Journal of Studies in Academic, Humanities, Research and Innovation
Volume 2 No 2 December 2025
E-ISSN: 3089-7106
https://journal.as-salafiyah.id/index.php/sahri
sahrijournaleditor@gmail.com

Beyond Profit: How Board Gender Diversity Shapes Financial and ESG Performance in Indonesia

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Abstract: *This study examines the impact of board gender diversity, board size, and the presence of a critical mass of women on corporate boards on both financial and ESG performance in Indonesian publicly listed firms between 2020 and 2024. Using a fixed effects panel regression on a balanced dataset of 51 firms observed over five years, the analysis reveals a nuanced relationship between governance structures and firm outcomes. The results show that board gender diversity has a positive and significant effect on ESG performance, supporting the argument that female directors contribute perspectives that enhance corporate responsibility. However, the critical mass hypothesis is not supported, indicating that numerical thresholds alone are insufficient to drive change. Board size is positively and significantly associated with both ESG performance and Tobin's Q, while neither gender diversity nor board size has a measurable impact on accounting-based indicators such as ROA and ROE. These findings challenge the universal applicability of Critical Mass Theory, suggesting that its influence may be constrained in emerging markets such as Indonesia, where cultural and institutional factors limit the effectiveness of female representation. Overall, the study contributes to the governance–performance literature by demonstrating that the benefits of board diversity are context-specific and vary across performance measures.*
Keywords*: Board Gender Diversity, Critical Mass Theory, ESG Performanc, Financial Performance*

INTRODUCTION

The discourse on gender diversity in corporate boards has gained increasing prominence, particularly for its implications on Environmental, Social, and Governance (ESG) performance and financial outcomes. In emerging markets, where regulatory frameworks and cultural norms intersect, this issue is especially significant. In Indonesia, initiatives to promote gender inclusion have advanced through both regulatory measures and growing public awareness. Yet female representation remains limited, raising questions about the effectiveness of existing diversity frameworks.

Recent studies show that women hold only 9.14 percent of board positions in Indonesian firms, underscoring persistent underrepresentation (Ilona et al., 2023). Institutional and cultural barriers, including patriarchal norms and weak organizational support, continue to hinder women's advancement to senior roles (Harymawan & Nismara, 2022). As a result, gender inclusivity in

boardrooms often appears symbolic rather than substantive, limiting women's influence on decision-making.

Parallel to these developments, Indonesia has integrated ESG principles into its capital market through regulatory initiatives such as Financial Services Authority (OJK) Regulation No. 51/POJK.03/2017, which mandates sustainability reporting, and the Sustainable Finance Action Plan (RAKB) (Yakovlev & Nikulina, 2019). The Indonesia Stock Exchange (IDX) also signaled its commitment by joining the Task Force on Climate-related Financial Disclosures (TCFD) Supporters in 2021. Nonetheless, compliance remains uneven across sectors, reflecting disparities in governance capacity (Harymawan & Nismara, 2022).

Within this regulatory landscape, board composition plays a key role in ESG engagement. Firms with greater female representation have been found to adopt more proactive CSR strategies, foster transparency, and improve stakeholder engagement, leading to stronger ESG ratings and reputational outcomes (Rahmadhani et al., 2021). Gender-diverse boards have also been associated with improved decision-making, financial oversight, and reduced agency costs (Bear et al., 2010; Bintarto & Harymawan, 2024), alongside enhanced competitiveness and CSR consistency (Mahdiati & Prijadi, 2023; Harymawan & Nismara, 2022). Yet, institutionalizing diversity remains difficult, often undermined by symbolic compliance, cultural resistance, and the setbacks of the COVID-19 pandemic, which disproportionately affected women in leadership roles (Sunita, 2022).

Despite growing evidence, the mechanisms through which gender diversity influences ESG and financial performance in Indonesia are still insufficiently understood. Few studies examine these dynamics within the country's unique institutional environment or address the threshold effects posited by Critical Mass Theory, which suggests that a minimum proportion of women is needed before their presence substantively affects governance.

To address these gaps, this study investigates the relationship between board gender diversity, ESG practices, and financial performance in Indonesia's publicly listed firms. Applying Critical Mass Theory, it evaluates whether the extent of female representation produces non-linear effects on firm outcomes. Indonesia provides a critical context for this research, as it exemplifies an emerging economy balancing governance reform with persistent gender norms.

Accordingly, the study is guided by the central question:

To what extent does gender diversity in board composition influence ESG and financial performance in Indonesian firms?

