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Driving Sustainability: The Role of Managerial Ability and Board Characteristics with Green CEO as a Moderator

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ABSTRACT

This study aims to examine and analyze the impact of managerial ability and the roles of the Board of Directors (BOD) on sustainability performance, with a focus on green CEO as a moderating variable. The BOD roles include an educational background in accounting and foreign experience, with an emphasis on companies in Indonesia. This study employs secondary data from the Indonesia Stock Exchange (IDX), with a sample of 39 manufacturing companies from 2018 to 2022. Data analysis was conducted using Eviews 12. The findings reveal that managerial ability and directors with foreign experience significantly enhance sustainability performance, with the green CEO strengthening the positive effect of managerial ability on sustainability performance. However, directors with an accounting education background show no significant effect. This study acknowledges several limitations. First, while our sample includes multiple sectors to enhance generalizability, regional differences within Indonesia still pose challenges. Second, the complex interaction between managerial abilities, BOD roles, and the green CEO requires careful analysis to avoid confounding effects. This study introduces green CEO as a moderating factor in the relationship between managerial ability and sustainability performance, a novel approach that has received limited attention in prior research. Exploring how environmentally oriented leadership influences sustainability strategies adds a fresh dimension to the literature.

Keywords: Managerial ability; sustainability performance; board characteristic; green CEO; Indonesia.

INTRODUCTION

The continued activities of businesses can have a significant impact on society [19]002C[36]. Increasing awareness of the environmental and social impacts of business activities—such as the misuse of natural resources, labor rights violations, and the exacerbation of poverty—has led to growing demands from multiple stakeholders [40],[39]. Governments, communities, and competitors are advocating the implementation of sustainable development practices [8]. This growing pressure provides sufficient justification for stakeholders to demand increased corporate accountability, particularly in the area of sustainability [15]. Furthermore, [67] emphasizes that this change serves as the primary catalyst for the industry's transition to a sustainability-centric focus.

To adapt to these evolving demands, companies are now expected to issue Sustainability Reports, which provide standardized frameworks to ensure transparency and foster open communication with stakeholders. A key purpose of this report is to assess the company's sustainability performance. In addition, such disclosures serve as strategic tools to protect and enhance a company's reputation [52]. Demonstrating strong sustainability performance can significantly enhance a company's image and brand value, which is crucial for attracting and retaining customers in increasingly competitive international markets [68]. In addition, disclosing sustainability information allows market participants and auditors to better understand the overall performance of the company, thereby improving financial transparency [33],[25].

Building on the growing importance of sustainability reporting and performance, this study examines the role of managerial capability and board characteristics in influencing corporate sustainability outcomes. Managerial ability encompasses the essential skills, knowledge, and experience that enable managers to allocate resources effectively and make innovative decisions in addressing various business challenges, including those related to sustainability [40]. By strategically managing economic, social, and environmental factors, managers can improve overall business performance while demonstrating responsibility for broader societal goals [50]. In this context, business leaders are increasingly recognized as key drivers in the successful implementation of sustainability strategies

[71], especially as sustainability expertise and commitment to environmental issues become more central to modern management structures [22].

Leaders at the executive level also play a critical role in advancing corporate sustainability agendas. In particular, green CEOs—leaders who prioritize environmental responsibility—tend to view sustainability not as a mere compliance obligation but as a strategic, long-term investment that can enhance competitive advantage [50],[63]. These leaders actively integrate sustainability into core business strategies and treat it as a valuable organizational asset. Green CEOs can significantly enhance the sustainability performance of their companies by combining high managerial ability with a strong environmental orientation [54]. This combination generates substantial value for stakeholders and enhances the company's competitive edge. Strategic decision-making and operational execution within organizations are thus profoundly shaped by the personal characteristics and values of their top executives, including their managerial expertise and commitment to sustainability goals [22].

