



## **BOARD DIVERSITY AND FINANCIAL PERFORMANCE: EVIDENCE FROM INDONESIA'S MANUFACTURING SECTOR**

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### **Abstract**

Financial performance is a crucial topic in research as it serves as a key indicator for stakeholders. By evaluating financial performance, investors and creditors can assess risks, while management can utilize the insights to refine corporate strategies and policies. This study aims to analyze the influence of board diversity on the financial performance of manufacturing companies. This research employs a quantitative approach using secondary data obtained from the annual reports of manufacturing companies listed on the Indonesia Stock Exchange for the period 2020-2023. The sample consists of 116 companies, selected using the purposive sampling method. Panel data is analyzed using Eviews 12 software and multiple regression analysis, complemented by the Chow and Hausman specification tests. The findings indicate that gender diversity has a significant influence on financial performance, whereas age diversity, nationality diversity, and educational diversity do not exhibit a significant effect. This study provides recommendations for corporate to pay greater attention to board composition, particularly regarding gender diversity. Management is encouraged to foster an inclusive work environment and ensure equal opportunities in strategic decision-making processes.

**Keywords:** Financial performance; Gender diversity; Age diversity; Nationality diversity; Educational diversity.

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## **INTRODUCTION**

The global economy is facing heightened uncertainty due to the COVID-19 pandemic and the Russia–Ukraine war, which have triggered high inflation and weakened the performance of industries and households. The Organisation for Economic Co-operation and Development projected that global economic growth in 2022 would reach only 3%, down from its earlier forecast of 4.5% (OECD, 2022). In Indonesia, this challenge has been exacerbated by the increasing number of corruption cases involving directors, such as the indictment of three Presidents of Pertamina Subholdings as suspects in alleged corruption related to crude oil governance (Yamdwi Putra, 2026). This case reflects the weakness of internal corporate oversight mechanisms.

The implementation of Good Corporate Governance (GCG) has become a critical determinant of corporate success (Sudjana et al., 2023). Indonesia adopts a two-tier board system, in which the board of directors acts as the decision-making body, while the board of commissioners serves as the supervisory body (Tanjaya & Kwarto, 2022; Putra & Setiawan, 2025). Board diversity, which includes gender, age, educational background, and nationality, is expected to broaden perspectives, enhance transparency and accountability, and reduce the dominance of particular groups that may harm the firm's interests (EmadEldeen et al., 2025; Torchia & Solarino, 2025; Islam et al., 2022).

Gender diversity, in particular, plays a significant role in enhancing corporate social responsibility and improving firm performance (Mallidis et al., 2024; Hana et al., 2022; Kusuma et al., 2023). Female directors are often perceived as being more sensitive to social and ethical issues, thereby supporting the effective implementation of GCG (Alhossini et al., 2024; Areneke et al., 2023). Data from Badan Pusat Statistik show that the proportion of women in managerial positions increased from 33.08% in 2015 to 35.2% in 2023 (Annur, 2023). Compared with male directors, female directors tend to demonstrate greater risk awareness, stronger ethical orientation, and more participative decision-making styles, which contribute to enhanced transparency, accountability, and stakeholder engagement within corporate governance practices (Areneke et al., 2023). Prior studies also suggest that women on boards are more likely to encourage sustainability initiatives and strengthen monitoring functions, ultimately improving the quality of corporate oversight (Cambrea, et al. 2023). Gender heterogeneity is also associated with stronger business ethics and social responsibility (Alhosani & Nobanee, 2023; Pramesti & Nita, 2022).

In addition, the growing trend toward sustainable business practices has encouraged firms to balance profitability with social and environmental responsibility (Suwasono & Purwaningsih, 2023). Empirical evidence in Indonesia suggests that gender diversity may positively influence financial performance, particularly in terms of return on assets (ROA) (Egbunike et al., 2023). This relationship is often attributed to the ability of diverse management teams to provide varied perspectives, reduce groupthink, and improve strategic decision-making, thereby enhancing operational efficiency and profitability. Al Muniro (2023) emphasized the importance of diversity within top management, in line with Otoritas Jasa Keuangan Regulation No. 51/POJK.03/2017, which highlights gender equality as an essential component of sustainable finance.

Several countries have introduced quota regulations to ensure female representation in corporate boards. Norway, for instance, has required since 2007 that listed companies maintain a 40/60 gender composition on their boards. Major stock exchanges have also promoted diversity transparency. Canada's 2014 rule requiring standardized board gender diversity disclosure increased women's representation on boards, using a difference-in-differences design (Hu, et al. 2025), while the Singapore Exchange launched sustainability reporting rules in December 2021, including a roadmap for women's representation beginning in 2022. In broader governance practices, gender equality is often accompanied by diversity in age, education, and nationality (Rokhilla Haris Lubis et al., 2021). Studies in developed countries such as the United States, Australia, the United Kingdom, and across Europe have widely examined the influence of gender diversity on firm performance, while age diversity has also become an emerging focus (Rokhilla Haris Lubis et al., 2021). The World Health Organization classifies older age into four categories, and age diversity is believed to bring variations in experience,

skills, and social networks (Serly et al., 2024). Younger managers tend to be more innovative, whereas older managers focus more on maintaining stability. However, empirical findings remain mixed: Tania and Hesniati (2022) found no significant impact of younger managers on firm performance, whereas Serly et al. (2024) found a positive association between age diversity and corporate performance.

Nationality diversity within boards offers global perspectives, broader networks, and enhanced competitiveness, while providing access to international resources and information (Egbunike et al., 2023; Lestari, 2021; Rokhilla Haris Lubis et al., 2021). Foreign directors can introduce innovative managerial practices, improve corporate credibility among global stakeholders, and assist in identifying and mitigating international market risks (Putri et al., 2021). Their international exposure and global networks may strengthen strategic decision-making and access to external resources. Nevertheless, foreign directors may encounter limitations in understanding local cultural and regulatory contexts. Conversely, local directors tend to possess deeper knowledge of domestic market conditions and stakeholder expectations, which can support more context-sensitive corporate decisions (Puthusserry, et al. 2021).

Educational diversity also influences the quality of strategic decision-making, although research results remain inconclusive. Lubis et al. (2022) found that education alone did not significantly affect ROA or ROE, except when combined with gender, age, and nationality diversity. In Indonesia, Rompis et al. (2018) revealed that directors with backgrounds in economics or business were more effective in monitoring financial performance. Higher education levels, such as master's degrees, have also been associated with improved firm performance and lower tendencies for manipulative practices (Fuadah et al., 2018). Furthermore, educational diversity enhances board credibility and public trust in a company's ability to manage risks adaptively (Safitri et al., 2024).

