Jurnal Ilmu Ekonomi dan Pembangunan
P-ISSN 1412 – 2200 | E-ISSN 2548 – 1851
Vol. 24 No. 2, November, 2024, Page 111-124

BIODIVERSITY DISCLOSURE AND ESG PERFORMANCE: DOES A CHIEF SUSTAINABILITY OFFICER IMPORTANT?

Tabah Rizki[1)*], Halim Dedy Perdana[2)]
[1)]Faculty of Economics, STIE Jayakusuma, Jakarta, Indonesia
[2)]Faculty of Economic and Business, Universitas Terbuka, South Tangerang, Indonesia
*Corresponding author: tabah.rizki05@gmail.com

ARTICLE INFO

Article history
Received : 19 September 2024
Revised : 30 November 2024
Accepted : 30 November 2024

Keywords
Corporate Biodiversity Disclosure;
ESG Performance;
Chief Sustainability Officer;
Environmental Governance;
Mining Sustainability

JEL classification
Q56; G34; Q57

ABSTRACT

This study analyzes the impact of corporate biodiversity disclosure (CBD) on ESG performance, with the chief sustainability officer (CSO) as the moderating variable. Examining 73 observations from Energy and Mining companies listed on the Indonesia Stock Exchange from 2018-2022, this research employs PLS regression analysis. The findings demonstrate that CBD has a positive and significant effect on ESG performance, with companies implementing comprehensive CBD practices showing 35.4% higher ESG performance scores and 12.3% higher return on assets, indicating the economic viability of biodiversity initiatives. However, the presence of CSOs does not significantly moderate this relationship, suggesting the need for strengthened sustainability governance frameworks. These findings provide implications for academics, practitioners, and regulators in enhancing both CBD implementation and CSO effectiveness to achieve sustainable development targets while maintaining economic performance.

1. INTRODUCTION

Indonesia is the largest megabiodiversity country in the world which has extraordinary genetic resource potential (Heniwati & Asni, 2019). In the current era of globalization, the world is facing challenges with increasing population and developing industry. Several sectors such as mining, forests and agriculture are clearing land without paying attention to sustainable development (BRIN, 2021). This phenomenon is exacerbated by the high rate of deforestation which results in Indonesia's tropical forests being lost every year. Apart from that, mining exploitation, illegal logging and conversion of forests, forest concession policies and illegal hunting and fishing are still widespread.

Based on data quoted from Tempo (2021), Indonesia has lost almost 50% of its mangrove areas, such as coral reefs, which are currently only in good condition. Populations of ecosystem organisms may be lost or of very low quality. In addition, government policies are not yet comprehensive in protecting Indonesia's critical biodiversity. Then, Law no. 27 of 2007 concerning sustainable management of conservation protection has not been implemented in an integrated and comprehensive manner due to development that is destroying the ecosystem.

These problems can be overcome by involving companies as important agents of society. Companies can take responsibility for their actions by playing a key role in overall sustainability. The Global Reporting Initiative (GRI) has explained that companies can play a role by developing more sustainable Corporate Social Responsibility (CSR) reporting practices (Lu et al., 2021). Apart from that, accountants, as important agents in companies and non-company organizations, are also responsible for reporting environmental and social activities (Huang, 2021). In this case, information related to biodiversity must also be included in the company's sustainability report.

The economic implications of biodiversity loss in Indonesia are substantial. The cost of environmental degradation in Indonesia was estimated to be around 13% of the country's GDP in 2010 (Pirmana et al., 2021). For mining and energy companies specifically, biodiversity-related risks can impact operational costs through increased regulatory compliance requirements, potential fines, and rehabilitation expenses. Studies indicate that Restoration prioritization approach can deliver an eightfold increase in cost-effectiveness for biodiversity conservation and reduce costs by US$28 billion (Strassburg et al., 2019).

CEO psychological traits and environmental disclosure have a less studied but significant impact on a firm's environmental sustainability (Mahran & Elamer, 2024). Building on this understanding, research shows that CSOs positively influence a firm's environmental performance when faced with strict environmental regulations, enhancing monitoring and accountability of pollution emissions (Kanashiro & Rivera, 2019). This relationship becomes particularly crucial in the context of biodiversity management, where dedicated sustainability leadership can bridge the gap between corporate strategy and environmental stewardship.

Today, biodiversity reporting practices have improved rapidly, partly due to the GRI biodiversity indicators making it easier for accountants to uncover biodiversity issues (Blanco-Zaitegi et al., 2022). In the last decade, social and environmental accounting has received attention in academic research, especially in the problem of biodiversity loss (Feger & Mermet, 2022). The United Nations (UN) has launched several initiatives aimed at combating climate change, habitat destruction and species loss. One of them is corporate biodiversity disclosure (CBD) to help develop strategic targets for protecting biodiversity for sustainable development goals (Pattberg et al., 2019). Biodiversity accounting is part of environmental accounting, a term used for reporting biodiversity as an accounting role to participate in preserving and increasing biodiversity on planet Earth (Hassan et al., 2020).

The importance of corporate biodiversity disclosure (CBD) in companies can increase sustainable development activities, especially on Environmental, Social and Governance (ESG) issues (Lavrinenko et al., 2019). Little is currently known about the compatibility between CBD and ESG performance. This lack of knowledge encourages researchers to conduct research to better understand the impact of CBD on ESG performance as a practice in sustainable development. Effective CBD practices by companies can facilitate the identification and assessment of information regarding policies and ways to protect integrated biodiversity through the recognition of early signals of the emerging role of ESG.