In addition to executive leadership, the composition and skills of the board of directors (BOD) are also critical in guiding companies toward sustainable development [23]. BOD members with a background in accounting bring specialized skills in financial analysis and budget management that support the efficient allocation of resources to achieve long-term sustainability goals [26]. Their solid understtianding of financial complexities enables them to contribute meaningfully to the development of sound financial strategies that underpin sustainable practices. Similarly, directors with foreign experience (DFE), particularly those with exposure to international markets, bring a broader global perspective. They are more adept at adopting and implementing international sustainability standards and incorporating best practices from different markets into the company's operations [12],[37]. This global insight enables companies to better meet international sustainability expectations, thereby increasing their competitive advantage. Consistent with stakeholder theory, the role of the board is critical in aligning corporate strategies with stakeholder interests, fostering a stronger reputation, and promoting sustainable long-term success [17].

Despite the growing body of research on managerial ability, board composition, and sustainability performance, important gaps remain. Much of the existing literature focuses on developed economies [3], limiting the broader applicability of its conclusions. Moreover, the role of green CEOs as a potential moderator in the relationship between managerial capability and sustainability outcomes has received limited empirical attention. To address these gaps, this study introduces several novel elements by examining multi-sector data in the Indonesian context—an emerging economy where sustainability concerns are increasingly prominent. By incorporating green CEO leadership as a moderating factor and considering board characteristics such as accounting education and foreign experience, this study aims to enrich the understanding of leadership profiles and their influence on corporate sustainability performance.

The main objective of this study is to determine how managerial capabilities influence sustainability performance in Indonesian firms. In addition, this study also examines whether the presence of a green CEO—defined as a CEO who has a pro-environmental orientation—strengthens or weakens this influence. Finally, this study examines the impact of accounting education and the CEO's accounting education and international experience on sustainability performance.

Literature Review

In examining the factors that influence sustainability performance, it is critical to consider the role of individual leaders, as leadership characteristics often shape organizational outcomes. To frame this relationship, this study adopts the upper echelon theory as its theoretical foundation. This theory is particularly relevant because it emphasizes how the personal characteristics of leaders, such as their experiences, values, and educational backgrounds, significantly influence the strategic choices and directions taken by organizations.

The upper echelon theory proposes that a firm often reflects the personality and characteristics of its top executives, with these characteristics strongly influencing the strategic decisions made within the organization [29]. Building on this notion, it emphasizes that the behavioral characteristics of top executives play a critical role in shaping both organizational strategies and decision-making processes [50]. Numerous studies have supported this perspective, showing that influential leaders significantly drive corporate engagement in socially responsible and sustainable initiatives [20]. Consequently, understanding the backgrounds, values, and experiences of leaders is critical, as these elements guide strategic directions and determine how companies interact with their broader social and economic environments [21]. Recognizing the personal characteristics of top executives thus enables researchers and stakeholders to better predict and interpret organizational behavior and policy.

Extending the upper echelon theory, [29] further argues that an executive's educational background significantly influences a firm's strategic orientation, performance outcomes, and overall business direction. In line with this, [77] emphasizes that the educational attainment of executives shapes strategic decision making, which ultimately affects firm performance. In support of these assertions, [57] found that firms with independent directors who have accounting or financial expertise tend to have higher profitability than those without such expertise. Similarly, [13] reinforces these findings by showing that financial expertise among board members can lead to stronger firm performance. In addition, research by [1] shows a positive relationship between a board's accounting expertise and the transparency of a firm's financial disclosures, suggesting that directors' professional qualifications, particularly in accounting and finance, contribute significantly to the quality and credibility of a firm's financial reporting.

The Relationship between Managerial Ability and Sustainability Performance

The evaluation of corporate performance has shifted from profitability alone to sustainability as a critical element of long-term success [50]. Recent studies highlight that environmental, social, and governance (ESG) activities have become central to corporate strategy, signaling a broader commitment to social and environmental responsibility [76],[31]. SG practices add value by strengthening relationships with employees and investors, thereby enhancing corporate reputation and stakeholder trust [70].

Corporate objectives increasingly integrate sustainability initiatives, contributing to value creation both now and in the future [7]. However, economic and regulatory barriers in developing countries can impede the impact of these efforts [78]. To address these challenges, companies are adopting strategies that address economic, environmental, and social goals to meet current needs while protecting resources for future generations [24], [4].