Preliminaries or Related Work or Literature Review

Conceptualizing Gender Diversity in Corporate Boards

Definitions and dimensions of board-level gender diversity are critical to understanding its implications for corporate governance. Gender diversity on corporate boards refers to the representation of women and their influence on corporate decision-making processes, encompassing direct roles in governance as well as the broader impacts of their perspectives on organizational culture and performance. Studies highlight not only quantitative measures (such as the proportion of female directors) but also qualitative dimensions, including the connectivity and influence of these directors on board dynamics (Wang & Yang, 2025) .

Dankwano and Hassan (2018) describe gender diversity as not merely a count of women present, but as a reflection of the heterogeneity between men and women on the board, which brings forth a wider array of characteristics, experiences, and skills. They argue that women and men, as equal contributors, introduce diverse perspectives that can enrich decision-making processes and corporate oversight.

Gender Diversity and Financial Performance

Numerous empirical studies have examined the relationship between gender diversity on corporate boards and various financial performance indicators, such as return on assets (ROA), return on equity (ROE), and Tobin's Q. A growing body of research supports the view that greater female representation on boards can be associated with stronger firm performance. For instance, companies with gender-diverse boards often benefit from enhanced strategic deliberation and a broader range of perspectives, which can mitigate groupthink and foster innovation, ultimately leading to better financial outcomes (Maji & Saha, 2023; Li et al., 2022). The presence of female directors has also been associated with a moderating effect on male CEO overconfidence, contributing to more prudent investment and risk-taking decisions, another factor linked to improved firm performance (Chen et al., 2019). In the Indonesian context, similar patterns have emerged. Evidence suggests that publicly listed firms with higher proportions of female directors tend to outperform their less diverse counterparts, particularly in sectors that prioritize sustainability and long-term stakeholder value (Mbarek & Ayadi, 2025; Najaf et al., 2024). These

findings lend support to the argument that gender diversity is not only a matter of equity, but also of financial efficiency and competitiveness.

The mechanisms underlying the positive relationship between board gender diversity and financial performance are grounded in several well-established governance theories. One frequently cited explanation is that gender-diverse boards tend to exhibit stronger monitoring capabilities, reducing agency costs and improving managerial accountability (Mais et al., 2024; Song, 2015). Enhanced cognitive diversity among board members can also contribute to more robust decision-making processes, as varying viewpoints and leadership styles introduce greater scrutiny and creativity in strategic discussions. Moreover, gender-diverse boards are often associated with more active engagement, deliberation, and risk awareness, which collectively support a culture of strategic discipline and foresight. These mechanisms help explain how inclusive boardrooms can positively influence financial outcomes beyond the symbolic value of diversity alone.

Gender Diversity and ESG Outcomes

The role of female board members in advancing environmental, social, and governance (ESG) and corporate social responsibility (CSR) practices has attracted growing scholarly attention. Firms with women in decision-making roles often demonstrate stronger commitments to sustainability, reflected in improved ESG scores, comprehensive CSR disclosures, and broader stakeholder engagement (Maji & Saha, 2023; Hu & Yang, 2021; Setyawan & Wulandari, 2021). Female directors contribute unique perspectives that complement other governance resources, thereby strengthening oversight and promoting effective ESG implementation (Lewellyn & Muller-Kahle, 2023). Empirical studies further show that gender-diverse boards integrate ESG factors into executive compensation and adopt long-term sustainability goals more readily than male-dominated boards, underscoring their role in fostering accountability and ethical governance (Ahmed et al., 2024; Le & Ngo, 2024).

In the Indonesian context, companies with female directors are more likely to engage in effective ESG reporting and attract socially conscious investors (Saeed et al., 2017). Comparative evidence across Southeast Asia confirms that female representation consistently supports ESG adoption, though impacts vary across contexts (Mbarek & Ayadi, 2025; Son et al., 2025). Studies also highlight how board attributes, including gender diversity, facilitate stakeholder engagement

and adoption of sustainable practices in Indonesia, though outcomes are shaped by local institutional and cultural factors (Setiani & Novitasari, 2024). Finally, evidence indicates that gender-diverse boards achieve greater ESG disclosures, suggesting that female empowerment enhances transparency and accountability in corporate leadership (Dempere & Abdalla, 2023). Collectively, these findings affirm that gender diversity strengthens governance and plays a critical role in shaping corporate responsibility and sustainability outcomes.

Theoretical Framework: Critical Mass Theory

Critical Mass Theory (CMT), first articulated by Rosabeth Moss Kanter (1977), provides an important framework for understanding the effects of female representation on corporate boards, particularly in relation to Environmental, Social, and Governance (ESG) outcomes. CMT posits that a threshold of female participation, often defined as three directors, is necessary for women to move beyond tokenism and exert substantive influence on board dynamics and strategic decision-making (Amorelli & Sánchez, 2019).

