

RESEARCH ARTICLE

Corporate biodiversity disclosure: The role of institutional factors and corporate governance

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Abstract

Extensive environmental degradation also has a negative impact on biodiversity, which plays a crucial role in both human survival and economic development. This condition has prompted various parties, including companies, to provide their contributions in preventing further severe damage. This study aims to examine the role of institutional factors, namely environmental performance and governance at the national level, as well as the role of corporate governance factors represented by board size, the proportion of independent directors, board diversity, and the presence of sustainability committees, in the corporate disclosure of biodiversity initiatives. The sample of this study comprises companies from 37 countries during the period 2016–2020. The study adopts a quantitative approach and utilizes analytical methods such as logistic regression and fixed-effect panel data analysis. Research findings indicate that the national environmental performance as an institutional factor, board size, and the existence of sustainability committees as representatives of corporate governance mechanisms are positively associated with corporate biodiversity disclosure. Meanwhile, the national governance index and the proportion of independent directors have a negative impact. Lastly, in general, the proportion of female board members does not significantly affect biodiversity disclosure. However, additional tests reveal its significance in companies operating in the environmentally-sensitive industries.

KEYWORDS

accountability, biodiversity disclosure, corporate governance, environment, institutional factors, sustainability

1 | INTRODUCTION

The increasing human population and economic growth have led to a greater demand for natural resources (Zhang et al., 2021). The UN projects predicted that the world's population will reach 10 billion by 2050, an increase of 2.3 billion from the current 7.7 billion (UN, 2019). Humanity requires resources equivalent to 1.5 planets to meet their needs in the future (McLellan et al., 2014). Human activities such as mining, agriculture, industry, and deforestation have significantly contributed to environmental and ecosystem degradation, directly or indirectly impacting declining biodiversity (Hassan et al., 2020; Roberts et al., 2021; Samkin et al., 2014).

The issues of environmental damage and extinction have become prominent in international forums. International organizations like the United Nations (UN) are increasingly focused on raising global awareness, strategies, and action plans to preserve biodiversity (Van Liempd & Busch, 2013). The year 2010 was declared the International Year for Biodiversity, and the period from 2011 to 2020 was designated as the UN Decade on Biodiversity.

Preserving nature and its ecosystems is not solely the responsibility of environmentalists or governments but requires involvement from various stakeholders, including companies (Skouloudis et al., 2019; Van Liempd & Busch, 2013). Companies have contributed to environmental degradation and loss of biodiversity, which is

believed to be a negative externality caused by corporate business operations (Mahmud et al., 2020). Therefore, they are expected to be part of the environmental preservation solution and to mitigate increasing extinction rates (Jones et al., 2020). One way companies respond to stakeholder demands is through sustainability reporting or other media like corporate websites. This disclosure is considered essential as a signal to stakeholders that the company is environmentally aware and fulfilling its obligations to the planet (Bae et al., 2018). Organizations like the UN and the European Commission are also developing strategies and action plans to enhance global biodiversity awareness. These strategies underscore the need to integrate biodiversity considerations into organizational accounting and reporting systems in both public and private sectors (Jones et al., 2020).

Existing studies on biodiversity disclosure have focused on aspects such as the extent of biodiversity reporting within companies (Boiral & Heras-Saizarbitoria, 2017; Rimmel & Jonäll, 2013; Van Liempd & Busch, 2013), developing tools, measurements, and frameworks for biodiversity reporting (Addison et al., 2020; Houdet et al., 2020), linking biodiversity disclosure to corporate governance (Amran et al., 2021; Haque & Jones, 2020), and testing determinants of corporate disclosure (Hassan et al., 2020; Sun et al., 2021). However, biodiversity disclosure should also be viewed from a broader perspective. O'Connor and Shumate (2010) suggest that differences in corporate social-environmental responsibility communication exist at the institutional and economic industry analysis levels. Some other studies indicate that internal corporate factors are not the sole determinants of social-environmental disclosure (Gallén & Peraita, 2018).

Uyar et al. (2021) tested whether institutional factors at the national level are associated with the level of corporate sustainability reporting in the tourism sector. The study employed national-level governance, social, and environmental performance as independent variables, along with GDP, export activities, and tourism sector size as control variables. The findings concluded that overall national sustainable development, particularly the national environmental index, influences the level of corporate sustainability reporting in the tourism sector. Other studies have followed a similar path as Uyar et al. (2021) albeit with different dependent variables, such as CSR disclosure (da Oliveira et al., 2019; de Villiers & Marques, 2016; Gallén & Peraita, 2018), water disclosure (Ben-Amar & Chelli, 2018), and sustainability disclosure (Uyar et al., 2021; Xiao et al., 2018). Yet, research specifically focusing on corporate biodiversity disclosure remains scarce. This is evidenced in a systematic literature review by Roberts et al. (2021), which suggests that researchers investigating corporate biodiversity disclosure should consider analyzing this practice from a broader perspective, linking it with national governance characteristics and ownership attributes.