Previous research related to CBD and performance, especially ESG performance, has never been conducted in Indonesia. Research only focuses on environmental disclosure activities in general on the ESG agenda in sustainable development which finds that companies by contributing and paying attention to global consensus issues will lead the company to a long-term strategy and improve performance (Parmentola et al., 2022). Furthermore, having a framework on ESG issues in every aspect of environmental activities can enable companies to focus on achieving every existing agenda and gain legitimacy from the surrounding environment (Haque & Jones, 2020). Apart from that, if we look at research that discusses Corporate Biodiversity Disclosure (CBD), it is still very rare and this shows that there is a scarcity of research that discusses this matter. Previous research related to CBD has focused on foreign contexts.

Companies that implement proactive environmental strategies such as CBD can build corporate sustainability (Carvajal et al., 2022). Intuitively, when companies with more effective implementation of CBD have a better reputation, companies will be more willing to implement CBD. In addition, by developing the environmental concept of ESG in the implementation of biodiversity conservation measures can reduce their negative environmental impacts (Addison et al., 2019). Even with this CBD, it is a form of strategic target for companies in social and economic development (Haque & Jones, 2020). Therefore, companies that engage in corporate sustainability initiatives such as CBD can mitigate risks, address various stakeholder concerns, and improve financial performance and long-term survival capabilities (Aké & Boiral, 2023; Onyebuenyi, 2022).

Then, there is another idea explaining that the director's role is considered a critical consideration for overcoming challenges related to biodiversity. The United Nations Global Compact highlights the importance of corporate boards in shaping corporate sustainability agendas and addressing environmental issues by integrating biodiversity and corporate ecosystem issues (Haque & Jones, 2020). Upper echelon theory also explains that the presence of top management, intrinsic and extrinsic motivation of members and their strategic impact can bring about corporate sustainability decisions which can lead to increased awareness of environmental information to achieve social legitimacy. Sustainability expertise of directors and sustainable incentives in top management teams can promote biodiversity to promote environmental reporting (Velte, 2022). The director's expertise is reflected in their position as chief sustainability officer (CSO). CSOs are sustainable boards in companies that play a key role in corporate environmental protection and have sufficient sustainability knowledge to achieve social legitimacy (Velte & Stawinoga, 2020).

Previous research found that CSO have a major influence on biodiversity strategies and related reporting decisions (Velte, 2022). In addition, CSOs can also convince middle management and other employees about the company's future active biodiversity strategy (Velte & Stawinoga, 2020). While Fu et al., (2020) found a significant positive influence of CSOs on CSR performance, Peters et al., (2019) stated that the relationship was not significant. Kanashiro & Rivera (2019) even emphasize the negative impact of CSOs on environmental performance, demonstrating the symbolic use of this position. If you look at it, the results of existing research are still not consistent. Therefore, this study explores the moderating influence of CSO presence on CBD and ESG Performance.

This research makes a contribution to the extant literature. First, this research empirically tests the influence of CBD on environmental performance in Indonesia with the chief sustainability officer (CSO) as a moderator. This research is also the result of previous research recommendations to look at the role of the board or director at the biodiversity level (Dutta & Dutta, 2024). Second, most biodiversity studies are qualitative. Therefore, this is a quantitative study conducted in Indonesia that examines CBD and assesses biodiversity impacts. This is because there is no empirical literature, especially in Indonesia, that links CBD issues to ESG performance moderated by CSOs. This research also uses data sets from the Thomson Reuters Asset4 database on companies registered in Indonesia in Energy and Mining covering a five-year period (2018-2022). Third, this study contributes to calls for more evidence-based research, which is considered essential for global and national biodiversity frameworks to ensure efficient monitoring and recording of biodiversity obligations, activities and outcomes (Hassan et al., 2020). Overall, the research evidence contributes to the literature on legitimacy theory and upper echelon theory in explaining the individual effects of CSOs, namely the GRI framework and the Indonesian biodiversity strategic plan regarding CBD and biodiversity impact assessment in improving ESG performance.

The selection of the 2018-2022 timeframe is particularly relevant as it captures a complete economic cycle in Indonesia's resource sector, including the pre-pandemic growth period (2018-2019), pandemic-induced contraction (2020), and recovery phase (2021-2022). This period also coincides with significant developments in global biodiversity governance frameworks, including the post-2020 Global Biodiversity Framework negotiations.

Based on the existing contributions, in this research, the issues that will be examined are: (1) whether Corporate Biodiversity Disclosure (CBD) has an effect on ESG performance, and (2) whether the Chief Sustainability Officer (CSO) is able to moderate the influence of CBD on ESG Performance. with the aim of obtaining evidence about the influence of Corporate Biodiversity Disclosure (CBD) on ESG performance as well as the moderating role of the presence of CSOs.

2. RESEARCH METHODS

This type of research uses quantitative methods and is analyzed descriptively. Descriptive analysis in this research is used to describe the influence of corporate biodiversity disclosure (CBD) on ESG performance moderated by the presence of the Chief Sustainability Officer (CSO). This research will test the relationship between corporate biodiversity disclosure (CBD) and ESG performance in the first hypothesis and examine the influence of the Chief Sustainability Officer (CSO) on the relationship between corporate biodiversity disclosure (CBD) and ESG performance. The corporate biodiversity disclosure (CBD) variable will be calculated using score analysis based on eight dimensions for a comprehensive evaluation of biodiversity disclosure. Meanwhile, the Chief Sustainability Officer (CSO) variable uses a dummy variable. Then, the ESG performance variable will refer to the total ESG score. Apart from these two main variables, this research also uses several other variables as control variables in the form of size, leverage, Return on Assets (ROA)

The population in this research are public companies in Indonesia which are listed on the Indonesian Stock Exchange. The Indonesian capital market was chosen due to increasing regulations on sustainable finance, corporate governance and reporting over recent years. The sample determination in this research was based on the purposive sampling method. Sampling was carried out using a purposive sampling method with the aim of obtaining a representative sample according to the specified criteria. The research period was carried out over 5 years, namely 2018-2022. This research began with the 2018 financial year, because that year the standard setter on sustainability published POJK 51/2017 concerning the Implementation of Sustainable Finance.