Managerial ability plays a critical role in achieving these long-term goals. As noted by [21], competent managers are better able to use resources efficiently and make strategic decisions that are aligned with sustainability goals. Their expertise influences operational efficiency and risk management. Empirical studies indicate that companies with highly competent managers tend to pursue innovative and sustainable solutions, thereby increasing their competitive advantage [58]. This is consistent with the upper echelon theory, which argues that the characteristics of top-level managers shape organizational outcomes. In this context, leadership capability reflects the influence of leaders on sustainability strategies and overall performance [40]. Therefore, enhancing leadership competence is a key component in building strong sustainability initiatives [74].

The findings of [34] state that managerial capabilities positively affect firm performance, particularly with respect to ESG disclosure. Managers with better capabilities not only increase firm profitability but also show greater commitment to sustainability practices [55]. They are able to allocate resources efficiently and identify opportunities to increase firm value, even under financial constraints [32]. This ability helps managers better assess ESG issues, develop strategies aligned with sustainability goals, and execute initiatives effectively [40]. With deep industry knowledge and insight, they can more accurately identify ESG risks and opportunities. This leads to more informed decision-making and stronger implementation of sustainability practices. In addition, trustworthy managers are better able to use voluntary disclosures and third-party assurance to build trust and legitimacy with stakeholders, thereby strengthening the company's sustainability performance [39]. Therefore, the following hypothesis is proposed:

H_1: Managerial ability has a positive and significant influence on sustainability performance.

The Relationship between Managerial Ability, Green CEO, and Sustainability Performance

A green CEO refers to a chief executive who places a high value on environmental sustainability, actively integrating it into the strategic direction and daily operations of the company [42]. Rather than simply complying with environmental regulations, these leaders proactively pursue innovative green technologies, advocate sustainable development, and integrate environmental priorities into the long-term vision of the company [54]. They see environmental and social challenges as strategic opportunities that can enhance the company's competitiveness and reputation. In Indonesia, this growing emphasis on environmentally responsible leadership is reflected in initiatives such as Warta Ekonomi's Green CEO Award, which recognises executives who demonstrate a strong commitment to environmental stewardship [11]. Such recognition underscores the growing importance of environmental leadership in shaping corporate behaviour and stakeholder expectations [50].

Research has shown that the presence of a green CEO can significantly improve a company's sustainability performance [50]. These leaders often prioritise long-term environmental goals over short-term financial gains, spearheading efforts in energy efficiency, waste reduction, circular economy practices, and stakeholder engagement [50]. In addition, green CEOs help to embed sustainability in organisational culture, encouraging employees at all levels to adopt it as a core value. By communicating a sustainability vision and aligning performance metrics with environmental goals, they ensure that corporate strategies and resources are focused on achieving meaningful environmental outcomes [50]. Their commitment is also reflected in tangible actions such as developing green products, implementing environmental management systems, and investing in clean technologies, which together improve the company's ESG performance and resilience in sustainability-driven markets [22].

According to the upper echelon theory [29], the values, experiences, and personal characteristics of top executives play a critical role in shaping organisational outcomes, including strategic priorities [53]. In this context, the green CEO serves as a moderating factor that channels managerial capabilities towards sustainability-focused goals. While capable managers can have a positive impact on organisational performance, the extent of their impact on sustainability depends heavily on the strategic direction set by the CEO. A green CEO provides the necessary vision and support, increasing the likelihood that managerial talent will be used to pursue sustainable innovations and practices [54]. On the other hand, in companies led by CEOs with low environmental concern, managerial talent may instead be directed towards efficiency or financial performance at the expense of sustainability outcomes.

The influence of a green CEO extends to shaping organisational values, culture, and strategic direction. As a facilitator, the Green CEO strengthens the link between managerial capability and sustainability performance by ensuring that managers are empowered to make decisions in line with environmental and social priorities. This involves establishing supportive structures such as performance incentives, resource allocation, and accountability mechanisms that favour sustainability [54]. Green CEOs also help to overcome institutional inertia by embedding sustainability in the organisation's identity, thereby legitimising and reinforcing managers' sustainable initiatives [71]. Conceptually, this means that the link between managerial capability and sustainability performance is significantly strengthened in the presence of a green CEO [50]. The following hypothesis is therefore proposed:

H_2: Green CEOs strengthen the positive effect of managerial ability on sustainability performance.