To mitigate potential bias, this study employs several control variables, namely board size (BSIZE), board independence (IND), firm size (FSIZE), leverage (FLEV), firm age (FAGE), and sales growth (SG). BSIZE is controlled because the number of board members may influence monitoring effectiveness, communication efficiency, and the quality of strategic decision-making (Eliya & Suprpto, 2022); ND is included to capture the board's ability to exercise objective oversight and reduce agency conflicts, which may affect corporate governance quality and firm performance (Egbunike et al., 2023); FSIZE represents the scale of a firm's operations and resource availability, as larger firms generally possess greater access to capital, stronger market power, and higher profit potential (Eliya & Suprpto, 2022); FAGE is controlled because older firms tend to have more operational experience, organizational stability, and established business networks, which may influence financial performance (Eliya & Suprpto, 2022); FLEV reflects the extent of debt financing and the firm's ability to manage financial obligations, which can affect risk exposure and profitability (Serly et al., 2024); Meanwhile, SG is included as an indicator of business expansion and financial health, since firms with higher sales growth may exhibit stronger market performance and future profitability prospects (Egbunike et al., 2023).

This study examines the effects of gender, age, nationality, and educational diversity on firm performance. Prior studies have shown that gender diversity, particularly the increasing number of female directors, positively affects performance and reduces financial distress risk (Ramdhanian et al., 2020; Abbas & Frihatni, 2023). Age diversity enhances the board's ability to identify and resolve shareholder-related issues (Lubis, 2022); nationality diversity promotes innovation and global competitiveness through international perspectives and networks (Natalia et al., 2023); while educational diversity strengthens managerial accountability and monitoring effectiveness (Lubis et al., 2022). However, previous studies still present several limitations. First, existing findings remain inconsistent, as some studies report positive effects of board diversity on firm performance, while others find insignificant or mixed results. Second, many prior studies focus only on a single dimension of diversity, particularly gender diversity, without comprehensively examining multiple board diversity characteristics simultaneously. Third, empirical evidence from developing countries, especially Indonesia, remains limited despite differences in institutional environments, corporate governance practices, and socio-cultural contexts that may influence the relationship between board diversity and firm performance. Therefore, this study seeks to provide a more comprehensive analysis by examining multiple dimensions of board diversity within the Indonesian context.

The contributions of this study are threefold: (1) addressing the limitations of prior studies (Egbunike et al., 2023) by focusing on the Indonesian manufacturing sector and encompassing four dimensions of board diversity; (2) supporting Otoritas Jasa Keuangan Regulation No. 51/POJK.03/2017 concerning gender equality and social responsibility disclosure; and (3) highlighting the relevance of the manufacturing sector as a key contributor to Indonesia's economy, accounting for 73,62 – 80,91% of national exports over 2010-2020 (Leonard, et al. 2021). The heavy dependence on this sector renders it vulnerable to global disruptions such as the Russia-Ukraine war and the COVID-19 pandemic. Board diversity, therefore, has the potential to enhance competitiveness through adaptive and innovative decision-making, making it crucial to analyze its impact on the financial performance of Indonesian manufacturing firms during the 2020–2023 period.

## **LITERATURE REVIEW**

### **Agency Theory**

The agency theory proposed by Michael C. Jensen and William H. Meckling (1976) explains the relationship between the principal (owner) and the agent (manager), which must be properly managed to minimize agency problems and agency costs. In this study, gender, age, nationality, and educational diversity within the board of directors are considered important factors that can enhance managerial oversight. A more diverse board tends to be independent, critical, and accountable, enabling it to scrutinize managerial policies and performance not only in terms of efficiency but also in terms of ethics and sustainability (Putri et al., 2021). Such diversity in perspectives and experiences reduces the likelihood of decisions that solely benefit management at the expense of shareholders (Darmawan, 2022), while strengthening accountability and transparency, which in turn constrain opportunistic behavior among agents (Lubis et al., 2022). Therefore, a more diverse board can improve the effectiveness of oversight, risk

management, and resource utilization efficiency, ultimately leading to stronger financial performance and long-term shareholder protection (Roika et al., 2019).

### **Financial Performance**

Financial performance serves as a primary indicator of a company's effectiveness in generating profit and managing resources. It is commonly assessed through profitability ratios such as Return on Assets (ROA) and Return on Equity (ROE), which measure how efficiently a firm utilizes its assets and equity to produce earnings (Intia & Azizah, 2021). Other financial aspects, including capital structure, leverage, and liquidity, are also critical as they reflect the firm's capacity to manage risk and maintain financial stability. ROA, as a key metric, evaluates the efficiency of asset utilization in generating profit and serves as a basis for investors to estimate potential returns on investment (Sitanggang, 2021).

Within the framework of corporate governance, agency theory underscores the monitoring role of the board of directors in mitigating conflicts of interest between management and shareholders, which in turn influences financial performance (Lestari, 2021). Board diversity in terms of gender, age, nationality, and education enriches the decision-making process, enhances supervisory effectiveness, and strengthens corporate resilience in the face of financial challenges, including financial distress (Abbas & Frihatni, 2023).

In this study, ROA is employed as the primary metric to evaluate the firm's ability to generate earnings from its assets (Anisa & Anwar, 2021) and to estimate the expected rate of return from investment (Daromes & Jao, 2020). ROA enables investors to assess how effectively a firm maximizes profits through its asset base, beyond mere sales profitability (Daromes & Jao, 2020).

### **Good Corporate Governance (GCG)**

Good Corporate Governance (GCG) represents a crucial mechanism within agency theory to mitigate conflicts of interest between shareholders (principals) and management (agents) arising from information asymmetry and divergent interests (Jensen & Meckling, 1976). The implementation of GCG emphasizes transparency and accountability through the active supervisory role of the board of directors in overseeing managerial decision-making (Gunawan & Wijaya, 2021). The core principles of GCG: transparency, accountability, responsibility, independence, and fairness, function as safeguards against the misuse of authority. In this context, board diversity may strengthen the implementation of these principles by providing broader perspectives, reducing groupthink, and enhancing the effectiveness of board oversight. Diverse boards tend to encourage more transparent and balanced decision-making processes, improve monitoring mechanisms, and increase sensitivity toward stakeholder interests (Destriana & Sebastian, 2025; Zattoni, et al. 2022). These conditions can reduce agency conflicts and improve the quality of strategic decisions, which may ultimately contribute to better financial performance.