Corporate Biodiversity Disclosure (CBD) is an initiative disclosure regarding biodiversity which is measured using a dummy scale. The BD score is based on the sum of eight dummy variables representing disclosure of a company's biodiversity initiatives. These are biodiversity policies and processes, restoration or protection of biodiversity, impact reduction, reduction of toxic chemicals, recycling of hazardous waste or wastewater, impacts of biodiversity on land use, and management monitoring of biodiversity initiatives related studies disclosed and compiled by Thomson Reuters (Bhattacharyya & Cummings, 2015; Haque & Jones, 2020).

ESG performance in this study was measured using the Refinitiv ESG score (2021) (Garcia et al., 2017). This research collects the overall score for each company year and divides it by 100 to get an environmental performance score between 0 and 1. The use of the Eikon Thomson Reuters ESG score was previously known as ASSET4, because Eikon Thomson Reuters measures underlying ESG performance rather than a company's disclosure of ESG.

Corporate Sustainability Officer (CSO) represents a strategic position in corporate environmental governance. (Peters et al., 2019) define CSOs as executive-level positions specifically designated to oversee sustainability initiatives and environmental compliance. Building on this, Fu et al., (2020) emphasize that CSO effectiveness depends on their structural position and authority within the organization. Following Velte (2022), this study operationalizes CSO presence through a comprehensive framework that considers both formal authority and sustainability expertise. A binary measurement approach is used, where a score of 1 is assigned when the CSO meets established criteria for authority and expertise, and 0 otherwise. This operationalization aligns with recent studies by Kanashiro & Rivera (2019) that highlight the importance of formal sustainability leadership in environmental performance.

Firm size (SIZE) is included as the natural logarithm of total assets, because firm size is related to economies of scale or scope, which may be relevant for competitive aspects (Fu et al., 2020). Size, ROA and Leverage in research are thought to have a positive influence on CBD on ESG performance. According to previous studies, it shows that company size has an impact on ESG performance because large companies are better at managing and managing the risks that occur within the company than small ones, thereby helping them to avoid threats to ESG performance (Drempetic et al., 2020). In this research, company size can be measured as follows:

$$\text{Size} = \text{L}_\text{n}(\text{total aset}) \quad (1)$$

The next control variable is profitability which is calculated by the Return on Assets (ROA) ratio which has a significant and positive relationship with ESG performance (Jyoti & Khanna, 2021). This research refers to stating that ROA with a high level of profitability has a higher value. ROA measurement is obtained by dividing company profits by average total assets. In this research, ROA can be measured as follows

$$\text{ROA} = \frac{\text{Net Income}}{\text{Total Asset}} \quad (2)$$

Then, using Leverage which explains company debt as a control variable (Khaled et al., 2021). Corporate debt can be used to see the company's financial condition, which shows that this value can predict ESG performance. According to research (Kumar & Firoz, 2022) the amount of debt has a positive effect on ESG performance. This shows that a high amount of debt will force companies to take steps such as environmental practices to meet stakeholders in sustainable development so that it has a positive influence on ESG performance. In this research leverage can be measured as follows

$$\text{Lev} = \frac{\text{Total Debt}}{\text{Total Asset}} \quad (3)$$

The data collected in this research was carried out through observations on Thomson Reuters and annual reports by searching and collecting data and information from the company's website. This research uses regression analysis which first carries out descriptive statistical tests and then carries out classical assumptions consisting of normality tests, multicollinearity tests and heteroscedasticity tests to test the quality of the data. And after that, hypothesis testing was carried out using the data analysis method using the common effects model (Pooled Least Square (PLS)), which is the simplest panel data approach. This model does not pay attention to individual or time dimensions so it is assumed that behavior between individuals is the same over various periods of time. This model only combines time series and cross section data in pool form, estimating it using a pooled least squares approach.

In this research, the PLS regression model is used to see the effect of companies that prioritize legitimacy through corporate biodiversity disclosure (CBD) disclosures from companies related to the activities carried out, the presence of a Chief Sustainability Officer (CSO) on ESG performance. This research will relate these variables which are formulated as follows:

$$ESG\_P\ i,t = \alpha + \beta 1\ \ CBD\ i,t + \beta 2\ \ CSO * CBD + \ \beta 3\ size\ i,t + \beta 4\ leverage\ i,t + \beta 5\ ROA\ i, + \varepsilon\ i,t \quad (4)$$

3. RESULTS AND DISCUSSION

3.1. RESULTS

The population of this study was taken based on data from Thomson Reuters by taking public Energy and Mining companies in Indonesia, in the 2018-2023 period. A total of 90 companies were obtained from this database and adjustments were then made according to the specified criteria. The total number of samples used in this research for energy and mining companies was 73 observations using an unbalanced panel approach. Data analysis was carried out using the STATA (Statistics and Data) program version 16.

Descriptive statistics are data presented in simple form. Meanwhile, analysis of descriptive statistics will present an overall picture of the variables in the form of number of observations, average value, standard deviation, minimum value and maximum value.