The Relationship between BOD with Accounting Education Background and Sustainability Performance

According to the Upper Echelon Theory, organizational outcomes are significantly influenced by the experience, values, and expertise of top executives, including members of the Board of Directors (BOD). In this context, directors with an accounting educational background bring critical knowledge in financial reporting, governance, and sustainability principles that can influence strategic decision-making and, ultimately, the company's sustainability performance. They are also in a position to develop strategies for the integration of economic, social, and environmental aspects of corporate performance [61],[59].

Research by [27] and [65] shows that directors with financial or accounting expertise are better able to balance short-term financial goals with long-term environmental and social goals. Their educational background equips them to understand the complexity of sustainability challenges and identify opportunities to integrate economic, social, and environmental considerations into the company's overall strategy [6] and [18].

Furthermore, research by [62] and [38] states that the presence of BOD with an accounting educational background improves the quality and transparency of sustainability disclosure. Their financial expertise allows them to view ESG issues not only as compliance but as a strategic tool to attract investors and build a strong corporate reputation [45]. This observation is supported by [66], who also state that when accounting principles are applied within a decentralized corporate structure, they can promote responsible resource management and strengthen sustainable practices. Therefore, the following hypothesis is proposed:

H_3: BOD who have an accounting education background have a significant positive effect on sustainability performance.

The Relationship between BOD with Foreign Experience and Sustainability Performance

The upper echelon theory asserts that the values, experiences, and cognitive frameworks of top leaders shape organizational outcomes. The international experience of directors plays a critical role in shaping corporate sustainability performance. Directors who have worked or studied abroad are exposed to different cultural, regulatory, and environmental contexts, enabling them to bring broader perspectives and adopt best practices from different regions and industries [12],[37].

This global exposure enables the board to better understand complex sustainability challenges and propose innovative solutions tailored to the context [64]. As emphasized by [35] and [14], this experience also enhances their ability to build stakeholder trust and reinforce the company's commitment to sustainable value creation, which is a critical asset in today's global business landscape. Their cross-cultural skills and awareness of global ESG trends enable them to integrate sustainability into the company's strategic agenda, balancing short-term pressures with long-term goals.

Empirical evidence from [35] and [79] supports the view that directors with international experience are better equipped to navigate dynamic market environments and respond proactively to evolving sustainability standards. In addition, research by [56] and [73] shows that these BODs provide critical knowledge of international regulations and stakeholder expectations, helping companies to anticipate risks and capitalize on sustainability opportunities. Consistent with the upper echelon framework, the diverse backgrounds and experiences of internationally exposed directors shape strategic decision-making in ways that enhance sustainability outcomes. Therefore, the following hypothesis is proposed:

H_4: BOD with overseas experience has a significant positive effect on sustainability performance.

RESEARCH METHOD

Sample and Data

The research methodology employed is quantitative research, which aims to quantify the population or sample [2]. The research is of an associative causality nature, as defined by [51], which involves analysing the relationship between one variable and another variable where there are elements of influence and influence. The sampling technique employed is purposive sampling, which considers a number of factors in order to obtain data that is more representative of the population under study [51].

This research uses secondary data collected and analyzed by third parties, including the Indonesia Stock Exchange and company websites, covering the period from 2018 to 2022. Out of 58 companies that consistently published sustainability reports over these five years, 39 were selected as the research sample. This selection was refined by excluding 4 companies that did not consistently apply the Global Reporting Initiative (GRI) standards and 15 financial sector companies, as the variable of managerial ability is less relevant to this sector. Consequently, the final sample comprises 39 companies that consistently publish sustainability reports, which are accessible to stakeholders and shareholders.