Hence, it is crucial to examine the drivers of biodiversity disclosure from various stakeholder perspectives. Stakeholders can be divided into at least three levels: internal stakeholders within the company (firm/micro level), stakeholders at the industry level such as consumers and suppliers (industry/meso level), and higher-level stakeholders at the country level, including government bodies and environmental organizations (country/macro level).

This study addresses previous literature gaps in several ways: Firstly, it analyzes the determinants of biodiversity disclosure at the national level, which has been relatively underexplored in previous research. Secondly, it employs corporate governance mechanisms as micro-level drivers. While corporate governance has been widely studied in relation to overall sustainability disclosure, its role in biodiversity disclosure remains limited. Thirdly, in line with the recommendation by Roberts et al. (2021) for studies to utilize larger samples for greater validity and robustness, this research uses data from companies in 37 countries, particularly those with mega-diverse ecosystems. These countries are home to a significant portion of the world's species, making them biodiversity-rich (60%–70% of global biodiversity). This cross-country approach enables an understanding of the variations in biodiversity disclosure across countries with different cultural, governance, and economic factors (Gallén & Peraita, 2018).

This study adopts a paradoxical perspective, where corporate management faces conflicting pressures. On one side, they are tasked with enhancing shareholder welfare (profit-oriented), while on the other side, they must address pressures from various stakeholders to be socially and environmentally responsible (social-environmental-oriented). To explore this in-depth, the study employs three theories—institutional theory, stakeholder theory, and impression management theory—that indirectly seem contradictory. These three theories have rarely been combined in sustainability research, particularly in a specific context like biodiversity disclosure. Their use aims to address concerns raised by researchers that a single theory might not adequately explain social and environmental disclosure.

2 | LITERATURE REVIEW

2.1 | Theoretical perspective

Due to the scarcity of empirical research addressing biodiversity aspects, researchers still adopt theories linking companies and their sustainability performance (see Amran et al., 2021). This is because biodiversity disclosure remains part of sustainability reporting (Hassan et al., 2020). The relationship between sustainability and corporate contributions has been analyzed using various theories. Starting from agency theory (Bae et al., 2018; Naciti, 2019); stakeholder theory (Naciti, 2019; Russo & Perrini, 2010); legitimacy theory (Amran et al., 2014; Haniffa & Cooke, 2005; Matuszak et al., 2019); to signaling theory (Bae et al., 2018). The multitude of theories used by researchers is because sustainability issues can be viewed from various perspectives and dimensions (Hussain et al., 2018; Kuzey & Uyar, 2017; Matuszak et al., 2019). To date, there is still no consensus on a theoretical framework that explains the determinants underlying voluntary corporate disclosures (Jones et al., 2020; Verrecchia, 2001). However, the common assumption accepted by almost all parties is that companies tend to disclose information beneficial to them and conceal information with adverse consequences (Dye, 2001).

Despite the diversity of theories and approaches used to understand corporate social responsibility (CSR) and sustainability reporting



practices, Gray et al. (1995) mentioned that there are two groups of theories that form the main axis of the theories used to observe CSR disclosure. These two groups are economically oriented theories and socially oriented theories. Economically oriented theories refer to positive accounting theory and agency theory, which state that companies use social and environmental disclosures to reduce agency costs that may arise in the form of political costs (Belkaoui & Karpik, 1989). However, in their development, both theories are often debated and considered unable to explain further than the dynamics of CSR and sustainability development. These two theories tend to overlook the role of external parties and the environment in which a company operates (Tilt, 1994). Whereas socially oriented theories rely on three popular theories: institutional theory, legitimacy theory, and stakeholder theory. These three theories are not entirely separate from each other but have many overlapping and intersecting parts (Gray et al., 1995). They also share similar ontological views with the assumption that organizations or companies are influenced by society and vice versa.

Despite the two main theoretical axes above, there are still some theories that are marginal and tend to be overlooked by researchers, such as impression management theory. This theory is highly relevant amidst increasing criticism and scrutiny from external stakeholders regarding companies' operations that have harmed the environment. Some critical sustainability literature mentions that stakeholders need to question whether companies have reported reliable information and reflected the actual situation (Boiral, 2013). Today, this theory is beginning to be considered for use in sustainability research because it provides a new perspective, especially for companies with higher environmental impact (see Corazza et al., 2020; Talbot & Boiral, 2018).