Diversity within the board of directors, encompassing gender, age, nationality, and educational background, enhances the effectiveness of oversight, enriches strategic perspectives in decision-making, reduces opportunistic behavior, and improves both performance and risk management (Gunawan & Wijaya, 2021; Rokhilla Haris Lubis et al., 2021).

### **Board Diversity: Gender, Age, Nationality, and Education**

Board diversity encompasses four key dimensions: gender, age, nationality, and education, each contributing to improved corporate governance effectiveness within the agency theory framework. Gender diversity enriches strategic perspectives, strengthens monitoring functions, and fosters stronger relationships with stakeholders (Thoomaszen & Hidayat, 2020; Eliya & Suprpto, 2022; Nurwahyudi & Mudasetia, 2020; Ramdhanita et al., 2020). Age diversity combines the experience of senior members with the innovation and technological insight of younger generations, leading to more creative and accountable decision-making (Rokhilla Haris Lubis et al., 2021).

Nationality diversity provides global perspectives, minimizes bias, and enhances the firm's ability to manage cross-border risks (Natalia et al., 2023; Rokhilla Haris Lubis et al., 2021). Meanwhile, educational diversity broadens expertise, improves the quality of managerial evaluation, and fosters creative problem-solving in addressing complex business challenges (Lubis et al., 2022; Safitri et al., 2024). Collectively, these four dimensions of diversity reinforce transparency, accountability, and decision-making quality, thereby reducing agency problems and improving overall corporate performance.

### **Hypotheses Development**

The board of directors serves as a key corporate organ endowed with full authority and responsibility to manage the company in accordance with its objectives and best interests. Within the framework of agency theory, the board acts as a monitoring mechanism designed to mitigate conflicts of interest between management (as the agent) and shareholders (as the principal). Diversity within the board, particularly in terms of gender, is expected to enhance monitoring effectiveness, as differing backgrounds yield diverse viewpoints and critical insights. Female directors, for instance, are often perceived as more meticulous and cautious in supervisory functions, thereby fostering greater managerial accountability and transparency (Areneke, et al. 2023; Elzahar, et al. 2022; Gunawan & Wijaya, 2021). Gender diversity on the board also plays an important role in reducing managerial opportunism, one of the central issues addressed by agency theory. This diversity contributes to improved decision-making quality, stronger oversight, and, ultimately, better financial performance. Empirical studies, such as that of Chatterjee & Nag (2022), Egbunike et al. (2023), and Rahman & Zahid (2021), have demonstrated a positive association between the presence of women on corporate boards and firm performance, as female directors tend to strengthen monitoring mechanisms and reduce the likelihood of decisions that deviate from shareholder interests. Therefore, based on the agency theory perspective, the following hypothesis is proposed:

**H<sub>1</sub>:** Gender diversity on the board of directors has a significant positive effect on the firm's financial performance.

From the perspective of agency theory, the board of directors bears the responsibility to oversee management performance in order to protect shareholders' interests and minimize potential conflicts of interest between managers (agents) and owners (principals). Age diversity among board members is an essential factor in enhancing the quality of oversight and decision-making. Variations in age introduce differences in experience, skills, and perspectives, thereby reducing the risk of decisions that disproportionately favor management (Janahi et al., 2022; Neukirchen et al., 2022; Putri et al., 2021). Younger board members are generally more open to innovation and new ideas, which can stimulate corporate growth. Conversely, older members tend to bring

wisdom and prudence, essential for ensuring organizational stability over the long term (Lubis et al., 2022; Tan & Taufik, 2022). Consequently, age diversity helps maintain a balance between innovation and caution in decision-making, leading to better corporate performance. Therefore, based on the agency theory framework, the following hypothesis is proposed:

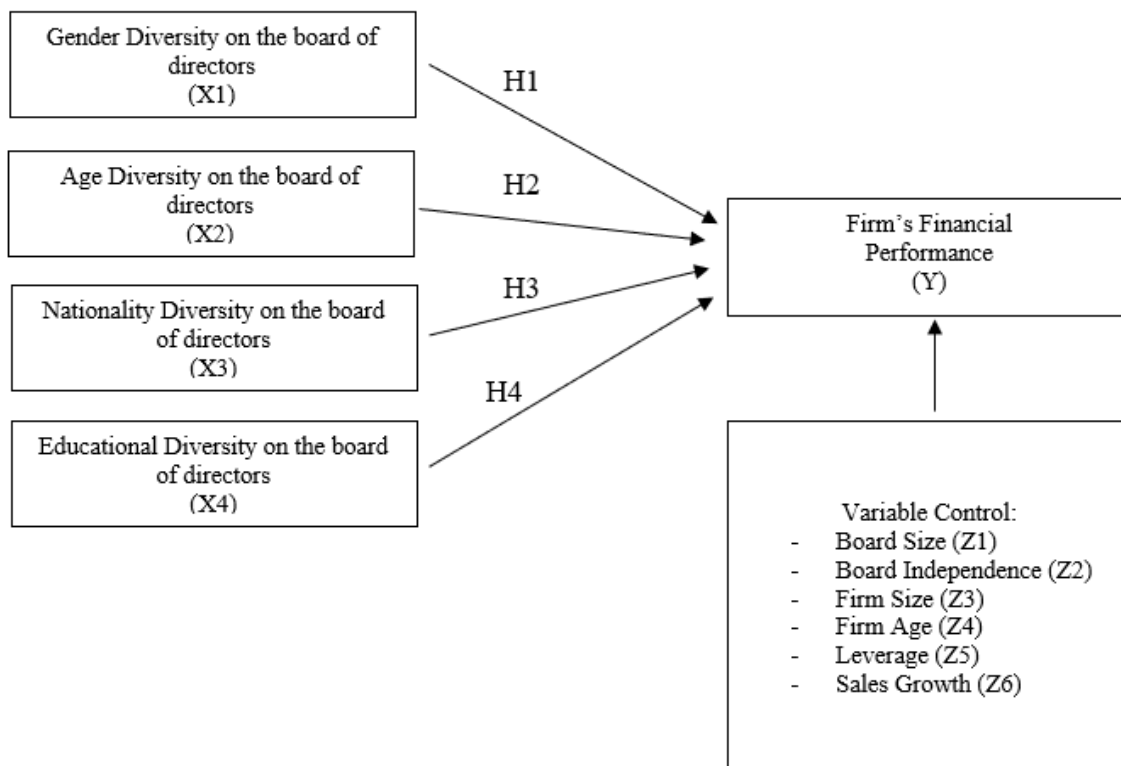
**H<sub>2</sub>:** Age diversity on the board of directors has a significant positive effect on the firm's financial performance.