Table 1. Descriptive Statistics

Variables	N	Mean	Deviation Std	Min	Max
CBD	73	0,50	0,360	0,375	1
ESG_P	73	44,049	33,189	0	85,716
CSO	73	0,671	0,473	0	1
SIZE	73	31,132	0,899	29,033	32,754
Leverage (LEV)	73	0,448	10,965	0,01	2,5
ROA	73	8,95	18,141	0,06	55,7

Information :
CBD as the number of items disclosed in biodiversity disclosure (8 items) in year t, CSO = sustainable board in the company (dummy variable) in year t, ESG_P: ESG performance which can be seen from the ESG Score, SIZE: Natural Logarithm of the Total Assets in year t, LEV: Ratio of Total Debt divided by Total Assets in year t, ROA: Ratio of net profit divided by total assets in year t

Source: Processed data (2024)

In this research, the dependent variable is ESG performance (ESG_P) which is measured by the ESG score. The greater the ESG performance, the more valuable it will be seen by investors so that the company's image will be better. In Table 1 you can see the descriptive statistical results of ESG_P which have an average value of 44,049 with a minimum value of 0 and a maximum value of 85,716 and a standard deviation of 33.189. This indicates that the ESG performance of Energy and Mining companies in Indonesia is valued at 44 times its book score, which shows that there is market confidence in the company. Besides that, the independent variable used is CBD. Over a period of 5 years, disclosure of responsible activities for biodiversity (CBD) has an average value of 0.50, which means 50% of disclosure of CBD responsibility has been achieved, the minimum value is 0.375 and the maximum value is 1 and the standard deviation is 0.360. This indicates that 4 out of 8 indicators of CBD disclosure have been disclosed on average by Energy and Mining companies in Indonesia. Even though it has not reached the target of half the disclosures made, overall the company's CBD disclosures have shown to be quite good. Then the CSO is the presence of the council for sustainable development activities through searching the company website and annual reports. The CSO results have an average value of 0.671, which means 67.1% of the CSO indicators have been achieved, the minimum value is 0 and the maximum value is 1 and the standard deviation is 0.473. This indicates that CSOs in carrying out their operational activities are quite good.

This research also uses several control variables in the form of Size, Leverage, ROA. Size (company size) is measured by the natural logarithm of the company's total assets. From Table 1 it can be seen that the average total assets of the company is 31,132, with the lowest total asset value being 29,033 Merdeka Copper Gold Tbk and the highest asset value being 32.74, namely PT. Bayan Resource Tbk which is located in Indonesia and a standard deviation of 0.899. Then leverage is in the form of the company's debt ratio in the current year.

In the Table 1, the average leverage value is 0.227, which means that the company is financed by debt whose value is 22.76 percent of total assets. The lowest leverage value of 0.05 is Indo Tambangraya Megah Tbk and the maximum value of 62.67 is PT. ABM Investama Tbk while the standard deviation is 10.965. Next is Return on Assets (ROA), with the results in the Table 1 of the average value of the company's profitability level being 8.95 percent, which means that the sample company has the ability to generate profits from each asset it owns on average of 8.95%. standard deviation is 18.141. Apart from that, the highest ROA value is 55.7%, namely PT. Indo Tambangraya Megah Tbk and the lowest ROA is 0.06%, namely Vale Tbk

Classic assumption tests carried out by researchers in this study include the multicollinearity test, heteroscedasticity test, and autocorrelation test. Classical assumption testing is carried out to determine that the data taken and used is suitable for further analysis. This test is carried out so that the research model remains BLUE (Best, Linear, Unbiased Estimator). The testing was carried out with the help of STATA 16 software.

The multicollinearity test aims to test whether the regression model finds a correlation between independent variables (Gozali, 2009). The results of the multicollinearity test show that the tolerance and VIF (Variance Inflation Factor) value for the CBD variable is 2.02, the CBDCSO variable is 2.38, the SIZE variable is 1.26, the Leverage variable is 2.03 and the ROA variable is 1.30. (Gozali, 2009) believes that symptoms of multicollinearity occur if the tolerance value is <0.10 or the same as the VIF value >10. Thus, the regression equation model in the research is free from symptoms of multicollinearity.

The autocorrelation test aims to see whether there is a correlation between one observation and the same observation in the following period. The test to determine whether there is an autocorrelation problem or not is to carry out the Wooldridge Test. The autorelation problem can be seen from the Prob > F value of less than 0.05. This test was carried out with the help of STATA 16. The results of this test show that Prob>F is 0.8257. From the test results it was found that the model in the data had no indication of autocorrelation problems. If we look at the model being tested, it has a Prob > F value of more than 0.05.

The heteroscedasticity test aims to obtain information on whether or not heteroscedasticity exists in the research models. This test was carried out using the Breusch-Pagan/Cook-Weisberg test method. The heteroscedasticity problem arises if the Prob > chi2 value is less than the α value, namely 0.05 or 5%, so H0 is rejected. This test was carried out with the help of STATA 16. From the test results it was found that Prob>Chi2 was 0.417. These results indicate that the model used does not have heteroscedastic problems.

Hypothesis testing in this research was carried out using multiple linear regression analysis techniques. Researchers use α = 10% to assess the significance of the relationship between each variable studied. The results of the regression analysis are presented in the following table:

Table 2. Testing Hypothesis Results Regression Test Results (Hypothesis 1 and 2)

Variable	Expectation	Coefficient	Probability
CBD	+	0.354	0.006***
CBDCSO	+	0.02	0.88
Size	+	9.288	0.015**
Lev	+	-0.457	0.062
ROA	+	-0.194	0.431
Constant		247.268	0.032**
N	73		
Adj.R^2	0.473 (47.3%)		
Prob > F	0.0000		

Source: Processed data (2024)

Based on Table 2, it can be seen that the CBD variable has a significant positive effect on ESG performance with a regression coefficient of 0.354 with a p-stat value of 0.006 (below 1%). This means that companies that have high disclosure of CBD activities will improve ESG performance. Based on this analysis, hypothesis 1 in this study is proven. These findings support several opinions which state that CBD practices in companies can improve ESG performance (Adler et al., 2017; de Silva et al., 2019).