This study employs three theories: institutional theory, stakeholder theory, and impression management theory to provide a broader and more comprehensive perspective. Hussain et al. (2018) mentioned that there is no single theory that can fully explain the relationship between driving factors and corporate sustainability disclosure. Therefore, in this study, all three theories will be used both in constructing hypotheses and explaining the research findings.

2.2 | Hypothesis development

The environmental development at the national level reflects a country's performance in environmental issues such as environmental degradation, climate change, global warming, and biodiversity loss (Xiao et al., 2018). A country's environmental performance shapes public interests and expectations, which in turn influence the understanding of appropriate and inappropriate corporate behavior. In countries with high environmental performance, corporate responsibility extends beyond financial welfare and encompasses broader environmental aspects (Uyar et al., 2021).

The environmental culture of a country serves as a crucial driver for private companies to enhance their environmental performance. In countries with a favorable environmental index, stakeholder demands

on companies tend to be higher. This necessitates companies to increase their investments in environmental management and enhance technological innovations related to environmental protection. Typically, governments encourage the improvement of their environmental index by tightening regulations concerning companies' environmental impacts (Eiadat et al., 2008). Furthermore, as governments enforce these regulations and laws, companies adopt more environmentally friendly operational practices, gradually leading stakeholders to perceive environmental protection as the norm. This condition fosters higher societal expectations regarding companies' environmental contributions in countries with higher environmental indexes (Xiao et al., 2018).

Based on institutional theory, companies adopt specific practices (in this case, incentives to disclose biodiversity information) due to government coercion in the form of specific regulations as coercive isomorphism and evolving societal norms as normative isomorphism (DiMaggio & Powell, 1983). Second, a set of regulations and norms emphasizing the importance of environmental protection and biodiversity conservation will cultivate shared awareness and elevate expectations for corporate contributions. Stakeholders, both internal and external, will continue to urge companies to adopt sustainable practices in their operations. Third, from the company's perspective, to avoid negative sentiments from various stakeholders and legal consequences, companies will utilize communication tools such as sustainability reports to create the impression that management has made efforts to meet their expectations (Corazza et al., 2020; Roberts et al., 2023).

Jensen and Berg (2012) concluded that companies domiciled in countries with higher social and environmental development are more likely to publish integrated reports. One proxy for a country's sustainability performance used in their research is the Environmental Performance Index (EPI). The results indicate that the national environmental index significantly influences corporate sustainability reporting. The hypothesis derived from the institutional theory and previous research is as follows:

H1. *The level of a country's environmental performance positively influences the tendency of companies to disclose biodiversity reports.*

The governance framework of a country relies on institutional environment, regulations, and social norms. Institutional environment and regulations (such as laws, rules, sanctions, policies, etc.) aim to codify socially accepted behaviors. This can act as a coercive mechanism for corporate engagement and reporting of social-environmental responsibilities (Miniaoui et al., 2019). Although some studies highlight the importance of innovation in public policies related to corporate social-environmental responsibility, regulations alone are not sufficient to ensure corporate engagement. Effective monitoring and enforcement of regulations are required (Campbell, 2007). Government efficiency and regulations on reporting will definitely impact corporate activities, thus influencing the extent of social-environmental disclosure practices. The legal framework in a country plays a crucial

role in facilitating corporate engagement with the state (Baldini et al., 2018).

Guenther et al. (2015) used one of the indicators from the World Governance Index (WGI), namely freedom of speech and transparency (voice and accountability), as a determinant of carbon disclosure. The voice and accountability indicator reflects people's ability in a country to influence politics. Climate change is a widely discussed issue in the media and by many stakeholders. Therefore, the ability of the general public to make their voices heard and to influence a judicial process is crucial for corporate disclosure decisions and should be positively associated with carbon disclosure. The results indicate that the role of all stakeholders, including the general public, in expressing their opinions empirically in this study significantly influences corporate carbon disclosure. Uyar et al. (2021) also provided evidence of the crucial role of a strong governance system in responsible corporate behavior. In their study, Uyar et al. (2021) used a global tourism industry sample from 2011 to 2016. The findings concluded that a strong national governance structure positively influences the adoption rate and level of sustainability reporting. We develop the hypothesis regarding the national governance structure as follows.

H2. The state governance structure positively influences the tendency of companies to disclose biodiversity reports.