Measurement Variable

Dependent Variable

In accordance with the findings of [47] research, we also employ sustainability performance as the dependent variable. In particular, the sustainability performance is gauged by the ESG performance score. The ESG serves to quantify the extent to which the company in question demonstrates compliance with and impact on a range of economic, social, financial, and corporate governance factors. The data analyzed pertains to the GRI Standard disclosure. The GRI Standard comprises a comprehensive set of social, economic, and environmental indices. The measurement employs a rating system ranging from 1 to 5, according to the extent of disclosure. The resulting index will be used to calculate an ESG score according to the following formula:

$$\text{ESG Score} = \frac{\text{Total index of all GRI disclosures}}{\text{GRI total}}$$

Independent Variable

The first independent variable is managerial ability. Based on research from [50],[60], Managerial ability is measured by MA score. MA score can be calculated using the following formula:

$$\text{MA Score:} \quad \frac{\text{Sales}}{\text{COGS + SGA + PPE + Oplease + R\&D + GD + OtherInt.}}$$

Notes:
Sales: Total Sales in the current period
COGS: Total cost of goods sold
SGA: Total selling, general & administrative
PPE: Total property, plant & equity
OpLease: Operating lease, total income from rental of operating goods
R&D: Expenses incurred for research & development
GD: Goodwill
OtherInt.: Total other intangible assets

The second independent variable is the BOD who has a degree in accounting or finance. This variable is obtained by dividing the number of BOD who has this degree by the total number of board members [6].

$$\text{DAE} = \frac{\text{Number of Director with Accounting Education Background}}{\text{Total Board of Directors}}$$

The third independent variable is the directors with foreign experience. It is calculated from directors who have experience in training, work, and education abroad. The variable number is obtained by dividing the number of directors who have this experience by the total number directors [73].

$$\text{DFE} = \frac{\text{Number of Directors with Foreign Experience}}{\text{Total Board of Directors}}$$

Moderating Variable

The moderating variable used is the green CEO variable. According to [50], a company can be said to have a green CEO if if, in the current year, it receives an award from Warta Ekonomi magazine. The author considers that green CEO can also be measured through awards from the Ministry of Environment and Forestry. Green CEO is a dummy variable where the calculation is 2 and 1. Score 2 if the CEO receives an award as a green CEO in the period of the study year, and score 1 otherwise [50].

Control Variable

First, leverage measures how much a company uses debt to finance its assets, which reflects the financial risk faced by the company [48]. Leverage is measured by Debt to Equity Ratio (DER) [43]. In addition, company size is measured based on total assets owned; the greater the total assets, the greater the size of the company, which can affect investment decisions and investor confidence [16]. Then, the age of the company describes the time from its establishment to the current year; a longer age often indicates experience and stability [28]. Firm age is measured by the number of years the company has been established [10]. Growth measures the change in sales or revenue over time, reflecting the company's ability to expand; it is measured by the difference between this year's sales and last year's sales, divided by last year's sales [46].

In addition, board independence refers to the proportion of board members who are not involved in day-to-day management, which serves to improve oversight and reduce conflicts of interest [9]. This variable is measured by the number of independent board members divided by the total number of board members. Finally, board size refers to the total number of board members, which can affect strategic decisions and the effectiveness of supervision [75]. Board size is measured by counting the number of board members in the current year. Through the analysis of these six variables, it is expected to offer a more detailed look at the factors affecting company performance during the period.

Specific Model

This study uses the panel regression method to examine the effect of Managerial Ability (X1), Board Directors Background Education in Accounting (X2), and Board Directors Foreign Experience (X3) on Sustainability Performance (Y), considering the moderating role of green CEO (M1) and other control variables. The researcher will test the research model in two stages.

The first one will test the relationship between the independent and dependent variables, taking into account the control variables, but without including moderation interactions. The regression equation used is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \gamma_1 K_1 + \gamma_2 K_2 + \gamma_3 K_3 + \gamma_4 K_4 + \gamma_5 K_5 + \gamma_6 K_6 + \varepsilon$$

Notes:
Y: Sustainability perfromance
X1: Managerial Ability
X2: Director with accounting education background
X3: Directors with foreign experience
K1: Leverage
K2: Firm Size
K3: Firm Age
K4: Growth
K5: Board Indipendence
K6: Board Size
ϵ: Residual