Empirical evidence supports the importance of this threshold. Studies in India and Spain demonstrate that boards with at least three women are significantly more likely to strengthen ESG disclosures and CSR policies, highlighting the link between critical mass and responsible governance (Yadav & Prashar, 2022; Amorelli & Sánchez, 2019). Similarly, research in the UK shows that firms with three or more female directors outperform peers in financial metrics, with diverse boards associated with stronger strategic decision-making, enhanced risk management, and improved overall performance (Brahma et al., 2020; Rossi et al., 2017; Gharbi & Othmani, 2022). Evidence from European markets further illustrates that gender-balanced boards contribute positively to ESG integration, as shown in the Italian banking sector and in Greece following regulatory reforms (Birindelli et al., 2018; Menicucci & Paolucci, 2022; Harjoto, 2023).

At the same time, critiques of CMT caution that achieving numerical thresholds alone may not ensure lasting influence. Scholars argue that quality of engagement and institutional context are equally important, with tokenism and entrenched cultural barriers limiting the substantive contributions of female directors in male-dominated environments (Lafuente & Vaillant, 2019; Cambrea et al., 2023). These critiques underline the need for policies that move beyond numerical targets to promote meaningful participation and leadership opportunities, ensuring that women's presence translates into effective governance and organizational change (Sabovchyk, 2023).

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METHOD

The

This reserach uses a quantitative research design to investigate the relationship between board gender diversity and two key dimensions of corporate outcomes: financial performance and Environmental, Social, and Governance (ESG) performance. This approach aligns with previous research in emerging market contexts, which has frequently employed panel data regression techniques to explore the influence of board composition on firm performance (Adesanmi et al., 2019; Carmo et al., 2022; Yadav & Prashar, 2022).

To test this relationship, the study proposes the following hypotheses:

H1: *Board gender diversity has a positive effect on a firm's ESG performance.*
H2: *A critical mass of women on the board of directors has a positive effect on ESG performance*
H3: *Board size has a positive effect on ESG performance*
H4: *Board gender diversity has a positive effect on Returrn on Asset (ROA).*
H5: *Board gender diversity has a positive effect on Returrn on Equity (ROE).*
H6:*Board gender diversity has a positive effect on on Tobin's Q (TBQ).*
H7: *A critical mass of women on the board of directors has a positive effect on Returrn on Asset (ROA).*
H8: *A critical mass of women on the board of directors has a positive effect on Returrn on Equity (ROE).*
H9: *A critical mass of women on the board of directors has a positive effect on on Tobin's Q (TBQ).*
H10: *Board size has a positive effect on Return on Asset (ROA)*
H11: *Board size has a positive effect on Return on Equity (ROE)*
H12: *Board size has a positive effect on Tobin's Q (TBQ)*

The key independent variable is board gender diversity, measured as the proportion of female directors on a company's board. This continuous variable has been widely used in prior empirical studies and allows for nuanced variation in the analysis (e.g., Adesanmi et al., 2019; Carmo et al., 2022).

Two separate panel regression models will be estimated to assess the effect of gender diversity on each performance domain:

Model 1: Financial Performance

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Numerous studies hypothesize that an increase in women's representation on corporate boards correlates with improved financial outcomes. A common hypothesis is that having at least three women on a board, as per Critical Mass Theory, is necessary for enhancing firm performance metrics such as Return on Assets (ROA) and Return on Equity (ROE). Brahma et al. demonstrate a significant positive effect on financial performance when three or more women are appointed to boards, aligning with Critical Mass Theory that suggests a threshold is required for substantial influence (Brahma et al., 2020). Similarly, Chijoke-Mgbame et al. find that female representation positively impacts financial performance, with implications for a critical mass of female directors enhancing this effect (Chijoke-Mgbame et al., 2020). The regression model is as follows:

$$ROA = \alpha + \beta 1 Gender\ Diversity + \epsilon$$
$$ROE = \alpha + \beta 1 Gender\ Diversity + \epsilon$$
$$TBQ = \alpha + \beta 1 Gender\ Diversity + \epsilon$$

Model 2: ESG Performance

In the domain of ESG, similar theoretical frameworks support hypotheses linking gender diversity with enhanced corporate responsibility and environmental sustainability. Critical Mass Theory posits that the effective influence of women in leadership roles only materializes when a certain number is reached, suggesting improved CSR practices alongside heightened stakeholder engagement. Research by Galbreath supports this notion by illustrating how women's unique perspectives contribute to a firm's social initiatives, leading to enhanced CSR outcomes (Galbreath, 2016). Therefore, The regression model is as follows:

$$ESG\ Performance: \alpha + \beta 1\ Gender\ Diversity + \epsilon$$

The study will employ panel data regression techniques, specifically using a fixed effects (FE) model. The fixed effects approach is chosen because it effectively controls for time-invariant, unobserved heterogeneity across firms, such as corporate culture, industry-specific norms, or governance structures, which may otherwise bias the estimated relationships between board gender diversity and firm performance (Wooldridge, 2010). By focusing on within-firm variation over time, the FE model allows for a clearer identification of the impact of changes in board composition on both financial and ESG performance. This approach is particularly suitable in corporate governance research, where firm-level characteristics that remain constant over time, such as ownership structure or historical reputation, are likely to influence outcomes but cannot be directly observed (Baltagi, 2005).