In the realm of governance, potential drivers of non-financial reporting can be categorized into two main types, namely corporate governance represented by board characteristics and company financial characteristics (Amran et al., 2021). However, most researchers use company financial characteristics as control variables (e.g., Haque & Jones, 2020; Hassan et al., 2020; Hussain et al., 2018; Naciti, 2019). Governance context encourages companies to consider ethics, fairness, transparency, and accountability in all their affairs (Jamali et al., 2008). Effective governance structures prevent illegal actions against stakeholders and therefore ensure long-term success and sustainability of the company. Strong corporate governance has been shown to reduce agency problems and encourage managers to operate effectively (Terjesen et al., 2016). Specifically, governance structures play a crucial role in enhancing corporate social-environmental performance and encouraging companies to be transparent and accountable about their social-environmental responsibility initiatives (Campbell, 2007).

Research attempting to link the influence of corporate governance on corporate social-environmental responsibility has been extensive. Matuszak et al. (2019) examined the role of banking corporate governance in Poland. Using proxies for board size and diversity, they found that both proxies positively influence the level of corporate CSR reporting. Naciti (2019) also drew similar conclusions that good governance will produce value and benefits as expected by stakeholders. This study provides more specific evidence of the influence of governance on corporate sustainability performance. Naciti (2019) disaggregates sustainability performance into two dimensions, social and environmental, using governance proxies such as board diversity, board independence proportion, and CEO duality. The results show that all variables of

corporate governance significantly influence sustainability performance both overall and in each dimension.

The board of directors in a company plays a crucial role (Sun et al., 2021). Beyond overseeing management in company operations, the board provides deeper insights and analysis into current or potential future issues (Bae et al., 2018). Another key role of the board is as a liaison between the company and stakeholders. This communication involves not only financial information but also non-financial corporate activities (Matuszak et al., 2019). A larger board can assist management by facilitating access to resources, skills, and expertise in specific fields (Aksoy et al., 2020). Numerous empirical findings conclude that board size plays a crucial role in encouraging companies to enhance their environmental performance (see Bae et al., 2018; Giannarakis, 2014; Naciti, 2019; Sun et al., 2021). A larger board allows for a broader exchange of innovative ideas and experiences (Giannarakis, 2014), typically comprising members with diverse backgrounds, expertise, experiences, and competencies (Bae et al., 2018; Matuszak et al., 2019). Based on this comparison, the following hypothesis is developed:

H3. Board size positively influences the tendency of companies to disclose biodiversity reports.

Based on stakeholder theory, independent directors represent the diverse interests of various company stakeholders. This enables the board to exert pressure on companies to fulfill and disclose their social and sustainability responsibilities. Independent board members typically oversee, supervise, and monitor management while providing valuable advice for sustainable corporate behavior (Aksoy et al., 2020; de Villiers et al., 2011). García-Meca and Palacio (2018) assert that a higher proportion of independent directors can be considered a policy to manage the company's relationship with the external environment to enhance credibility, reputation, and legitimacy. Sun et al. (2021) conducted specific research on disclosure practices of animal welfare and factors driving such disclosure in food companies in China. Their findings revealed that a high proportion of independent directors could effectively reduce agency problems through monitoring and controlling management. Therefore, boards with a high proportion of independent directors are expected to compel management to present higher transparency levels through corporate reporting. The developed hypothesis related to the proportion of independent directors is:

H4. The proportion of independent directors positively influences the tendency of companies to disclose biodiversity reports.

Female board members are believed to demonstrate greater sensitivity to current social and environmental concerns, including biodiversity risks (Haque & Jones, 2020). This notion is also supported by Glass et al. (2016), who claim that female board members focus more on long-term company decisions and strategies, prioritizing the broader community's interest in sustainable environmental development. According to stakeholder theory, the board should mirror a



multicultural societal structure advocated in modern society, allowing for a diverse range of backgrounds, experiences, and perspectives. Naciti (2019) provides empirical evidence of the relationship between female board members and corporate sustainability performance. The results show that women play a crucial role in company strategic policies (also see Haque & Jones, 2020; Liao et al., 2015). Therefore, the following hypothesis is developed:

H5. *The proportion of female directors positively influences the tendency of companies to disclose biodiversity reports.*

Another attribute in the corporate governance structure extensively researched recently is the presence of a sustainability/CSR committee (Hussain et al., 2018). This committee's existence signifies the company's orientation and commitment to sustainable development. Besides managing company risks and opportunities related to sustainability issues, this dedicated committee serves to fulfill the company's obligations to stakeholders (García-Sánchez et al., 2019). Fuente et al. (2017) highlight that a sustainability committee is a crucial accountability mechanism, ensuring the quality of corporate sustainability reporting. They provide reliable and credible information to all stakeholders, playing a key role in managing risk oversight. Hussain et al. (2018) found in their research that the committee is essential in supporting company sustainability reporting. Indirectly, the board gives priority to the company's efforts to enhance environmental and social concerns. Therefore, the following hypothesis is developed:

H6. *The existence of a CSR/sustainability committee positively influences the tendency of companies to disclose biodiversity reports.*

3 | RESEARCH METHOD

3.1 | Data and sample

The population in this study consists of all companies in countries encompassing all members of the Organization for Economic Cooperation and Development (OECD), countries under consideration by the OECD council, and countries engaged in strengthening OECD cooperation. The OECD is regarded as an organization continuously striving to achieve Sustainable Development Goals (SDGs), including the preservation of biodiversity to mitigate the extinction rates of flora and fauna. Companies within the population were then selected using three criteria: (a) Company data, including financial and board data, are available on Thomson Reuters. (b) Published sustainability reports during the period 2016–2020. (c) Reported performance/information related to biodiversity during this period using the standards set by the Global Reporting Initiative (GRI). After the selection process, the sample meeting the selection criteria comprises 12,432 observations from 3373 companies across 37 countries, as presented in Table 1. The research period spans from 2016 to 2020.

TABLE 1 Sampled countries.

Country	Obs.	%
Australia	899	7.23
Austria	86	0.69
Belgium	109	0.88
Brazil	334	2.69
Canada	1228	9.88
Chile	148	1.19
Colombia	87	0.70
Czech Republic	14	0.11
Denmark	142	1.14
Finland	128	1.03
France	541	4.35
Germany	629	5.06
Greece	100	0.80
Hungary	22	0.18
Indonesia	110	0.88
Ireland	198	1.59
Italy	325	2.61
Japan	1859	14.95
South Korea	580	4.67
Luxembourg	81	0.65
Mexico	221	1.78
Netherlands	175	1.41
New Zealand	233	1.87
Norway	177	1.42
Peru	112	0.90
Philippines	102	0.82
Poland	171	1.38
Portugal	56	0.45
Romania	6	0.05
Russia	187	1.50
Singapore	245	1.97
Spain	280	2.25
Sweden	443	3.56
Switzerland	435	3.50
Thailand	256	2.06
Turkey	186	1.50
United Kingdom	1527	12.28
Total	12.432	100

3.2 | Measurement of variables

The dependent variable in this study uses the measurement of biodiversity disclosure (BIODIS) based on the GRI 304 Biodiversity Index. This standard contains four disclosure components as can be seen in Table 2. A score of 0 is assigned to companies that do not disclose GRI 304 at all. A score of 1 is assigned to companies that partially or

TABLE 2 Biodiversity disclosure based on GRI 304 biodiversity index.

304-1	Disclosing the location of well-managed company operations, whether leased, owned, or situated near areas of high biodiversity value.
304-2	Disclosing the significant impacts made by the company, whether related to their operations, products, or services.
304-3	Revealing habitats that have been restored or protected by the company.
304-4	Disclosing which species have been affected by the company's operations, particularly those listed in the IUCN Red List and national conservation species lists of each respective country.

Source: <https://www.globalreporting.org/>.

fully disclose. The use of this binary variable is widespread in sustainability and biodiversity disclosure research, as demonstrated by studies conducted by Liao et al. (2015), Fuente et al. (2017), Uyar et al. (2021), and Sun et al. (2021). Due to its binary nature, the hypotheses in this study use the term “tendency,” which attempts to interpret logistic regression results using the concept of odds ratios.

In the additional analysis, this study employs the measurement of biodiversity disclosure quality extracted from the Refinitiv Eikon database (Velte, 2023). This score ranges from 0 to 100, indicating disclosure quality from worst to best. The score comprises eight dummy variables that represent a company's disclosure of biodiversity efforts, as reported by the sampled firms and compiled by Refinitiv. These variables encompass biodiversity policies and procedures, biodiversity restoration or protection, minimizing impact, decreasing toxic chemical use, recycling hazardous waste or wastewater, biodiversity impact on land use, and biodiversity initiative management monitoring. Utilizing the Refinitiv Eikon database accommodates variations in reporting standards across industries and nations. Moreover, the scoring system takes into account both the caliber and extent of company disclosures, enabling comparisons among peers within similar regions and sectors.

Furthermore, there are six main independent variables and four control variables. To clarify each variable used in this study, Table 3 summarizes the definitions, measurement methods, and data sources of each of these variables.