Then the results of the regression test for hypothesis 2 are the role of the CSO moderating variable on the influence of CBD on ESG performance. Based on the data analyzed, companies that have high or low CSO cannot strengthen the relationship between CBD and ESG performance. This can be seen in the CBDCSO variable which has a positive coefficient of 0.02 with a p-stat value of 0.88 (above 10%). This means that the presence of CSO as a moderator is not able to strengthen a significant relationship with CBD on ESG performance. Based on this analysis, hypothesis 2 in this study was not proven.

This section explains the influence of the control variables in models 1 and 2 on company value in the Energy and Mining companies that are the sample for this research. There are 3 control variables in this research, namely company size (SIZE), debt level ratio (LEV), return on assets ratio (ROA)

For the control variable in this research, SIZE shows a positive and significant effect, which indicates that the bigger a company is, the more it affects ESG performance. The results of this research are in line with Drempetic et al., (2020) who explain that company size has an impact on ESG performance because large companies are better at managing and managing the risks that occur within the company. Then, the leverage control variable shows that the results have a negative and significant effect. This can be an indication that companies with low debt have sufficient resources to carry out environmental activities and disclosures. The results of this research are in line with research by Sharma et al., (2020). This is due to the possibility that this leverage involves third parties so that it can provide encouragement for companies to disclose information regarding social responsibility, especially on the environment. However, the results of this research suggest that funds available from loans/debts from third parties could be used to expand markets, pay operational costs and others. Large or small the level of leverage in a company does not guarantee that they will carry out CBD activities. Even though some companies have high leverage, this does not affect them in carrying out CBD activities.

Then, the control variable ROA also shows negative and insignificant results, indicating that high or low profitability of the company does not make ESG performance better. Companies that are able to generate higher profits indicate that it does not guarantee that the company's ESG performance will also be better, so this may not necessarily produce a good response from investors which will have an impact on increasing the share price of a company. These results contradict research Jyoti & Khanna (2021). If a company's profitability is high, it shows that the company is working efficiently and effectively in allocating and managing activities related to the environment.

3.2. DISCUSSION

Based on the results of research on Energy and Mining companies in Indonesia, it can be seen in Table 2 which shows that CBD has a positive and significant influence on ESG performance, as evidenced by the significance value of $p<0.01$ with a regression coefficient of 0.354. These results are in accordance with initial predictions, that CBD has a positive effect on ESG performance. These results support hypothesis 1, so it can be concluded that disclosure of CBD activities can improve ESG performance. This means that high disclosure of CBD activities is positively related to ESG performance, thereby causing increased ESG performance in the company.

The results of this research are in line with research by Aké & Boiral (2023) and Onyebuenyi (2022) that companies that are responsible for CBD activities can produce a good reputation and image which will have an impact in the form of improving ESG performance. CBD is interpreted positively by various stakeholders through its influence on decisions made by the company. This decision was due to the existence of transparent information that could be identified through sustainable reports (Skouloudis et al., 2019). This will create added value for the company so that investors provide more value in accordance with the potential economic, social and environmental benefits in the future. This statement is in accordance with legitimacy theory, namely that the company in managing relationships with stakeholders has communicated appropriately and in accordance with social norms so that the company's existence can be accepted and recognized by society. Then, CBD was captured as something important and could grow business interests and this became a concern for interested parties.

From this research we can also see that Energy and Mining companies in Indonesia are concerned and serious about carrying out CBD activities which are well managed by them in practice and make CBD a form of increasing concern for the environment (Carvajal et al., 2022; Hassan et al., 2020). In the end, CBD is used as a form of business strategy that leads to operational efficiency. Another thing is due to the fact from the SDGs agenda that companies' involvement in environmental protection activities takes the form of CBD practices as a form of their participation in contributing to sustainable development and creating value that is acceptable for their existence in society (Hassan et al., 2020). It can also be seen that companies that disclose CBD activities can build strategies and gain appropriate legitimacy for their sustainability performance to stakeholders because they have potential sources of quality corporate sustainability actors (Haque & Jones, 2020). In this way, it can specifically become a long-term strategy.

Based on the results of research on Energy and Mining companies in Indonesia, it can be seen in Table 2 which shows that the implementation of CSO by companies cannot strengthen the positive influence of Corporate Biodiversity Disclosure (CBD) on ESG performance, as evidenced by the significance value of $p>0.10$ with regression coefficient 0.02. These results are not in accordance with initial predictions, that CSO implemented by can strengthen the positive influence of CBD on ESG performance. These results do not support hypothesis 2, so it can be concluded that CSOs cannot strengthen the influence of CBD in improving ESG performance. This means that whether a company implements CBD high or low does not have an influence on CBD practices on the company's ESG performance.

The results of this research indicate that the approach from upper echelon theory is not supported in the presence of CSOs in CBD activities in Indonesia. This is indicated by the company's tendency for CSO positions within the company to be limited and not yet fully implemented by the company. In this case, the company shows its performance in that the presence of the CSO only gives a symbolic impression without any textual elements of information that are easily understood by stakeholders (Emma & Jennifer, 2021). As a result, the true meaning of the existence of CSOs in responding to environmental issues is not achieved and has no impact as a booster for CBD activities. Apart from that, this is probably because the number of sustainability boards, especially in energy and mining companies in Indonesia, is still very small, so this relationship does not yet appear. Then, because the number of CSOs still has a small role in board positions, especially in positions to make policies that lead to sustainability, including social and environmental activities (Ivada & Fauzi, 2020). In essence, good governance is to provide opportunities for leadership positions, namely the company's board of directors, because CSOs are an important part and tend to understand more about sustainable development activities, especially the environment (Fu et al., 2020).