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Table 1 shows a summary of all the variables used in this research and its expected relationship:

Name of Variable (Acronym)	Measurement	Expected Relationship
Women on the board of Director (WBP)	Percentage of women on the board of directors	Positive
Critical mass of women on the BOD (CMT)	Dummy variable that is equal to 1 if boards have at least three women, 0 otherwise	Positive
Board Size Number (BSN)	A control variable comprises of total number of director's on the firms' board	Positive
Return on Equity (ROE)	Captures how much return a company generates for its shareholders, indicating effectiveness in using equity capital.	Positive
Tobin's Q (TBQ)	Compares a firm's market value to the replacement cost of its assets, signaling investor confidence and growth potential.	Positive

Table 1 . *Variables used in the research*

RESULT AND DISCUSSION

This study relies on secondary quantitative data collected from Bloomberg. The unit of analysis comprises 51 Indonesian publicly listed companies, with a specific focus on firms listed on the Indonesia Stock Exchange (IDX). The study period spans five years (2020–2024) to capture temporal variation and recent developments in governance and ESG regulation.

Board composition data, particularly the proportion of female directors, will be obtained from Bloomberg. Financial performance indicators, including Return on Assets (ROA), Return on Equity (ROE), and Tobin's Q, will be collected from financial databases such as Bloomberg. These performance indicators are selected for their widespread use in corporate finance research and their ability to reflect firm profitability and market valuation.

Data on ESG performance will be drawn from publicly available Bloomberg ESG scores. In addition, All data will be compiled and processed using Microsoft Excel and analyzed using E-views 12 for statistical modelling.

Descriptive Statistics

Based on the provided descriptive statistics in Table 2, this study examines several key financial and non-financial variables for a sample of companies, with data spanning from 2020 to 2024.

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E-ISSN: 3089-7106
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Date: 08/20/25 Time: 17:06
Sample: 2020 2024

	ROA	ROE	TBQ	ESG	WBP	CMT	BSN
Mean	9563803.	13080.12	143113.7	3.371203	12.57959	0.058091	6.132780
Median	44.75500	124.2260	112490.0	3.320000	10.00000	0.000000	6.000000
Maximum	2.30E+09	1301333.	899620.0	5.530000	60.00000	1.000000	17.00000
Minimum	-35.52200	-177.0460	10020.00	0.870000	0.000000	0.000000	2.000000
Std. Dev.	1.48E+08	121265.9	129738.3	1.043912	14.09154	0.234403	2.397699
Skewness	15.42738	9.783867	2.842975	0.020411	0.810046	3.778354	1.155229
Kurtosis	239.0042	99.60603	13.57520	2.499255	2.945849	15.27596	4.992436
Jarque-Bera	568860.2	97561.03	1447.656	2.534635	26.38578	2086.689	93.46805
Probability	0.000000	0.000000	0.000000	0.281586	0.000002	0.000000	0.000000
Sum	2.30E+09	3152309.	34490402	812.4600	3031.681	14.00000	1478.000

Table 2. *Descriptive Statistics*

The financial performance variables, ROA and ROE, exhibit extreme variability and significant non-normality. The mean for both is heavily inflated by extreme outliers, as evidenced by the vast difference between the mean and the median. The exceptionally high standard deviations for ROA and ROE indicate a wide dispersion and a lack of consistency in profitability across the sample. The high positive skewness and exceptionally high kurtosis for both variables confirm that their distributions are highly peaked with long, heavy tails. The Jarque-Bera probability of 0.000 for both variables rejects the null hypothesis of normality, a finding that necessitates the use of robust statistical methods or data transformations for subsequent regression analysis.

The firm-specific characteristics and governance variables, TBQ and ESG, also display notable distributional properties. The mean TBQ is significantly higher than its median, once again pointing to positive outliers that inflate the average. Its high skewness and kurtosis further confirm a non-normal distribution. In contrast, the ESG score appears to be more symmetrically distributed with a mean close to its median. Its Jarque-Bera probability suggests that the distribution is not significantly different from normal, indicating that ESG performance within the sample is clustered around the mean.

Finally, the remaining governance variables: WBP, CMT, and BSN, provide a glimpse into the corporate governance structure. The WBP has a mean of 12.579 and a median of 10.000, indicating a range of board gender diversity. Its distribution is non-normal. The Critical Mass Theory (CMT) has a very low mean and a median of 0.000. The Board Size variable (BSN) has a fairly consistent size across the sample, with a mean close to its median, though its distribution also deviates significantly from normality. These descriptive findings are critical for guiding subsequent inferential statistical modeling.