The objective of the first stage is to identify the direct relationship between the independent and dependent variables by accounting for the effects of control variables. In the second stage, the moderating variable Green CEO (M1) will be included in the model, specifically as a moderator that affects the relationship between Managerial Ability (X1) and Sustainability Performance (Y). The equation used at this stage is:

$$Y = \beta 0 + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4(X1\times M1) + \gamma 1K1 + \gamma 2K2 + \gamma 3K3 + \gamma 4K4 + \gamma 5K5 + \gamma 6K6 + \varepsilon$$

In this equation, (X1×M1) is the interaction variable between managerial ability (X1) and green CEO (M1). The purpose of the second stage is to test whether green CEO (M1) moderates the relationship between managerial ability (X1) and sustainability performance (Y), considering the same control variables as in the first model. This model is expected to provide insight into the role of managerial ability and board variables in influencing sustainability performance, as well as how a green CEO moderates the relationship.

RESULTS AND DISCUSSION

Statistic Descriptive

As shown in Table 1, a number of variables are associated with sustainability performance, which serves as the dependent variable in this study. The mean sustainability performance is 0.299, with a standard deviation of 0.154, indicating a moderate degree of variation among the companies in question. The managerial ability variable, which serves as the primary independent variable, exhibits an average value of 0.751, with a maximum value of 2.909. This suggests that there are notable disparities in the managerial capabilities observed among the firms under analysis. Furthermore, the variables pertaining to the educational background of board directors in accounting and their foreign experience exhibit identical means of 0.343, with standard deviations of 0.206 and 0.279, respectively.

Table 1. Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Std. Dev.
SP	0.299	0.258	0.910	0.056	0.154
MA	0.751	0.758	2.909	0.146	0.313
BDEAcc	0.343	0.333	1.000	0.000	0.206
BDFE	0.343	0.333	1.000	0.000	0.279
Green_CEO	1.164	1.000	2.000	1.000	0.371
Lev	0.550	0.534	1.854	0.114	0.262
FSize	30.688	30.876	34.203	27.527	1.342
FAge	48.128	47.000	163.000	4.000	25.971
Growth	0.083	0.045	2.266	-0.394	0.244
BIndepen-dence	0.383	0.400	1.000	0.000	0.144
BSize	11.503	11.000	29.000	4.000	3.640

Source: Author's own work

The green CEO, which serves as a moderating variable in this study, exhibits an average value of 1.164 and a standard deviation of 0.371, indicating that the majority of companies tend to have CEOs who demonstrate concern for sustainability aspects. Control variables, including leverage, firm size, firm age, growth, board independence, and board size, are also presented. The mean firm size is 30.688, with a standard deviation of 1.342. The mean board size is 11.503, with a standard deviation of 3.640. These figures demonstrate that company size, leverage, and firm age vary significantly across the sample, allowing for more precise control over their influence on sustainability performance.

Regression Analysis

This study uses multiple linear regression and moderate regression analysis in assessing the tested hypotheses. As a result of statistical testing, Table 2 regression model equation is obtained

The regression results in Table 2 show that managerial competence has a significant and positive impact on sustainability performance (coefficient = 0.0236, p = 0.000), supporting Hypothesis 1 (H1). These results suggest that firms led by competent managers will have better sustainability performance. Similarly, DFE also shows a significant and positive effect on sustainability performance (coefficient = 0.2293, p = 0.0001), confirming Hypothesis 4 (H4). This suggests that exposure to international business practices enables directors to adopt a broader and more progressive approach to sustainability.

Table 2. Regression analysis without moderating variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA	0.231	0.054	4.272	0.000
DAE	0.104	0.070	1.473	0.143
DFE	0.229	0.057	3.997	0.000
Leverage	0.215	0.076	2.830	0.005
Firm Size	0.063	0.033	1.885	0.061
Firm Age	0.016	0.006	2.679	0.008
Growth	-0.001	0.039	-0.034	0.973
Board Indipendence	0.665	0.105	6.350	0.000
Board Size	0.008	0.005	1.736	0.085
C	-3.162	0.975	-3.242	0.002
Effects Specification				
R-squared	0.863	**Mean dependent var**		0.299
Adjusted R-quared	0.819	**S.D. dependent var**		0.223
F-statistic	1.966	**Akaike info criterion**		-1.665
Prob(F-statistic)	0.000			