Members of the board are expected to possess the credibility, skills, and experience required to make independent judgments concerning strategic, performance-related, and resource allocation issues (Lubis et al., 2022). Within the context of agency theory, nationality diversity is considered vital, as it enhances the board's capacity to monitor management effectively and reduces the potential for conflicts of interest between shareholders (principals) and managers (agents). Nationality diversity allows the board to incorporate varied perspectives and a deeper understanding of global markets, customer dynamics, and emerging business opportunities. Empirical evidence by Dodd & Zheng (2022), Roika et al. (2019), and Khan et al (2023) reveals that boards composed of members from diverse national backgrounds gain broader access to valuable resources. Such boards are better equipped to comprehend diverse market segments, as each member contributes unique experiences and cultural insights. This finding aligns with Lubis et al. (2022) and Chen, et al. (2024) who argue that a diverse board offers a wider range of knowledge and skills beneficial to corporate governance. Accordingly, nationality diversity not only enriches business perspectives but also contributes to improved financial performance. Hence, based on agency theory, the following hypothesis is proposed:

**H<sub>3</sub>:** Nationality diversity on the board of directors has a significant positive effect on the firm's financial performance.

Within agency theory, which emphasizes the relationship between shareholders (principals) and management (agents), educational background diversity among board members is regarded as a crucial factor in enhancing oversight and decision-making. The theory posits that directors must monitor and evaluate managerial actions to safeguard shareholder interests. In this regard, board members with diverse educational backgrounds, particularly in business, finance, and economics, are better equipped to formulate strategic policies and assess corporate performance effectively (Lubis et al., 2022; Odero & Egessa, 2023). Although empirical research on educational background remains relatively limited compared to other diversity dimensions, previous scholars have acknowledged its importance in influencing organizational outcomes. Not all board members possess formal academic training in economics or business; however, both formal and informal education can provide critical knowledge and analytical capabilities that strengthen governance quality and strategic insight. Given the board's responsibility to oversee management on behalf of shareholders, it is essential that board members possess sufficient education and qualifications to ensure that shareholders' investments are protected. Empirical evidence also indicates a positive relationship between the presence of highly educated board members, particularly those holding doctoral qualifications, and firm performance (Kha et al., 2023; Kabara et al, 2022; Lubis et al., 2022; Tuo et al., 2025). Therefore, in line with the agency theory perspective, the following hypothesis is proposed:

**H<sub>4</sub>:** Educational background diversity on the board of directors has a significant positive effect on the firm's financial performance.



**Figure 1.** Conceptual Framework  
Source: Developed by authors, 2025.

## RESEARCH METHOD

### Research Design and Approach

This study employs a quantitative approach, focusing on the analysis of numerical data through statistical processing (Mustakini, 2021). The quantitative method was selected because it allows for the objective measurement of relationships among variables and enables empirical testing (Savitri et al., 2021). The primary objective of this approach is to examine hypotheses based on statistically analyzed data (Sugiyanto, 2022).

The research design adopts a causal-comparative approach, which seeks to identify cause-and-effect relationships between independent and dependent variables (Sugiyanto et al., 2022). Specifically, the study investigates the effect of gender, age, nationality, and educational diversity within the board of directors on corporate performance.

An empirical research strategy was employed using secondary data, referring to historical information already available to the public (Ghozali, 2020). The quantitative data were obtained from the annual financial reports of manufacturing companies listed on the Bursa Efek Indonesia (IDX) for the period 2020–2023. Secondary data are widely used in capital market and financial studies because they offer broad coverage and allow for robust statistical testing (Gujarati & Porter, 2013). The analysis was conducted using multiple linear regression, which enables simultaneous measurement of the relationships between independent and dependent variables (Savitri et al., 2021).

## Population and Sampling

The population of this study comprises 171 manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the 2020–2023 period. A purposive sampling technique was employed to obtain firms that met the research criteria. Initially, all manufacturing companies listed on the IDX were identified as the study population. Subsequently, companies that did not consistently publish complete financial statements and annual reports throughout the observation period were excluded from the sample. After applying these criteria, 116 companies were selected as the final research sample, resulting in 464 firm-year observations during the 2020–2023 period.

## Operational Definitions and Measurement of Variables

### Dependent Variable (Y): Financial Performance

Corporate financial performance is proxied by Return on Assets (ROA), which measures management's ability to utilize total assets to generate net profit. A higher ROA reflects managerial efficiency and effectiveness in achieving corporate goals and delivering greater returns to investors (Tania & Hesniati, 2022).

$$ROA = \frac{Net\ Income}{Total\ Asset}$$

### Independent Variables

#### Gender Diversity

Measured by the proportion of female directors on the board. The presence of women is believed to bring diverse perspectives, enhance corporate reputation, and encourage more prudent decision-making (Birindelli et al., 2019; Serly et al., 2024).

$$Gender\ Diversity = \frac{Number\ of\ Female\ Directors}{Total\ Number\ of\ Directors}$$

#### Age Diversity

The variation in directors' ages affects their perspectives and decision-making tendencies. Members aged over 40 are assumed to contribute experience, while younger members introduce innovative ideas (Safitri et al., 2024; Serly et al., 2024; Egbunike et al., 2023).

$$Age\ Diversity = \frac{Number\ of\ Directors\ Aged\ >\ 40}{Total\ Number\ of\ Directors}$$

#### Nationality Diversity

Refers to the presence of foreign nationals on the board, which may enrich business perspectives and enhance the firm's international credibility (Roika et al., 2019; Lubis et al., 2022).

$$Nationality\ Diversity = \frac{Number\ of\ Foreign\ Directors}{Total\ Number\ of\ Directors}$$

## **Educational Background Diversity**

Refers to the proportion of board members with educational backgrounds in economics or business, which supports more strategic and data-driven decision-making (Lubis et al., 2022; Egbunike et al., 2023; Brahma et al., 2021).

$$\text{Educational Diversity} = \frac{\text{Number of Directors with Business Backgrounds}}{\text{Total Number of Directors}}$$