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E-ISSN: 3089-7106
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Normality Test

The histogram and descriptive statistics of the standardized residuals indicate that the normality assumption of the regression model is not satisfied (See Figure 1). The histogram shows a moderately left-skewed distribution with a pronounced heavy tail, deviating from the bell-shaped curve of a normal distribution. This is supported by the skewness value of -0.899199, confirming left skewness, and the kurtosis value of 6.264016, which is considerably higher than the mesokurtic benchmark of 3.0. The elevated kurtosis suggests a leptokurtic distribution with a sharp peak and heavy tails, pointing to the presence of outliers. The Jarque-Bera test provides the strongest evidence of non-normality, with a test statistic of 146.4031 and a probability value of 0.00000, rejecting the null hypothesis of normal residuals at any conventional significance level. These results indicate a violation of the normality assumption, raising concerns for hypothesis testing and confidence interval estimation.

The regression results remain valid under the Central Limit Theorem (CLT). According to the CLT, with a sufficiently large sample size, the distribution of estimated coefficients approaches normality regardless of the underlying residual distribution. In this study, although data are drawn from 51 firms, the total number of observations is 253, exceeding the commonly accepted threshold of 30 for the CLT to apply. Thus, while residuals are not normally distributed, the estimated parameters can be assumed to follow an approximately normal distribution. This ensures that statistical inferences, such as hypothesis testing and p-value calculations, remain asymptotically valid.

Although non-normality is acknowledged as a diagnostic issue, it does not undermine the reliability of the regression analysis given the sufficiently large sample size.

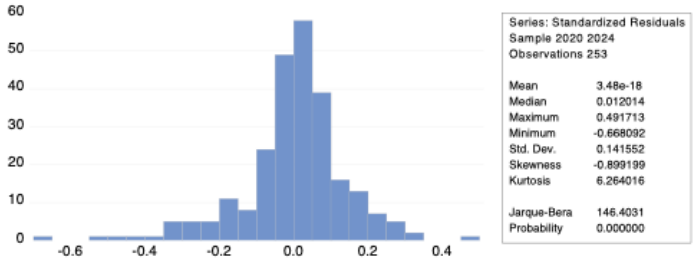

Table 2. *Normalilty Test*

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E-ISSN: 3089-7106
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Multicollinearity Test

Based on the correlation matrix (See Figure 2), the multicollinearity test reveals that the three independent variables, Critical Mass Theory (CMT), Board Size (BSN), and Women on Board (WBP) do not exhibit a high degree of correlation that would pose a significant multicollinearity issue in the regression model.

	Correlation		
	CMT	BSN	WBP
	CMT	BSN	WBP
CMT	1.000000	0.197980	0.511898
BSN	0.197980	1.000000	-0.099501
WBP	0.511898	-0.099501	1.000000

Figure 2. *Multicollinearity Test Result*

This level of correlation is well below the common thresholds for concern. The correlation between Board Size (BSN) and Critical Mass Theory (CMT) is 0.197980, a weak positive relationship. Conversely, the correlation between Board Size (BSN) and Women on Board (WBP) is -0.099501, indicating a very weak, almost negligible, negative relationship. Given these results, the independent variables are sufficiently distinct, and multicollinearity is not a significant threat to the validity of the regression analysis. This suggests that the individual effects of CMT, BSN, and WBP on the dependent variable can be reliably estimated without the confounding effects of strong inter-variable relationships.

Regression on ESG Model

The panel regression analysis using the Panel Least Squares method provides empirical insights into the determinants of ESG performance, with a particular focus on gender diversity in corporate boards. The dependent variable is ESG, while the independent variables include Women on Board (WBP), Board Size (BSN), and Critical Mass Theory (CMT). The estimation is conducted on an unbalanced panel dataset of 51 firms over the 2020–2024 period, yielding 253 firm-year observations (See Figure 3).

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E-ISSN: 3089-7106
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Dependent Variable: ESG
Method: Panel Least Squares
Date: 08/20/25 Time: 14:45
Sample: 2020 2024
Periods included: 5
Cross-sections included: 51
Total panel (unbalanced) observations: 253

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.479553	0.225249	11.00804	0.0000
WBP	0.010458	0.005686	1.839282	0.0674
BSN	0.120832	0.035843	3.371160	0.0009
CMT	0.018405	0.248321	0.074116	0.9410

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.852397	Mean dependent var	3.348498
Adjusted R-squared	0.813086	S.D. dependent var	1.074288
S.E. of regression	0.464453	Akaike info criterion	1.490880
Sum squared resid	42.92762	Schwarz criterion	2.245043
Log likelihood	-134.5964	Hannan-Quinn criter.	1.794305
F-statistic	21.68326	Durbin-Watson stat	1.269104
Prob(F-statistic)	0.000000		

Figure 3. *ESG Regression*

The panel regression on ESG performance shows that the overall model is statistically significant, with R-squared (0.852) and Adjusted R-squared (0.813) values indicating strong explanatory power. The F-statistic (21.683, $p < 0.001$) confirms the joint significance of the predictors, with fixed effects appropriately controlling for unobserved heterogeneity.