3.3 | Research model

To test the hypotheses, this study employs logistic regression analysis. The model used is as follows:

$$\begin{aligned} \text{BIODIS}_{it} = & \beta_0 + \beta_1 \text{EPI}_{it} + \beta_2 \text{WGI}_{it} + \beta_3 \text{BSIZE}_{it} + \beta_4 \text{BINDEP}_{it} \\ & + \beta_5 \text{BGENDER}_{it} + \beta_6 \text{SUSCOM}_{it} + \beta_7 \text{SIZE}_{it} + \beta_8 \text{ROA}_{it} \\ & + \beta_9 \text{RISK}_{it} + \beta_{10} \text{GDP}_{it} + \beta_{11} \text{INF}_{it} + \text{Year Dummies} \\ & + \text{Board Type Dummies} + \mu_{it} \end{aligned}$$

Information on the variables:

BIODIS: Biodiversity disclosure

EPI: National environmental index

WGI: National governance index

BSIZE: Board size

BINDEP: Proportion of independent board members

BGENDER: Proportion of female board members

SUSCOM: Presence of CSR/Sustainability Committee

SIZE: Company size

ROA: Company profitability

RISK: Company risk

GDP: National economic size

INF: Inflation rate

Year Dummies: Year effect

Board Type Dummies: Corporate governance type effect

μ : Error term

4 | RESULTS AND DISCUSSION

4.1 | Descriptive statistics

Descriptive statistics of all variables used in this study are presented in Table 3. From the table, it can be observed that the average biodiversity disclosure across 12,432 observations is only 32.8 percent, indicating that only 4078 observations disclose this information. The remaining 8354 observations do not disclose it. Secondly, the BIODIS SCORE variable attempts to capture the quality of biodiversity disclosure by companies. Similar to the previous measurement, the average of this variable shows a figure of 31.479. This average suggests that the quality of disclosure by companies is still low. The table also provides insights into the excellent EPI of the sampled countries. The average EPI score is 75.009.

4.2 | Correlation test (univariate analysis)

To measure the correlation between research variables, Pearson's correlation test was employed. The results of this correlation test are presented in Table 4. Based on the table, there are no very strong relationships except between the BIODIS and BIODIS_SCORE variables. This is because both of them are dependent variables that are interrelated. The BIODIS_SCORE variable assesses the quality of disclosure when the BIODIS variable takes a value of 1. This strong relationship is not a concern as they are not analyzed together in one model. A significant positive relationship with the BIODIS variable is observed in the variables BSIZE, SUSCOM, FSIZE, and RISK. This indicates that board attributes such as board size and the presence of a sustainability committee can enhance the tendency of companies to disclose biodiversity reports. A significant negative relationship with the BIODIS variable is observed in the variables EPI, WGI, and

TABLE 3 Research Variables.

Variables	Explanation	Measurement	Data source
BIODIS	Biodiversity disclosure	Dummy value: 1 if the company discloses, 0 otherwise	Corporate Sustainability Report
BIODIS SCORE	Level of biodiversity disclosure quality	Value ranging from 0 to 100 for the company's biodiversity disclosure	Refinitiv Eikon
EPI	National environmental index	Value ranging from 0 to 100 for the Environmental Performance Index (EPI). The index employs 40 performance indicators spanning 11 issue categories to evaluate and score 180 countries on their performance regarding climate change, environmental health, and ecosystem vitality.	Yale University https://epi.yale.edu/
WGI	National governance index	Value ranging from −2.5 to 2.5 from World Governance Indicators (WGI). The index comprises six governance indicators namely Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption	World Bank
BSIZE	Board size	Number of board members	Thomson Reuters
BINDEP	Proportion of independent board members	Percentage of independent board members divided by total board members	Thomson Reuters
BGENDER	Proportion of female board members	Percentage of female board members divided by total board members	Thomson Reuters
SUSCOM	Presence of CSR/Sustainability Committee	Score 1 if the company has a specialized committee for CSR or Sustainability, and 0 if not	Thomson Reuters
SIZE	Company size	Natural logarithm of total company assets	Thomson Reuters
ROA	Company profitability	Return on Assets (ROA)	Thomson Reuters
RISK	Company risk	Ratio of total debt to total assets	Thomson Reuters
GDP	National economic size	Natural logarithm of Gross Domestic Product (GDP)	World Bank
INF	Inflation rate	Change in the prices of goods and services.	World Bank

TABLE 4 Descriptive statistics.