## **Control Variables**

To improve the accuracy of estimation, several control variables were included in this study. Board Size (BSIZE) was measured by the total number of directors, as larger boards are expected to enhance managerial supervision and strengthen monitoring effectiveness (Egbunike et al., 2023; Salami et al., 2020). Board Independence (IND) was represented by the proportion of independent commissioners, who are expected to limit managerial opportunism and promote better corporate governance practices (Rahma & Mawardi, 2023; Kusumastuti et al., 2021; Rubino & Napoli, 2020). Firm Size (FSIZE) was proxied by the natural logarithm of total assets, since larger firms generally receive greater scrutiny from regulators and the public, which may encourage higher performance standards (Mabruroh & Anwar, 2022; Tiara & Jayanti, 2022). Firm Age (FAGE) was calculated as the difference between the reporting year and the establishment year, reflecting operational experience and organizational maturity that may influence firm performance (Brahma et al., 2021; Lestari, 2021). Leverage (FLEV) was measured using the ratio of total debt to total assets, as higher leverage may increase agency costs and financial risk, potentially affecting firm performance negatively (Serly et al., 2024). Sales Growth (SG) was calculated as the annual percentage increase in sales relative to the previous year and was included because firms with higher sales growth are generally expected to demonstrate stronger business performance and market expansion potential (Egbunike et al., 2023).

## **Data Analysis Technique**

The study utilizes panel data regression analysis with the aid of EViews software. Panel data regression combines both cross-sectional and time-series characteristics, providing several advantages, including increased degrees of freedom, reduced estimation bias, and mitigation of omitted variable problems (Savitri et al., 2021). The data analysis process was conducted through several stages. Initially, descriptive statistical analysis was performed to describe the characteristics and distribution of the research variables. Subsequently, classical assumption tests were conducted to ensure the validity and reliability of the regression model (Basuki & Yuliadi, 2014; Napitupulu et al., 2021). The multicollinearity test was applied to identify potential high correlations among independent variables that could distort regression estimates, while the heteroskedasticity test was employed to verify the homogeneity of residual variance and ensure consistent and unbiased estimations.

After the classical assumption tests were satisfied, panel regression analysis was conducted using three alternative model specifications, namely the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM). The Common Effect Model assumes a homogeneous data structure across observations, the Fixed Effect Model accounts for individual-specific characteristics that may influence the

dependent variable, and the Random Effect Model treats individual differences as part of the error term. To determine the most appropriate regression model, model selection tests were subsequently performed. The Chow test was used to compare the suitability between the Common Effect Model and the Fixed Effect Model, the Hausman test was applied to determine whether the Fixed Effect Model or Random Effect Model was more appropriate, and the Lagrange Multiplier (LM) test was employed to compare the Common Effect Model and Random Effect Model. Based on the results of these tests, the most suitable panel regression model was selected for hypothesis testing and interpretation.

### Hypothesis Testing

Hypothesis testing was conducted using the partial t-test at significance levels of 1%, 5%, and 10%. A hypothesis is accepted if  $t\text{-statistic} > t\text{-table}$  or  $p\text{-value} < \alpha$  (Ghozali & Ratmono, 2020).

The econometric model used to examine the effect of board diversity variables on firm financial performance is expressed as follows:

$$ROA_{i;t} = \alpha_0 + \beta_1 KG_{i;t} + \beta_2 KU_{i;t} + \beta_3 KK_{i;t} + \beta_4 KP_{i;t} + \beta_5 BSIZE_{i;t} + \beta_6 INDI_{i;t} + \beta_7 FSIZE_{i;t} + \beta_8 FAGE_{i;t} + \beta_9 FLEV_{i;t} + \beta_{10} SGI_{i;t} + \epsilon_{i;t}$$

A 5% significance level was selected as the optimal threshold, balancing the risks of Type I and Type II errors. This level is widely accepted in social, economic, and business research (Gujarati & Porter, 2013). The 1% threshold is considered too stringent, whereas 10% is relatively lenient. With 464 observations, the 5% level provides an appropriate balance between statistical power and research credibility.

## RESULTS AND DISCUSSION

This study empirically examines the effect of board diversity on the financial performance of firms. The population comprises 171 manufacturing companies listed on the Bursa Efek Indonesia (IDX) during the period 2020–2023. Using purposive sampling, 116 companies that met the specified criteria were selected as the research sample, namely, manufacturing firms listed on the IDX that consistently published complete financial statements during the observation period. Accordingly, the final dataset consisted of 464 firm-year observations.

**Table 1.** Descriptive Statistics Result

	Y	X1	X2	X3	X4	Z1	Z2	Z3	Z4	Z5	Z6
Mean	0.035 582	0.127 787	0.914 246	0.142 608	0.566 767	4.698 276	0.391 789	22.68 446	20.43 966	0.514 978	0.032 629
Median	0.040 000	0.000 000	1.000 000	0.000 000	0.600 000	4.000 000	0.330 000	22.40 000	25.50 000	0.420 000	0.030 000
Max	0.940 000	0.750 000	1.000 000	1.000 000	1.000 000	15.00 000	2.000 000	31.51 000	46.00 000	5.520 000	1.940 000
Min	- 1.050 000	0.000 000	0.000 000	0.000 000	0.000 000	2.000 000	0.000 000	11.91 000	0.000 000	0.000 000	- 1.000 000
Std.Dev	0.122 795	0.176 823	0.176 333	0.243 787	0.268 901	2.180 692	0.214 632	5.486 928	12.20 897	0.569 617	0.290 163
Skwnss	- 1.160 527	1.197 546	- 2.469 753	1.569 816	- 0.229 085	1.364 777	2.463 382	- 0.170 785	- 0.239 490	5.890 009	0.330 392
Kurtosis	25.15 838	3.461 837	9.808 776	4.260 881	2.532 532	5.775 951	17.42 040	1.504 243	1.620 429	45.72 492	9.030 716

	Y	X1	X2	X3	X4	Z1	Z2	Z3	Z4	Z5	Z6
Jarque-Bera	9596.702	115.0286	1367.991	221.3108	8.283293	293.0230	4489.602	45.50989	41.23099	37974.29	711.5859
Probability	0.000000	0.000000	0.000000	0.000000	0.015897	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
Sum	16.51000	59.29333	424.2100	66.17000	262.9800	2180.000	181.7900	10525.59	9484.000	238.9500	15.14000
Sum Sq. Dev.	6.981443	14.47637	14.39614	27.51714	33.47855	2201.759	21.32902	13939.25	69014.31	150.2266	38.98219
Observations	464	464	464	464	464	464	464	464	464	464	464