At the individual level, Women on Board (WBP) has a positive coefficient ($\beta = 0.010$, $p < 0.10$), suggesting that board gender diversity positively influences ESG performance. This result supports H1. Board Size (BSN) also exerts a significant positive effect ($\beta = 0.121$, $p < 0.01$), thereby supporting H3. By contrast, the Critical Mass Theory (CMT) dummy variable is statistically insignificant ($\beta = 0.018$, $p = 0.941$), leading to the rejection of H2.

Thus, hypotheses H1 and H3 are accepted, while H2 is rejected.

Regression on ROA Model

This study employs a panel regression analysis with Return on Assets (ROA) as the dependent variable, estimated using the Panel Least Squares method (See Figure 4). The independent variables include Board Size (BSN), Critical Mass Theory (CMT), and Women on Board (WBP). The dataset comprises 51 firms over the period 2020–2024, yielding a total of 253 firm-year observations.

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E-ISSN: 3089-7106
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Dependent Variable: ROA
Method: Panel Least Squares
Date: 08/18/25 Time: 23:32
Sample: 2020 2024
Periods included: 5
Cross-sections included: 51
Total panel (unbalanced) observations: 253

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9110171.	70873645	0.128541	0.8979
BSN	1.116739	11277766	9.90E-08	1.0000
CMT	-16.42870	78132994	-2.10E-07	1.0000
WBP	0.795762	1789008.	4.45E-07	1.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.196825	Mean dependent var	9110187.
Adjusted R-squared	-0.017085	S.D. dependent var	1.45E+08
S.E. of regression	1.46E+08	Akaike info criterion	40.62479
Sum squared resid	4.25E+18	Schwarz criterion	41.37896
Log likelihood	-5085.036	Hannan-Quinn criter.	40.92822
F-statistic	0.920128	Durbin-Watson stat	1.565594
Prob(F-statistic)	0.631011		

The regression results with Return on Assets (ROA) as the dependent variable indicate that the model is not statistically significant. The F-statistic (0.920, p = 0.631) and low R-squared (0.197) with a negative Adjusted R-squared (-0.017) show that the predictors fail to explain variations in ROA.

Individually, none of the independent variables, WBP, BSN, or CMT, are statistically significant (all p-values = 1.000). Therefore, hypotheses H4, H7, and H10, which predicted positive effects of board gender diversity, critical mass, and board size on ROA, are rejected.

Regression on ROE Model

This analysis reports the results of a panel regression with Return on Equity (ROE) as the dependent variable. The findings indicate that the overall model is highly significant. The F-statistic of 92.08510, with a p-value of 0.00000, demonstrates that the explanatory variables, in combination with the firm-level fixed effects, jointly exert a strong influence on ROE. This is further supported by the high R-squared (0.960823) and Adjusted R-squared (0.950389), which show that approximately 95 percent of the variation in ROE is explained by the model.

Nevertheless, the individual governance variables do not display statistical significance. The coefficients for BSN (p = 0.9799), WBP (p = 0.6132), and CMT (p = 0.8210) are all above conventional significance thresholds. This suggests that, although the model captures substantial variation in ROE, the explanatory power stems primarily from the fixed effects that account for unobserved, firm-specific characteristics rather than from the direct effects of board size, female representation, or critical mass effects. These results imply that firm-level heterogeneity is a more critical determinant of equity-based returns than the examined governance characteristics.

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E-ISSN: 3089-7106
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Dependent Variable: ROE
Method: Panel Least Squares
Date: 08/18/25 Time: 23:33
Sample: 2020 2024
Periods included: 5
Cross-sections included: 51
Total panel (unbalanced) observations: 253

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	25381.58	18086.62	1.403335	0.1621
BSN	72.47512	2878.033	0.025182	0.9799
WBP	-231.1489	456.5464	-0.506299	0.6132
CMT	4517.780	19939.18	0.226578	0.8210

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.960823	Mean dependent var	23102.27
Adjusted R-squared	0.950389	S.D. dependent var	167435.1
S.E. of regression	37293.74	Akaike info criterion	24.07783
Sum squared resid	2.77E+11	Schwarz criterion	24.83199
Log likelihood	-2991.846	Hannan-Quinn criter.	24.38126
F-statistic	92.08510	Durbin-Watson stat	1.612018
Prob(F-statistic)	0.000000		

Figure 5. *ROE Regression*

The regression on Return on Equity (ROE) demonstrates strong overall significance. The F-statistic (92.085, p = 0.000) and high R-squared (0.961) with Adjusted R-squared (0.950) confirm that the model explains most of the variation in ROE.