Variables	Obs.	Mean	Std. dev.	Min	Max
BIODIS	12,432	0.328	0.469	0	1
BIODIS SCORE	12,432	31.479	40.311	0	98.592
EPI	12,432	75.009	9.76	37.8	90.68
WGI	12,432	1.148	0.636	−0.718	1.865
BSIZE	12,432	9.793	3.626	3	22
BINDEP	12,432	0.526	0.257	0	1
BGENDER	12,432	0.19	0.15	0	0.571
SUSCOM	12,432	0.621	0.485	0	1
SIZE	12,432	22.25	1.721	17.496	26.882
ROA	12,432	0.033	0.087	−0.5	0.285
RISK	12,432	0.267	0.189	0	1
GDP	12,432	27.985	0.957	24.854	29.265
INF	12,432	1.504	1.923	−1.248	16.332

Note: The definition of variables is presented in Table 2.

BINDEP. This implies that lower environmental performance and government governance indices can increase the tendency of companies

to disclose biodiversity reports. This could be because companies seek to maintain legitimacy among stakeholders.

TABLE 5 Correlation test results.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) BIODIS	1.000												
(2) BIO_SCORE	0.990*** (0.000)	1.000											
(3) EPI	-0.088*** (0.000)	-0.081*** (0.000)	1.000										
(4) WGI	-0.143*** (0.000)	-0.157*** (0.000)	0.680*** (0.000)	1.000									
(5) BSIZE	0.221*** (0.000)	0.253*** (0.000)	-0.010 (0.255)	-0.187*** (0.000)	1.000								
(6) BINDEP	-0.075*** (0.000)	-0.069*** (0.000)	0.151*** (0.000)	0.276*** (0.000)	-0.226*** (0.000)	1.000							
(7) BGENDER	0.008 (0.391)	0.032*** (0.001)	0.275*** (0.000)	0.240*** (0.000)	0.031*** (0.001)	0.347*** (0.000)	1.000						
(8) SUSCOM	0.353*** (0.000)	0.343*** (0.000)	0.004 (0.617)	-0.001 (0.911)	0.257*** (0.000)	0.044*** (0.000)	0.119*** (0.000)	1.000					
(9) FSIZE	0.285*** (0.000)	0.372*** (0.000)	-0.049*** (0.000)	-0.167*** (0.000)	0.532*** (0.000)	-0.042*** (0.000)	0.044*** (0.000)	0.347*** (0.000)	1.000				
(10) ROA	0.008 (0.395)	0.003 (0.741)	0.019** (0.033)	-0.048*** (0.000)	0.022** (0.014)	-0.028*** (0.002)	0.028*** (0.002)	0.024*** (0.007)	0.078*** (0.000)	1.000			
(11) RISK	0.063*** (0.000)	0.022** (0.029)	-0.129*** (0.000)	-0.118*** (0.000)	0.027*** (0.003)	0.027*** (0.003)	0.059*** (0.000)	0.027*** (0.003)	0.056*** (0.000)	-0.192*** (0.000)	1.000		
(12) GDP	0.083*** (0.000)	0.099*** (0.000)	0.220*** (0.000)	0.115*** (0.000)	0.170*** (0.000)	-0.184*** (0.000)	-0.120*** (0.000)	0.100*** (0.000)	0.119*** (0.000)	0.003 (0.715)	-0.112*** (0.000)	1.000	
(13) INF	0.042*** (0.000)	0.042*** (0.000)	-0.372*** (0.000)	-0.499*** (0.000)	-0.040*** (0.000)	-0.031*** (0.001)	-0.061*** (0.000)	-0.039*** (0.000)	-0.010 (0.258)	0.053*** (0.000)	0.081*** (0.000)	-0.130*** (0.000)	1.000

Note: The definition of variables is presented in Table 2. Significance level: ***<0.01; **<0.05; *<0.1.



Furthermore, significant positive relationships with the BIODIS variable are evident in the BSIZE, SUSCOM, FSIZE, and RISK variables. This indicates that board attributes such as board size and the presence of a sustainability committee can enhance a company's tendency to disclose biodiversity reports. Significant negative relationships with the BIODIS variable are observed in the EPI, WGI, and BINDEP variables. This implies that lower environmental and governance performance index scores can increase a company's tendency to disclose biodiversity reports. This could be attributed to companies striving to maintain stakeholder legitimacy.

This study used an upper threshold of 0.9 and a lower threshold of -0.9 to indicate a strong correlation, similar to Matuszak et al. (2019) and Hassan et al. (2020). Table 4 does not reveal any such strong relationships, thus suggesting that the data in this study is free from autocorrelation issues.

4.3 | Hypothesis testing

Prior to conducting the hypothesis testing, we performed the tests for classical assumptions and found that there are no autocorrelation and multicollinearity problems; however heteroscedasticity does exist based on the Breusch–Pagan/Cook–Weisberg test and the Modified Wald test for groupwise. To address the problem, robust treatment is applied to the standard error in panel data regression (Hoechle, 2007).