Source: Author's own work

On the other hand, DAE shows a significant and positive influence (coefficient = 0.1037, p = 0.1430), indicating that this characteristic does not significantly influence sustainability performance, thus rejecting Hypothesis 3 (H3). Among the control variables, leverage, company age, and board independence are found to have a positive and significant influence on sustainability performance. Board independence, in particular, has the highest coefficient (0.665), emphasizing the crucial role of independent oversight in promoting sustainability. The R-squared value of 0.819 indicates that approximately 81.89% of the variation in sustainability performance is explained by the model, demonstrating strong explanatory power and good model fit.

Table 3. Regression Analysis with Moderating Variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
MA	0.129	0.060	2.140	0.034
MAXGreenCEO	0.102	0.030	3.372	0.001
DAE	0.076	0.069	1.110	0.269
DFE	0.217	0.056	3.900	0.000
Leverage	0.254	0.074	3.418	0.001
Firm Size	0.067	0.032	2.068	0.040
Firm Age	0.013	0.006	2.241	0.027
Growth	-0.008	0.038	-0.206	0.837
Board Indipendence	0.656	0.101	6.483	0.000
Board Size	0.006	0.005	1.356	0.177
C	-3.132	0.942	-3.324	0.001
	Effects Specification			
R-squared	0.873	**Mean dependent var**		0.299
Adjusted R-squared	0.831	**S.D. dependent var**		0.223
F-statistic	2.084	**Akaike info criterion**		-1.729
Prob(F-statistic)	0.000			

Source: Author's own work

The regression analysis in Table 3 adds green CEO as the moderating variable to analyze its effect on managerial competence. Based on the results, it is known that MA still has a positive and significant effect on sustainability performance (p = 0.034), which strengthens the support of Hypothesis 1. In addition, the influence of MA on sustainability performance is strengthened by the green CEO and becomes highly significant (p = 0.001), thus supporting Hypothesis 2 (H2). The evidence indicates that the presence of a green CEO strengthens the positive effect of managerial competence on sustainability performance. CEOs with strong environmental values appear to enhance the influence of competent managers by promoting a leadership culture that prioritizes sustainability at all strategic levels.

As shown in Table 2, the influence of DFE remains positive and significant (p = 0.0001), thus supporting Hypothesis 4, while the influence of DAE is not statistically significant (p = 0.269), further reinforcing that Hypothesis 3 is not supported. Leverage, firm size, firm age, and board independence continue to be significant control variables, demonstrating consistent and robust effects across both models. The adjusted R-squared value of 0.831 indicates that approximately 83% of the variation in sustainability performance is explained by Model 2, showing an improvement in explanatory power.

Discussion

The results of this study indicate that managerial capability has a significant positive impact on sustainability performance, providing strong support for Hypothesis 1. These findings highlight that firms led by more competent managers are better able to integrate sustainability into their strategic and operational agendas. Skilled managers are more adept at navigating complex stakeholder demands, aligning business objectives with sustainability goals, and making decisions that improve long-term environmental, social, and economic outcomes [49]. Upper echelon theory, which asserts that top executives' characteristics, values, and cognitive orientations influence organizational outcomes, aligns with these findings. In this context, managerial capabilities serve as a reflection of leaders' strategic thinking and problem-solving abilities, which are directly reflected in the organization's sustainability orientation. Previous studies in Chinese and Indonesian firms support this view, finding that higher managerial capability is associated with stronger stakeholder engagement and better environmental performance [40], [50],[34].

This study also found that the presence of a Green CEO significantly strengthens the positive influence between managerial capabilities and sustainability performance, confirming Hypothesis 2. These findings suggest that environmentally oriented leadership strengthens the effectiveness of managerial capabilities. By prioritizing environmental and social considerations, a green CEO fosters a corporate culture that prioritizes sustainability in decision-making processes [50].