**Source:** Data Processing Results with Eviews 12, 2025.

Based on the descriptive analysis presented in Table 1, the Return on Assets (ROA) variable recorded a minimum value of  $-1.05$  and a maximum value of  $0.94$ , with a mean of  $0.035$  and a standard deviation of  $0.122$ . The standard deviation exceeding the mean indicates relatively high variability in firms' profitability levels. Gender diversity within the board of directors ranged from  $0$  to  $0.75$ , with a mean value of  $0.127$  and a standard deviation of  $0.176$ , reflecting substantial variation among firms. Conversely, age diversity ranged from  $0$  to  $1.00$ , with a mean of  $0.914$  and a standard deviation of  $0.176$ —suggesting a relatively homogeneous distribution. Nationality diversity varied between  $0$  and  $1.00$ , with a mean of  $0.142$  and a standard deviation of  $0.243$ , indicating moderate variability. Educational diversity exhibited the lowest dispersion, ranging from  $0.03$  to  $1.85$ , with a mean of  $0.4412$  and a standard deviation of  $0.2239$ , suggesting a relatively uniform distribution across firms.

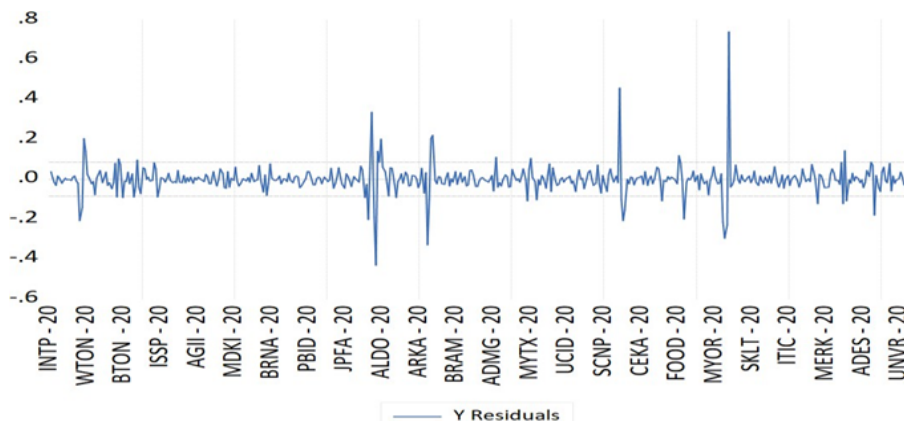
For the control variables, board size ranged from  $2$  to  $15$  members (mean =  $4.69$ ; SD =  $2.18$ ), implying a relatively consistent board composition across firms. Board independence ranged between  $0$  and  $1.00$  (mean =  $0.142$ ; SD =  $0.243$ ), indicating moderate variation. Firm size (log of total assets) ranged from  $11.91$  to  $31.51$ , with a mean of  $22.68$  and SD of  $5.48$ , showing relatively homogeneous firm scales. Firm age ranged from  $0$  to  $46$  years (mean =  $20.43$ ; SD =  $12.20$ ), while leverage exhibited greater variability (min =  $0$ ; max =  $5.52$ ; mean =  $0.51$ ; SD =  $0.56$ ). Lastly, sales growth ranged from  $-1.00$  to  $1.94$  (mean =  $0.03$ ; SD =  $0.29$ ), indicating that revenue expansion varied considerably among firms.

**Table 2.** Multicollinearity Test Results

	X1	X2	X3	X4	Z1	Z2	Z3	Z4	Z5	Z6
X1	1.000000	-0.137823	-0.079534	0.084344	0.046398	-0.058465	0.033114	0.080839	-0.096178	-0.005743
X2	-0.137823	1.000000	0.068560	-0.094733	0.148646	-0.044754	-0.071061	0.131630	0.002997	0.016709
X3	-0.079534	0.068560	1.000000	-0.165591	0.264217	-0.050687	-0.291960	0.258382	0.062868	0.019435
X4	0.084344	-0.094733	-0.165591	1.000000	-0.112128	0.171169	0.101578	-0.096354	-0.133796	0.047200
Z1	0.046398	0.148646	0.264217	-0.112128	1.000000	-0.302113	-0.158247	0.166591	-0.031060	0.055290
Z2	-0.058465	-0.044754	-0.050687	0.171169	-0.302113	1.000000	-0.153478	-0.063304	0.037233	-0.029800
Z3	0.033114	-0.071061	-0.291960	0.101578	-0.158247	-0.153478	1.000000	-0.225094	-0.088398	0.030707
Z4	0.080839	0.131630	0.258382	-0.096354	0.166591	-0.063304	-0.225094	1.000000	0.079218	-0.084078
Z5	-0.096178	0.002997	0.062868	-0.133796	-0.031060	0.037233	-0.088398	0.079218	1.000000	-0.179022
Z6	-0.005743	0.016709	0.019435	0.047200	0.055290	-0.029800	0.030707	-0.084078	-0.179022	1.000000

**Source:** Data Processing Results with Eviews 12, 2025.

The multicollinearity test results in Table 2 indicate no serious multicollinearity among the independent variables, as none of the pairwise correlation coefficients exceeded the threshold value of 0.85. This finding confirms that the regression model is free from multicollinearity issues (Napitupulu et al., 2021).



**Figure 2.** Heteroscedasticity Test Results.  
 Source: Data Processing Results with Eviews 12, 2025.

Meanwhile, the heteroskedasticity test results (Figure 2) reveal that the residual variance was constant, as evidenced by the residual plot (blue line) remaining within the range of  $\pm 500$ . Hence, the data passed the heteroskedasticity test, indicating homoscedastic residuals and validating the model assumptions (Napitupulu et al., 2021).

**Table 3.** Fixed Effect Model (FEM) Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.104412	0.153120	-0.681899	0.4958
X1	0.152971	0.065316	2.342029	0.0198
X2	-0.027306	0.057856	-0.471974	0.6372
X3	0.017780	0.068851	0.258234	0.7964
X4	-0.042778	0.035271	-1.212834	0.2260
Z1	-0.008708	0.007248	-1.201369	0.2304
Z2	-0.023952	0.043240	-0.553937	0.5800
Z3	-0.003682	0.004835	-0.761542	0.4469
Z4	0.011810	0.003745	3.153038	0.0018
Z5	0.112579	0.039674	2.837567	0.0048
Z6	0.048585	0.016114	3.015135	0.0028
Effects Specification Cross-section fixed (dummy variables)				
R-squared	0.645167	Mean dependent var	0.035582	R-squared
Adjusted R-squared	0.513942	S.D. dependent var	0.122795	Adjusted R-squared
S.E. of regression	0.085610	Akaike info criterion	-1.851757	S.E. of regression
Sum squared resid	2.477245	Schwarz criterion	-0.727564	Sum squared resid
Log likelihood	555.6076	Hannan-Quinn criter.	-1.409233	Log likelihood
F-statistic	4.916489	Durbin-Watson stat	1.832007	F-statistic
Prob(F-statistic)	0.000000			Prob(F-statistic)

Source: Data Processing Results with Eviews 12, 2025.