However, none of the governance variables show individual significance: WBP (p = 0.613), CMT (p = 0.821), and BSN (p = 0.980). This indicates that firm-level fixed effects, rather than board gender diversity or board size, drive ROE outcomes. Consequently, H5, H8, and H11 are rejected.

Regression on TBQ Model

This panel regression examines Tobin's Q (TBQ) as the dependent variable, with Board Size (BSN), Critical Mass Theory (CMT), and Women on Board (WBP) as the explanatory variables. The analysis employs the Panel Least Squares method on an unbalanced panel dataset comprising 51 firms over the period 2020–2024, yielding a total of 241 firm-year observations.

The results indicate that the overall model is statistically significant. The F-statistic of 6.470931 with a p-value of 0.00000 confirms that the independent variables collectively exert a significant influence on Tobin's Q. The adjusted R-squared of 0.547135 suggests that

Journal of Studies in Academic, Humanities, Research and Innovation
Volume 2 No 2 December 2025
E-ISSN: 3089-7106
https://journal.as-salafiyah.id/index.php/sahri
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approximately 54.71 percent of the variation in Tobin's Q is explained by the model, indicating a reasonably good fit for the data.

When examining the individual predictors, Board Size (BSN) emerges as the only statistically significant factor. Its positive coefficient (14052.69) with a p-value of 0.0392 indicates that larger boards are positively associated with higher Tobin's Q, implying that increased board size contributes to enhanced market valuation relative to firm assets. In contrast, CMT and WBP show no statistically significant effects, with p-values of 0.2299 and 0.9934, respectively. This suggests that, within this sample, neither critical mass effects nor the proportion of women on the board have a measurable impact on Tobin's Q. The inclusion of fixed effects further accounts for unobserved firm-specific heterogeneity, strengthening the robustness of the analysis.

Dependent Variable: TBQ
Method: Panel Least Squares
Date: 08/18/25 Time: 23:34
Sample: 2020 2024
Periods included: 5
Cross-sections included: 51
Total panel (unbalanced) observations: 241

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	60097.95	42806.28	1.403952	0.1620
BSN	14052.69	6767.626	2.076458	0.0392
CMT	-56451.85	46861.53	-1.204652	0.2299
WBP	8.987696	1091.024	0.008238	0.9934

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.647143	Mean dependent var	143113.7
Adjusted R-squared	0.547135	S.D. dependent var	129738.3
S.E. of regression	87307.71	Akaike info criterion	25.78671
Sum squared resid	1.43E+12	Schwarz criterion	26.56754
Log likelihood	-3053.299	Hannan-Quinn criter.	26.10129
F-statistic	6.470931	Durbin-Watson stat	1.582867
Prob(F-statistic)	0.000000		

Figure 6. *TBQ Regression*

The regression results for Tobin's Q (TBQ) indicate overall model significance. The F-statistic (6.471, p = 0.000) confirms joint significance, and the Adjusted R-squared (0.547) shows that more than half of the variation in Tobin's Q is explained by the model.

Board Size (BSN) is the only variable with a statistically significant coefficient (β = 14052.69, p = 0.039), indicating a positive association between board size and Tobin's Q. This finding supports H12. Conversely, both WBP (p = 0.993) and CMT (p = 0.230) are insignificant, leading to the rejection of H6 and H9.

Discussion

ESG

Journal of Studies in Academic, Humanities, Research and Innovation
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The relationship between board gender diversity, critical mass theory, and corporate social responsibility (CSR) or environmental, social, and governance (ESG) performance remains a contentious area of research, particularly in emerging markets. Multiple studies have documented that greater female representation on boards correlates positively with improved ESG outcomes, suggesting that female directors bring unique perspectives and sensitivity towards social and environmental issues, subsequently enhancing corporate governance and CSR activities.

Empirical studies have also examined the implications of critical mass theory, specifically, the idea that having three or more women on a board is necessary for significant improvements in governance and CSR performance. Evidence shows that results can vary based on factors such as cultural and regulatory environments, and the specific characteristics of firms. For example, Temiz and Acar assert that in countries with high secrecy cultures, firms often struggle with CSR disclosure regardless of gender diversity on boards (Temiz & Acar, 2023). This suggests that while critical mass may be important, contextual factors can hinder the expected benefits.