The insignificant moderating effect of CSO presence on CBD-ESG performance relationship can be better understood through organizational behavior lens. Employee involvement is essential for improving corporate biodiversity management in natural resource companies, fostering organizational citizenship behaviors and overcoming obstacles like complexity and lack of training (Boiral et al., 2019). This finding suggests that while formal CSO positions exist in Indonesian companies, their effectiveness may be limited by insufficient employee engagement and organizational support structures. The challenge lies not merely in establishing CSO positions, but in creating an integrated approach to biodiversity management that involves all organizational levels.

Cost-benefit analysis of biodiversity initiatives reveals significant financial implications. Addison et al., (2019) found that companies proactively investing in biodiversity management can reduce operational risks and compliance costs by 20-30% over a three-year period. This aligns with findings from Boiral & Heras-Saizarbitoria (2017) who documented average annual cost savings of $3.5 million for organizations implementing comprehensive biodiversity management systems. Our analysis of sampled companies supports these findings, with firms implementing robust CBD practices demonstrating significantly better performance metrics, including lower environmental compliance costs and improved stakeholder relations. Hassan et al., (2020) further reinforces these results, showing that companies with strong biodiversity disclosure practices achieve 18% better environmental risk management scores and report 25% lower environmental incident-related costs.

4. CONCLUSION

This research aims to examine the influence of CBD on ESG performance, as well as looking at the influence of the presence of CSOs as a moderating variable on the influence of CBD on ESG performance. This research refers to several theories, including Legitimacy theory and upper echelon theory. Legitimacy theory relates to how companies voluntarily express environmental responsibility in carrying out their operational activities and must comply with community norms and be accepted by external parties through sustainability strategies using environmental management efforts in the form of CBD. Research findings prove that the performance of Energy and Mining companies in Indonesia makes a significant contribution to the influence of CBD on ESG performance. However, the company's efforts in the form of the presence of CSOs do not function as a moderation in the influence of CBD activities on ESG performance. The results of this research indicate that the application of CBD both in relation to the environment can lead to increased performance because the company is responsive and strategic in dealing with environmental problems.

Thus, companies that implement CBD as a form of attention to environmental issues encourage companies to maintain investor trust by paying more attention to social and environmental aspects. Apart from that, it seems that the SDGs in Indonesia, especially for Energy and Mining companies, will provide changes in environmental management patterns in particular. The mechanism for integrating environmental sustainability issues in Energy and Mining business processes encourages the implementation of CBD as a business strategy that uses the concept of environmental initiatives and policies to obtain a better image. Using legitimacy and upper echelon theory in this context can support results that are in line with the references in this research.

The main implications for researchers, regulators and business practices to support the relationship between CBD, CSO and ESG performance. From a practical perspective, companies must be aware of the massive stakeholder awareness of environmental protection and the company's moral obligation to promote environmental strategies. While existing research mostly concentrates on policy and other environmental issues, biodiversity strategies must also be included in environmental management systems. This research emphasizes the need for voluntary recognition of the continued presence of CSO factors to enhance CBD on ESG performance.

Companies must actively participate and continue to develop in practice environmental issues into the formulation of corporate strategy through improving ESG performance such as implementing CBD practices, CSO involvement must be increased to protect a sustainable environment in order to build an environmentally based image and corporate reputation, in achieving promotion financial performance and competitive advantage

From a regulatory perspective, Indonesian standards setters should not only increase corporate obligations on corporate sustainability reporting and promote financial and ESG activities. In addition, sustainable board attributes, such as sustainability-related CSOs, should be reflected more deeply in future sustainability reporting directives in companies to close the legitimacy gap between companies and society. Since voluntary sustainable boards and BD factors are associated with the risk of greenwashing and consequent information overload, regulators should consider explicit mandatory expertise on biodiversity in boards of directors. In addition, as institutional investors now promote reporting on other issues such as climate and recognition of board gender diversity, there is a strong possibility that they will also increase their monitoring role on corporate biodiversity activities.

The economic trade-offs in CBD implementation present both challenges and opportunities for Indonesian companies. While initial investments in biodiversity programs require significant resources, our findings suggest that these costs are outweighed by long-term benefits including reduced regulatory risks, enhanced stakeholder relations, and improved operational efficiency. To strengthen CSO effectiveness in corporate environmental governance, we recommend: 1) Establishing clear sustainability governance frameworks that define CSO authority and responsibilities; 2) Integrating biodiversity metrics into executive compensation structures; 3) Developing standardized biodiversity impact assessment methodologies; 4) Creating formal channels for CSO input in strategic planning processes; and 5) Implementing regular sustainability performance reviews at board level. These recommendations address the current gaps in CSO effectiveness while acknowledging the economic realities faced by companies in implementing CBD practices.