The panel data regression using the Fixed Effects Model (FEM), identified as the most appropriate specification, was conducted on 116 firms over the 2020–2023 period (464 observations). The regression results indicate that variables X1, Z4, Z5, and Z6 exerted a positive and statistically significant effect on firm performance (Y), with coefficients of 0.152971, 0.011810, 0.112579, and 0.048585, respectively. In contrast, variables X2, X3, X4, Z1, Z2, and Z3 were found to be statistically insignificant ( $p$ -value > 0.05). The constant (C) was also insignificant and served merely as a baseline in the regression equation. These findings confirm that gender diversity (X1), along with firm age (Z4), firm leverage (Z5), and sales growth (Z6), play a crucial role in explaining variations in firms' financial performance.

**Table 4.** Hypothesis Testing Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Decision
C	-0.104412	0.153120	-0.681899	0.4958	-
X1	0.152971	0.065316	2.342029	0.0198	Accepted
X2	-0.027306	0.057856	-0.471974	0.6372	Rejected
X3	0.017780	0.068851	0.258234	0.7964	Rejected
X4	-0.042778	0.035271	-1.212834	0.2260	Rejected
Z1	-0.008708	0.007248	-1.201369	0.2304	-
Z2	-0.023952	0.043240	-0.553937	0.5800	-
Z3	-0.003682	0.004835	-0.761542	0.4469	-
Z4	0.011810	0.003745	3.153038	0.0018	-
Z5	0.112579	0.039674	2.837567	0.0048	-
Z6	0.048585	0.016114	3.015135	0.0028	-

**Source:** Data Processing Results with Eviews 12, 2025.

The first hypothesis test demonstrates that gender diversity on the board of directors positively influences the financial performance of manufacturing companies listed on the Bursa Efek Indonesia (IDX) during the 2020–2023 period. The four firms with the highest gender diversity: PT Multi Bintang Indonesia Tbk, PT Nippon Indosari Corpindo Tbk, PT Tempo Scan Pacific Tbk, and PT Unilever Indonesia Tbk, had an average financial performance (ROA) of 0.145, higher than that of companies without female board members (0.033). This result aligns with agency theory, which posits that diverse boards enhance the effectiveness of supervision, innovation, and inclusivity, ultimately driving firm performance. The results of this study are in line with several recent studies published in reputable international journals. Areneke et al. (2023) found that female board representation strengthens monitoring effectiveness and contributes positively to firm value and sustainability practices. Similarly, Chatterjee and Nag (2022) reported that gender-diverse boards improve strategic decision-making quality and corporate financial performance. Rahman and Zahid (2021) also demonstrated that the presence of women directors is associated with stronger governance oversight and reduced agency problems. Furthermore, recent evidence from Egbunike et al. (2023) suggests that gender diversity contributes positively to profitability by enhancing board independence and managerial accountability. Consistent findings were also reported by Alhosani and Nobanee (2023), who emphasized that female directors tend to promote greater transparency and stakeholder-oriented governance practices, which ultimately support long-term financial performance.

The control variables further support this finding. Firms with greater gender diversity showed higher firm age (25 years vs. 20 years), reflecting better organizational maturity; lower leverage (0.41 vs. 0.51), indicating healthier capital structures and better-controlled financial risk; and higher sales growth (0.06 vs. 0.03), demonstrating more adaptive and innovative marketing and operational strategies. Overall, gender diversity, together with

firm age, leverage, and sales growth, contributed positively to the financial performance of Indonesian manufacturing firms during the study period.

The second hypothesis test reveals that age diversity within the board of directors does not significantly affect the financial performance of manufacturing firms listed on the Indonesia Stock Exchange (IDX) during the 2020–2023 period. The findings indicate that firms with older directors and those with relatively younger directors demonstrated inconsistent financial performance, with some companies recording positive ROA while others experienced lower profitability. This suggests that age diversity alone may not be sufficient to directly influence firm performance. Although age diversity theoretically contributes to broader perspectives and balanced decision-making, the empirical evidence in this study indicates that differences in age among board members do not necessarily translate into more effective governance or improved financial outcomes. The findings of this study are consistent with several recent international studies reporting that age diversity does not significantly influence firm performance. Janahi et al. (2022) found that age heterogeneity within boards did not consistently improve corporate financial outcomes, as differences in generational perspectives may complicate strategic consensus. Similarly, Neukirchen et al. (2022) reported that age diversity has limited direct influence on profitability because board effectiveness depends more on governance quality and managerial competence than demographic composition alone. Comparable findings were also documented by Putri et al. (2021), who showed that age diversity may produce both positive and negative effects depending on organizational context and leadership dynamics.

Nevertheless, some control variables show significant relationships. Firms whose directors were on average older than 40 years had higher firm age (40 years vs. 20 years), indicating greater organizational maturity; lower leverage (0.01 vs. 0.53), implying a healthier capital structure and lower financial risk; and higher sales growth (1.94 vs. 0.05), indicating stronger capabilities in developing market-responsive marketing and operational strategies. Therefore, even though age diversity does not have a direct effect, factors such as firm age, leverage, and sales growth still contribute to corporate financial performance

The third hypothesis test indicates that nationality diversity on the board of directors does not significantly influence the financial performance of manufacturing firms listed on the Indonesia Stock Exchange (IDX) during the 2020–2023 period. The findings show that firms with foreign directors and those dominated by local directors experienced varying financial performance, with both positive and negative outcomes observed across the sample. This suggests that nationality diversity alone may not directly determine a firm's financial success. Although foreign directors may contribute international perspectives, global networks, and broader managerial experience, these advantages do not necessarily translate into improved profitability within the Indonesian manufacturing context. The findings of this study are consistent with several recent studies that reported insignificant relationships between nationality diversity and firm performance. Khan et al. (2023) found that the presence of foreign directors does not always improve financial performance because the effectiveness of board oversight depends more on governance quality and organizational integration than on nationality composition alone. Similarly, Dodd and Zheng (2022) suggested that foreign board representation may generate communication barriers and coordination difficulties that weaken decision-making efficiency. Comparable findings were also reported by Roika et al. (2019), who argued

that nationality diversity may not significantly affect profitability in firms operating primarily within domestic markets.