Conversely, a study by Nguyen et al. challenges the critical mass effect by demonstrating that the relationship between gender diversity and firm performance is not uniform across industries or societal attitudes. Their findings propose that ESG ratings act as a mediating factor in the relationship, indicating that merely increasing the number of women on boards does not guarantee enhanced firm performance unless aligned with industry norms and societal expectations (Nguyen et al., 2023). Similarly, Majeed et al. provide evidence that high female board representation does not universally translate into increased CSR disclosures in specific contexts, emphasizing the need to examine contextual and firm-level heterogeneity (Majeed et al., 2015).

There is substantial evidence that women's presence on boards can enhance CSR initiatives, often attributed to their unique perspectives on stakeholder relationships and social issues. For instance, Xaviolyn et al. illustrate that female board members often exhibit a greater inclination toward social responsibility, suggesting that their decision-making reflects a broader commitment to societal issues, a view that resonates with the findings from Byron and Post, who conducted a meta-analysis revealing a positive association between board gender diversity and corporate social performance (Xaviolyn et al., 2023; Byron & Post, 2016). Nonetheless, they caution that the critical mass effect may not manifest uniformly across all datasets, particularly due to variations in sample sizes and contextual dynamics affecting the governance landscape.

In summary, the literature supports the notion that board gender diversity positively influences ESG performance; however, the critical mass theory, while relevant, may not yield uniform outcomes due to moderating factors such as firm heterogeneity, cultural context, and disclosure environments. To optimize the potential of diverse boards, organizations should consider these aspects critically.

Financial Performance

The findings from this panel regression analysis underscore the nuanced relationship between board gender diversity, board size, critical mass, and firm financial performance in the Indonesian context. Specifically, the absence of significant effects of gender diversity, board size, and critical mass on ROA and ROE, alongside a positive effect of board size on Tobin's Q, reflects the complexity of governance-performance linkages in emerging markets.

Prior studies report similar results. Marpaung et al. (2022) observed that female directors did not significantly affect Tobin's Q or accounting-based indicators such as ROA and ROE in Indonesian firms, supporting the present findings on gender diversity. Zunairoh et al. (2023), however, identified a positive relationship between board size and ROE but not Tobin's Q, highlighting contradictions across financial measures. Such inconsistencies point to the contingent nature of governance effects, shaped by cultural norms, institutional settings, and operational structures unique to Indonesia.

Contrasting evidence from other markets further illustrates the importance of context. Khidmat et al. (2020), for instance, found a positive relationship between gender diversity and firm performance in China, suggesting that regulatory frameworks and societal acceptance of female leadership may moderate these outcomes. In Indonesia, where board influence is often constrained to advisory and supervisory roles, gender diversity may have limited direct impact on operational efficiency, helping to explain the null results for ROA and ROE. Similarly, the theorized benefits of critical mass (Moraes et al., 2022) may be less observable in emerging economies where entrenched governance structures limit female directors' influence.

By contrast, the significant positive effect of board size on Tobin's Q highlights the role of market-based perceptions. Larger boards may signal stronger oversight, enhanced compliance, and a wider range of expertise, factors that investors reward through higher market valuations even if accounting returns remain unaffected. This finding resonates with evidence from other markets

where board size has been positively linked to investor confidence and firm stability (Shobhwani & Lodha, 2024).

Overall, these results add to the ongoing debate on the governance–performance nexus by demonstrating that the benefits of gender diversity and board structures are neither universal nor uniform across performance dimensions. For practitioners, the findings suggest that in emerging markets, market-based outcomes such as Tobin's Q may be more responsive to governance changes than accounting-based measures, underscoring the need for firms to align governance strategies with both internal operational realities and external investor expectations.

CONCLUSION

This study investigated the effects of board gender diversity, critical mass, and board size on financial and ESG performance in Indonesian listed firms from 2020 to 2024, using fixed effects panel regression. The results indicate that gender diversity has only a modest influence, showing a weak but positive association with ESG performance but no significant effect on financial measures (ROA, ROE, Tobin's Q). The critical mass hypothesis is not supported, reflecting the limited number of boards with three or more women. In contrast, board size consistently shows significance, enhancing ESG performance and positively affecting Tobin's Q, though not ROA or ROE. These findings suggest that market-based valuations respond more strongly to governance structures than do accounting-based indicators.

Theoretically, the results point to the limited applicability of Critical Mass Theory in emerging markets, where institutional and cultural barriers may constrain women's influence. Practically, while gender diversity remains important, broader reforms to strengthen board effectiveness are needed to ensure meaningful governance improvements. Overall, the study underscores that the governance–performance relationship is context-dependent and shaped by the type of performance measure considered. Future research should explore sectoral differences, incorporate qualitative analysis of board dynamics, and examine interactions with other governance variables to enrich understanding in emerging market contexts.

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