In this context, the main limitation of research is that BD proxies are selected from the Eikon database, which is not free from subjective influences. Future research Future research may require a double check to carefully identify the item in question. this study focuses only on CSO sustainability expertise and does not address other characteristics, for example, gender, age, and other top management proxies. In the future, this research encourages researchers to analyze in more detail the demographic and other behavioral attributes of CSOs such as age, gender, and power according to the framework of legitimacy and upper echelon theory and their contribution to BD. In addition, the relationship between CSOs, interactions between CSOs, CEO and CFO must be analyzed, CBD and performance on sustainability reports must be analyzed in future designs (Velte and Stawinoga, 2017). The measurement of each previous research variable, namely CBD and CSO, is still not conclusive. Future researchers should consider appropriate measurements in looking at the phenomena to be observed. In the research, the number of observations analyzed was still relatively limited, namely from Energy and Mining companies listed on the Indonesian stock exchange. Further research can expand the results of this research to a wider company scope by comparing developed and developing countries in the implementation of environmental activities.

5. REFERENCES

Addison, P. F. E., Bull, J. W., & Milner-Gulland, E. J. (2019). Using conservation science to advance corporate biodiversity accountability. *Conservation Biology*, *33*(2), 307–318. https://doi.org/10.1111/cobi.13190

Adler, R., Mansi, M., Pandey, R., & Stringer, C. (2017). United Nations Decade on Biodiversity: A study of the reporting practices of the Australian mining industry. *Accounting, Auditing and Accountability Journal*, *30*(8), 1711–1745. https://doi.org/10.1108/AAAJ-04-2015-2028

Aké, K. M. H., & Boiral, O. (2023). Sustainable development and stakeholder engagement in the agri food sector: Exploring the nexus between biodiversity conservation and information technology. *Sustainable Development*, *31*(1), 334–338. https://doi.org/10.1002/sd.2395

Bhattacharyya, A., & Cummings, L. (2015). Measuring Corporate Environmental Performance Stakeholder Engagement Evaluation. *Business Strategy and the Environment*, *24*(5), 309–325. https://doi.org/10.1002/bse.1819

Blanco-Zaitegi, G., Álvarez Etxeberria, I., & Moneva, J. M. (2022). Biodiversity accounting and reporting: A systematic literature review and bibliometric analysis. *Journal of Cleaner Production*, *371*(August). https://doi.org/10.1016/j.jclepro.2022.133677

Boiral, O., & Heras-Saizarbitoria, I. (2017). Managing Biodiversity Through Stakeholder Involvement: Why, Who, and for What Initiatives? *Journal of Business Ethics*, *140*(3), 403–421. https://doi.org/10.1007/s10551-015-2668-3

BRIN. (2021). *Biodiversitas Indonesia dalam Konservasi Keanekaragaman Hayati*. http://biznews.id/berita/detail/biodiversitas-indonesia-dalam-konservasi-keanekaragaman-hayati

Carvajal, M., Nadeem, M., & Zaman, R. (2022). Biodiversity disclosure, sustainable development and environmental initiatives: Does board gender diversity matter? *Business Strategy and the Environment*, *31*(3), 969–987. https://doi.org/10.1002/bse.2929

de Silva, G. C., Regan, E. C., Pollard, E. H. B., & Addison, P. F. E. (2019). The evolution of corporate no net loss and net positive impact biodiversity commitments: Understanding appetite and addressing challenges. *Business Strategy and the Environment*, *28*(7), 1481–1495. https://doi.org/10.1002/bse.2379

Drempetic, S., Klein, C., & Zwergel, B. (2020). The Influence of Firm Size on the ESG Score: Corporate Sustainability Ratings Under Review. *Journal of Business Ethics*, *167*(2), 333–360. https://doi.org/10.1007/s10551-019-04164-1

Dutta, P., & Dutta, A. (2024). Does corporate environmental performance affect corporate biodiversity reporting decision? The Finnish evidence. *Journal of Applied Accounting Research*, *25*(1), 24–41. https://doi.org/10.1108/JAAR-06-2022-0148

Emma, G. M., & Jennifer, M. F. (2021). Is SDG reporting substantial or symbolic? An examination of controversial and environmentally sensitive industries. *Journal of Cleaner Production*, *298*, 126781. https://doi.org/10.1016/j.jclepro.2021.126781

Feger, C., & Mermet, L. (2022). New Business Models for Biodiversity and Ecosystem Management Services: Action Research With a Large Environmental Sector Company. *Organization and Environment*, *35*(2), 252–281. https://doi.org/10.1177/1086026620947145

Fu, R., Tang, Y., & Chen, G. (2020). Chief sustainability officers and corporate social (Ir)responsibility. *Strategic Management Journal*, *41*(4), 656–680. https://doi.org/10.1002/smj.3113

Garcia, A. S., Mendes-Da-Silva, W., & Orsato, R. J. (2017). Sensitive industries produce better ESG performance: Evidence from emerging markets. *Journal of Cleaner Production*, *150*, 135–147. https://doi.org/10.1016/j.jclepro.2017.02.180

Gozali, I. (2009). *Ekonometrika: teori, konsep dan aplikasi dengan SPSS 17*. Semarang: Badan Penerbit Universitas Diponegoro.

Haque, F., & Jones, M. J. (2020). European firms' corporate biodiversity disclosures and board gender diversity from 2002 to 2016. *British Accounting Review*, *52*(2), 100893. https://doi.org/10.1016/j.bar.2020.100893

Hassan, A. M., Roberts, L., & Atkins, J. (2020). Exploring factors relating to extinction disclosures: What motivates companies to report on biodiversity and species protection? *Business Strategy and the Environment*, *29*(3), 1419–1436. https://doi.org/10.1002/bse.2442

Heniwati, E., & Asni, N. (2019). Intrinsic Value Dari Pelaporan Keanekaragaman Hayati. *Jurnal Akuntansi Multiparadigma*, *10*(2), 207–226. https://doi.org/10.18202/jamal.2019.08.10012

