obtaining PROPER certification, which reduce short term profitability. To stabilize earnings, managers may reduce sustainability-related budgets despite improved environmental reporting and strong moral commitments. Practically, increased GA adoption imposes financial pressures due to compliance costs and cash flow constraints, leading firms particularly in the mining sector to prioritize short term financial efficiency over long term sustainability investments.

The results of this study align with the perspective of (Schaltegger et al., 2022), who emphasize that environmental or green accounting promotes the incorporation of ecological considerations into corporate reporting and decision-making, ultimately strengthening firms' social and environmental accountability. Nevertheless, these findings diverge from those reported by D. Andini et al., (2025) and Julianto et al., (2025), which document a positive association between green accounting and sustainability performance. Such inconsistencies are likely attributable to variations in research settings and the choice of dependent variables. While this study focuses on mining firms and SCB as the outcome variable, prior studies employed broader performance indicators and different industry settings.

Gender diversity has a positive effect on sustainability corporate budgeting

Hypothesis 2 (H2) proposes that GD has a positive influence on SCB. Nevertheless, the REM results presented in Table 5 show a GD coefficient of −5.4820 with a significance probability of 0.0062 ($p < 0.05$), indicating a statistically significant negative relationship between GD and SCB.

This result suggests that a higher level of GD in the managerial structure of mining firms does not automatically lead to an increase in sustainability budgeting allocations. Within the Indonesian mining industry context, the presence of women in management positions may still be largely formal or representational in nature, and has not yet translated into substantial influence over strategic decisions concerning sustainability budgeting.

Within the QBL framework (profit, people, planet, and purpose/governance), GD relates primarily to the *people* and *purpose* dimensions. However, diversity may also introduce interpersonal conflicts or divergent perspectives that complicate consensus-building in strategic budgeting decisions, potentially reducing efficiency. If female representation is driven primarily by quota fulfillment rather than expertise, its impact on SCB may be limited.

From a profit perspective, female directors are often associated with more conservative accounting practices and risk averse decision making. This tendency may lead to prioritizing cash preservation and short term financial stability over investments in sustainability projects, which are typically high cost and high risk. Additionally, increased GD does not necessarily improve waste management efficiency and may even negatively affect recycling practices within the Indonesian mining industry context.

These findings align with Firew, (2024), who reports that GD does not consistently yield positive effects on firm performance and may lack significance across various sectors. This suggests that female representation on boards does not automatically influence strategic corporate policies, including sustainability budgeting. However, the results differ from those of Chang et al.,

(2024) and Pernamasari, (2025), who find a positive association between GD and CSR/ESG performance.

Gender diversity moderates the effect of green accounting on sustainability corporate budgeting

Hypothesis 3 (H3) proposes that GD moderates the relationship between GA and SCB. The empirical results support this hypothesis, indicating that GD significantly strengthens the effect of GA on SCB. During the observation period, GD increased by 0.056 among the sampled mining firms.

The moderating role of GD is crucial in enhancing SCB performance. The presence of women on boards tends to reinforce GA implementation by encouraging firms to incorporate environmental costs into financial reporting. GD amplifies the impact of GA, as female directors are generally more sensitive to social and environmental issues. Consequently, GD promotes greater resource allocation toward sustainable practices and strengthens corporate commitment to environmental responsibility and social accountability in mining companies.

At the managerial and board levels, GD contributes to optimizing corporate performance outcomes, particularly in the allocation of SCB. These findings are consistent with the QBL framework (Elkington, 1997; Lee, 2003; Rob & Milne, 2004), which evaluates sustainability across profit, people, planet, and moral or spiritual values (Jahan, 2023; Wafiq et al., 2024). The moral dimension emphasizes human centered, planned sustainability in response to climate change challenges (Schaltegger et al., 2022; Raper et al., 2022).

GD should not be viewed solely as a form of representational inclusion, but rather as a strategic factor that contributes to achieving equilibrium among profitability, social well being, environmental sustainability, and ethical corporate objectives. Organizations with greater GD generally demonstrate higher levels of adaptability and long term sustainability.

The results are consistent with the findings of Julianto et al., (2025), who report that GD enhances the linkage between sustainability practices and firm value. Their research indicates that the presence of female board members increases corporate focus on environmental and social aspects, thereby strengthening the implementation of sustainability initiatives. In contrast, these findings are not aligned with those of Tael Batak et al., (2025), who reveal that GD does not exert a statistically significant moderating effect on the relationship between good corporate governance (GCG) and sustainability performance. Such inconsistencies may be attributed to differences in industry sectors, variable selection, and research periods, as this study specifically focuses on mining firms with GA and SCB as key sustainability indicators.

CONCLUSION

Empirical evidence indicates that green GA has a statistically significant negative impact on SCB. The implementation of GA in the sampled mining companies is not consistently associated with an increase in SCB allocation. This outcome may be attributed to the substantial initial costs of GA adoption, including investments in environmentally friendly technologies, waste management systems, and environmental reporting mechanisms. As a result, firms tend to prioritize environmental cost efficiency and regulatory compliance rather than proportionally expanding sustainability budget allocations.

GD is likewise shown to exert a negative and statistically significant influence on SCB. This result suggests that greater representation of gender diversity within corporate management does not automatically translate into an increase in sustainability budgeting allocations. Such a

condition may arise because the role of women in the management of mining companies remains relatively limited in influencing strategic decisions, particularly those related to sustainability budget allocation.

However, GD has been empirically shown to exert a positive and significant moderating effect on the relationship between GA and SCB. This finding indicates that GA becomes more effective in strengthening the implementation of corporate sustainability practices when it is supported by gender-diverse leadership, particularly through the involvement of female directors at the board level or within top management positions. GA, reinforced by gender diverse leadership, significantly enhances firms' focus on SCB, contributes to firm value, and strengthens corporate commitment to the PROPER program.

The results of this study suggest that the variables analyzed explain only a limited portion of SCB implementation. Accordingly, future studies are recommended to include other potential determinants of SCB, including firm size, profitability, environmental performance, and alternative corporate governance mechanisms that may provide a more comprehensive explanation. From a policy perspective, these results may serve as an evaluative basis for governments to strengthen oversight of GA implementation and the PROPER program within mining companies, thereby promoting more effective sustainability practices. For practitioners, the findings provide valuable insights for management in integrating GA practices with GD in strategic decision making, enabling more optimal and sustainable SCB allocation.

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