Within the framework of upper echelon theory, the study highlights the importance of leadership values in shaping strategic outcomes. CEOs who are committed to sustainability are more likely to support investments in clean technologies, resource-efficient processes, and socially responsible initiatives that collectively strengthen a firm's sustainability performance [22],[30]. The synergy between managerial skills and green leadership leads to more comprehensive and effective sustainability strategies, enabling companies to more effectively manage environmental and social risks in different organizational contexts.

Regarding the role of the board of directors, research suggests that having members with international experience has a significant and positive impact on sustainability performance, supporting Hypothesis 4. Directors with international exposure often bring diverse perspectives, advanced knowledge, and strategic insights gained from global practices, contributing to more progressive governance and decision-making aligned with sustainability goals [41], [79]. This international experience enhances a company's adaptability and responsiveness to environmental challenges, particularly in emerging markets with institutional gaps [44]. In addition, this diversity improves board discussions and facilitates the adoption of broader sustainability standards, ultimately enhancing stakeholder legitimacy and trust [35],[3],[37]. These findings reinforce the relevance of the Upper Echelon Theory, which emphasizes that the composition and background of board members significantly influence organizational outcomes.

On the other hand, Hypothesis 3, which proposed that board members with an accounting education background would have a positive impact on sustainability performance, was not supported. The research results showed no statistically significant effect, suggesting that while financial expertise is valuable, it does not automatically translate into stronger sustainability outcomes. One possible explanation is that sustainability performance is more influenced by the quality and scope of sustainability reporting than by the educational background of board members [69]. In addition, broader institutional factors—such as regulatory frameworks, stakeholder pressure, and corporate values—may play a more decisive role in shaping environmental and social initiatives [5],[72]. These findings further clarify the application of Upper Echelon Theory by highlighting that not all individual characteristics of top executives have a direct influence; instead, their relevance may depend on specific contextual interactions and broader organizational priorities.

CONCLUSION

This study deepens our understanding of how the characteristics of top executives—particularly managerial competence, green CEO, and the overseas experience of board members—affect sustainability performance. Consistent with upper echelon theory, these findings confirm that managerial competence significantly improves firm sustainability outcomes because competent managers are better able to integrate sustainability into strategic decision-making. In addition, the moderating role of green CEOs shows how leaders' environmental values can amplify the effect of managerial competence, reinforcing the theory's premise that leader characteristics shape organizational direction. Similarly, the positive contribution of BOD with international experience suggests that globally exposed leadership facilitates broader and more effective sustainability strategies. On the other hand, the insignificant impact of BOD's accounting education background suggests that technical knowledge alone may not be sufficient; sustainability outcomes are more strongly influenced by practical leadership experience and contextual factors.

This study empirically validates the influence of BOD characteristics on sustainability performance and provides theoretical and practical implications. Theoretically, this study extends upper echelon theory by integrating green CEOs and international exposure into the analysis of sustainability outcomes. This multidimensional perspective enriches our understanding of how cognitive traits and experiences at the highest executive level translate into firm sustainability performance. Practically, these findings highlight the strategic importance of appointing competent managers and green CEOs to enhance sustainability integration. In addition, companies should consider the value of internationally experienced BOD when designing governance structures, as their global insights and potential for knowledge transfer can significantly improve environmental and social outcomes. For policymakers and regulators in emerging economies such as Indonesia, this study highlights the need to promote diversity in leadership and sustainability-oriented governance to encourage responsible corporate behavior across industries.

While this study has several implications, it also has some limitations. First, since the research focuses only on manufacturing companies, the results may not be applicable to other sectors such as services or finance, which may have different sustainability priorities and governance structures. Second, managerial skills and green CEOs' characteristics are measured using observable indicators. Despite the empirical usefulness of this approach, the indicators might not encompass the cognitive aspects, personal values, or behaviors outlined in Upper Echelon Theory. As a result, the true influence of leaders may not be fully captured in this analysis.

Further research is recommended to use a longitudinal design to examine how sustainability practices evolve and how leader characteristics develop through the organizational learning process. Qualitative approaches, such as in-depth interviews or case studies, could also provide a more detailed picture of how executives make decisions. In addition, broadening the sample to include different sectors and countries would help test whether these findings are consistent across different institutional contexts and enrich our understanding of how leadership characteristics affect sustainability outcomes.

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