However, several control variables exhibited significant relationships. Firms with foreign directors had a higher average firm age (30 years vs. 20 years), indicating greater organizational maturity; lower leverage (0.07 vs. 3.5), suggesting a healthier capital structure and lower financial risk; and higher sales growth (0.24 vs. -0.1), reflecting more innovative and adaptive operational strategies. Thus, although nationality diversity does not have a direct effect, related factors such as firm age, leverage, and sales growth still contribute to firm performance.

The fourth hypothesis test aims to analyze the influence of educational diversity among board members on firm performance. The findings show that companies with directors experienced in economics or business and those without such backgrounds both displayed mixed financial performance, with positive ROA values (0.19; 0.22; 0.25; 0.20; 0.15) and negative ones (-0.07; -0.09; -0.25; -0.30; -0.10). These results suggest that educational diversity within the board of directors does not significantly affect the financial performance of manufacturing firms listed on the Indonesia Stock Exchange (IDX) during 2020–2023. Accordingly, the findings do not support agency theory, which argues that board diversity enhances monitoring effectiveness, decision-making quality, innovation, and inclusive governance practices that ultimately improve corporate performance. The findings of this study are consistent with several previous studies reporting insignificant effects of educational diversity on firm performance. Odero and Egessa (2023) found that educational background diversity does not necessarily improve profitability because governance effectiveness depends more on managerial competence and organizational processes than academic qualifications alone. Similarly, Lubis et al. (2022) suggested that the impact of educational diversity may vary depending on industry characteristics and corporate governance practices.

However, these findings differ from several prior studies that documented positive relationships between educational background and firm performance. Kha et al. (2023) found that highly educated directors contribute to stronger strategic analysis and governance quality, thereby improving firm performance. Likewise, Kabara et al. (2022) and Tuo et al. (2025) reported that boards with advanced educational qualifications, particularly doctoral degrees, tend to demonstrate better monitoring effectiveness and financial outcomes. The inconsistency among these findings indicates that the influence of educational diversity on firm performance remains context-dependent and may be affected by other factors such as managerial experience, organizational culture, industry dynamics, and the effectiveness of board collaboration.

Some control variables, however, exhibited significant relationships with firm performance. Firms whose directors had economics or business experience had higher firm age (25 years vs. 20 years), suggesting more stable structures and strategies; lower leverage (0.03 vs. 3.3), implying healthier capital structures and lower financial risk; and more positive sales growth (0.7 vs. -0.1), indicating that diversity fosters innovative and market-responsive operational strategies that support revenue growth.

Overall, the findings of this study provide important insights into the role of board diversity in responding to the economic and governance challenges highlighted in the introduction. During the 2020–2023 period, Indonesian manufacturing firms operated under conditions of heightened uncertainty caused by the COVID-19 pandemic, global

inflation, supply chain disruptions, and the Russia–Ukraine war, all of which pressured corporate profitability and operational stability. At the same time, the emergence of major corruption cases involving corporate executives in Indonesia highlighted weaknesses in internal governance and monitoring mechanisms. In this context, the implementation of Good Corporate Governance (GCG) through effective board structures became increasingly important for maintaining corporate resilience and stakeholder trust.

The findings indicate that among the four dimensions of board diversity examined, only gender diversity demonstrated a significant positive influence on firm financial performance. This suggests that female board representation may strengthen governance quality, improve managerial accountability, and support more transparent and stakeholder-oriented decision-making during periods of economic uncertainty. The results therefore support the argument that gender-diverse boards can contribute to stronger corporate resilience and more adaptive strategic responses in challenging business environments. This finding is also relevant to the increasing emphasis on gender equality and sustainable finance promoted through Otoritas Jasa Keuangan Regulation No. 51/POJK.03/2017.

In contrast, age, nationality, and educational diversity did not show significant direct effects on financial performance. These findings imply that demographic diversity alone may not automatically improve corporate outcomes unless supported by effective governance systems, organizational integration, and managerial competence. In the Indonesian manufacturing sector, operational experience, financial stability, and market adaptability appear to play more substantial roles in determining firm performance than demographic composition alone. This may explain why several firms with diverse boards still experienced inconsistent profitability during the observation period. Furthermore, the results reflect the unique characteristics of the Indonesian corporate environment, where governance effectiveness may depend more heavily on institutional quality, board collaboration, and strategic execution than on diversity attributes alone. Although nationality and educational diversity theoretically provide broader knowledge, international perspectives, and analytical capabilities, their benefits may be limited when firms face challenges related to organizational coordination, cultural adaptation, and external economic pressure. Therefore, the study suggests that board diversity should not merely be viewed as symbolic representation, but rather as part of a broader governance strategy aimed at strengthening accountability, improving decision-making quality, and enhancing corporate adaptability in uncertain economic conditions.

## **CONCLUSSION**

This study concludes that gender diversity within the board of directors has a positive influence on the financial performance of manufacturing firms during the 2020–2023 period. The findings indicate that increasing female representation at the board level can contribute to improved corporate performance. Conversely, age, nationality, and educational diversity on the board do not exhibit any significant effect on financial performance. This suggests that changes in these dimensions of diversity do not necessarily lead to immediate positive outcomes for firm performance, at least within the scope of this study's sample.

The implications of these findings are twofold. For investors, gender diversity in the board of directors can be considered an important indicator in investment decision-making, given its demonstrated positive relationship with firm performance. For corporations, policies that promote female representation in leadership positions may serve as an effective strategy to enhance financial outcomes. Although age, nationality, and educational diversity did not show a direct impact, effectively managing these aspects remains essential to building an inclusive and innovative organizational environment, which could yield long-term benefits for corporate sustainability and competitiveness.

The contribution of this study lies in providing empirical evidence on the relationship between board diversity and firm financial performance, specifically within Indonesia's manufacturing sector. Nevertheless, this study has certain limitations, as it focuses solely on one sector and thus cannot be generalized to other industries or regions. Future research may expand the dataset to include multiple sectors or countries, enabling cross-industry and cross-country comparisons. Furthermore, other dimensions of diversity such as board tenure, leadership style, and cultural background should be explored to gain a more comprehensive understanding of how diversity influences corporate financial performance.

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