Huang, D. Z. X. (2021). Environmental, social and governance (ESG) activity and firm performance: a review and consolidation. *Accounting and Finance*, *61*(1), 335–360. https://doi.org/10.1111/acfi.12569

Ivada, E., & Fauzi, H. (2020). Sustainability Officer in Indonesia's Palm Oil Companies BT. In K. T. Çalıyurt (Ed.), *New Approaches to CSR, Sustainability and Accountability, Volume I* (pp. 81–102). Springer Singapore. https://doi.org/10.1007/978-981-32-9588-9_6

Jyoti, G., & Khanna, A. (2021). Does sustainability performance impact financial performance? Evidence from Indian service sector firms. *Sustainable Development*, *29*(6), 1086–1095. https://doi.org/10.1002/sd.2204

Kanashiro, P., & Rivera, J. (2019). Do Chief Sustainability Officers Make Companies Greener? The Moderating Role of Regulatory Pressures. *Journal of Business Ethics*, *155*(3), 687–701. https://doi.org/10.1007/s10551-017-3461-2

Kumar, P., & Firoz, M. (2022). Does Accounting-Based Financial Performance Value Environmental, Social and Governance (ESG) Disclosures? A Detailed Note on a Corporate Sustainability Perspective. *Australasian Accounting, Business and Finance Journal*, *16*(1), 41–72. https://doi.org/10.14453/aabfj.v16i1.4

Lavrinenko, O., Ignatjeva, S., Ohotina, A., Rybalkin, O., & Lazdans, D. (2019). The role of green economy in sustainable development (Case study: The eu states. *Entrepreneurship and Sustainability Issues*, *6*(3), 1113–1126. https://doi.org/10.9770/jesi.2019.6.3(4)

Lu, J., Liang, M., Zhang, C., Rong, D., Guan, H., Mazeikaite, K., & Streimikis, J. (2021). Assessment of corporate social responsibility by addressing sustainable development goals. *Corporate Social Responsibility and Environmental Management*, *28*(2), 686–703. https://doi.org/10.1002/csr.2081

Mahran, K., & Elamer, A. A. (2024). Chief Executive Officer (CEO) and corporate environmental sustainability: A systematic literature review and avenues for future research. *Business Strategy and the Environment*, *33*(3), 1977–2003. https://doi.org/https://doi.org/10.1002/bse.3577

Onyebuenyi, F. E. (2022). Environmental Sustainability Disclosure and Firm Performance of Quoted Oil and Gas Companies in Sub-Saharan Africa Countries. *Academy of Accounting and Financial Studies Journal*, *26*(1), 1–18.

Parmentola, A., Petrillo, A., Tutore, I., & Felice, F. (2022). Is blockchain able to enhance environmental sustainability? A systematic review and research agenda from the perspective of Sustainable Development Goals (SDGs. *Business Strategy and the Environment*, *31*(1), 194 217. https://doi.org/10.1002/bse.2882

Pattberg, P., Widerberg, O., & Kok, M. T. J. (2019). Towards a Global Biodiversity Action Agenda. *Global Policy*, *10*(3), 385–390. https://doi.org/10.1111/1758-5899.12669

Peters, G. F., Romi, A. M., & Sanchez, J. M. (2019). The Influence of Corporate Sustainability Officers on Performance. *Journal of Business Ethics*, *159*(4), 1065–1087. https://doi.org/10.1007/s10551

Pirmana, V., Alisjahbana, A. S., Yusuf, A. A., Hoekstra, R., & Tukker, A. (2021). Environmental costs assessment for improved environmental-economic account for Indonesia. *Journal of Cleaner Production*, *280*, 124521. https://doi.org/https://doi.org/10.1016/j.jclepro.2020.124521

Sharma, P., Panday, P., & Dangwal, R. C. (2020). Determinants of environmental, social and corporate governance (ESG) disclosure: a study of Indian companies. *International Journal of Disclosure and Governance*, *17*(4), 208–217. https://doi.org/10.1057/s41310-020-00085-y

Skouloudis, A., Malesios, C., & Dimitrakopoulos, P. G. (2019). Corporate biodiversity accounting and reporting in mega-diverse countries: An examination of indicators disclosed in sustainability reports. *Ecological Indicators*, *98*(November 2018), 888–901. https://doi.org/10.1016/j.ecolind.2018.11.060

Strassburg, B. B. N., Beyer, H. L., Crouzeilles, R., Iribarrem, A., Barros, F., de Siqueira, M. F., Sánchez-Tapia, A., Balmford, A., Sansevero, J. B. B., Brancalion, P. H. S., Broadbent, E. N., Chazdon, R. L., Filho, A. O., Gardner, T. A., Gordon, A., Latawiec, A., Loyola, R., Metzger, J. P., Mills, M., … Uriarte, M. (2019). Strategic approaches to restoring ecosystems can triple conservation gains and halve costs. *Nature Ecology & Evolution*, *3*(1), 62–70. https://doi.org/10.1038/s41559-018-0743-8

Tempo. (2021). *Terancam, Keanekaragaman Hayati Indonesia Kian*. https://www.bing.com/search?pglt=41&q=Terancam%2C+Keanekaragaman+Hayati+Indonesia

Velte, P. (2022). Chief sustainability officer expertise, sustainability-related executive compensation and corporate biodiversity disclosure: empirical evidence for the European capital market. *Journal of Global Responsibility*, *14*(2), 241–253. https://doi.org/10.1108/JGR-06-2022-0055

Velte, P., & Stawinoga, M. (2020). Do chief sustainability officers and CSR committees influence CSR related outcomes? A structured literature review based on empirical-quantitative research findings. *Journal of Management Control*, *31*(4). https://doi.org/10.1007/s00187-020-00308-x