Table 5 presents the results of logistic regression, with the dependent variable being the BIODIS variable (company's biodiversity disclosure). The EPI variable, which serves as a proxy for the national-level Environmental Performance Index, has a moderately significant effect at the 0.1 level on a company's tendency to disclose biodiversity reports. This suggests that as the national-level Environmental Performance Index increases, the likelihood of companies disclosing biodiversity reports also increases. The results are consistent with hypothesis 1 and also aligns with prior research, even though they did not specifically use biodiversity disclosure as their dependent variable. Empirical studies that have examined the impact of the environmental performance index include Jensen and Berg (2012), Kiliç et al. (2019), and Uyar et al. (2021).

The environmental performance of a country reflects how effectively environmental issues such as pollution reduction, waste management, and biodiversity conservation have been addressed within that nation. As a country's overall environmental performance improves, internal stakeholders such as employees and management are more likely to respond positively to the enhanced environmental performance of companies, including reporting their impacts and initiatives to mitigate the ongoing loss of biodiversity (Xiao et al., 2018). This is due to pressures from external stakeholders such as environmental advocates and the government. In line with the institutional theory, government pressures can take the form of stricter regulations concerning company operations that directly impact environmental degradation (Eiadat et al., 2008).

In contrast to the formulated hypotheses, Table 5 also presents opposing directions. The logistic regression results indicate that a

lower governance index of a country will increase a company's tendency to disclose biodiversity information. Therefore, additional explanations are required to elucidate these contradictory findings. One potential explanation is that, in contexts where the governance index of a country is lower, companies may strive to project a more positive image than inferred from their operating environment, aiming to provide a level of certainty to stakeholders (Gerged et al., 2023). Therefore, for this variable, impression management theory is highly suitable in explaining how corporate management behavior seeks to create a “favorable impression” amidst poor governance conditions within a country. Meanwhile, according to institutional theory, this represents mimetic isomorphism behavior of companies (DiMaggio & Powell, 1983), as other companies adopt the same practices (namely, disclosing biodiversity information) to generate similar legitimacy among their stakeholders.

Regarding corporate governance attributes, the variables that have been found to positively influence biodiversity disclosure are board size and the presence of a sustainability committee. The board is represented as the shareholders' representatives, overseeing the company to minimize conflicts of interest between principals and agents, namely the management (Fama & Jensen, 1983). The board is also believed to represent various company stakeholders. Therefore, a larger and more diverse board can better represent minority interest groups in the decision-making processes. A larger board size also reduces gaps as it allows for sharing skills, experience, information, and resources (Nasih et al., 2019). Meanwhile, the presence of a sustainability committee signifies the company's orientation and commitment to sustainable development. Besides managing risks and opportunities related to sustainability issues, this specialized committee also fulfills the company's obligations to stakeholders (García-Sánchez et al., 2019). Thus, hypotheses three and six are accepted.

4.4 | Additional tests

To provide a broader perspective on biodiversity disclosure, this study conducted supplementary testing following the main tests. This research aimed to offer a broader insight into biodiversity disclosure score by companies in the sample countries. Based on data collected from Refinitiv EIKON, the range of biodiversity disclosure scores is from 0 to 100. Using this score as the measurement of the dependent variable qualifies the use of panel regression method. Based on the Hausman test (untabulated), we found that the fixed effect panel regression is most suitable for the additional test.

Based on the table, the factors influencing the quality of biodiversity disclosure include the environmental performance index, national governance index, board size, the presence of a sustainability committee, and company size. On the other hand, the proportion of independent board members, proportion of female board members, profitability, and company risk are not shown to significantly affect the quality of biodiversity reporting. Two differences are observed between the results in Table 6 (disclosure quality) and Table 5 (disclosure tendency). First, a poor national governance index can increase

TABLE 6 Logistic regression results for biodiversity disclosures.

Variables	Coefficient	p-Value	Explanation
EPI	0.006*	0.0785	Hypothesis accepted
WGI	−0.442***	0.000	Hypothesis rejected
BSIZE	0.023***	0.0005	Hypothesis accepted
BINDEP	−0.31***	0.001	Hypothesis rejected
BGENDER	0.067	0.352	Hypothesis rejected
SUSCOM	1.646***	0.000	Hypothesis accepted
SIZE	0.221***	0.000	
ROA	0.079	0.399	
RISK	0.581***	0.000	
GDP	0.05**	0.0315	
INF	0.028**	0.0265	
Constant	−8.414***	0.000	
Year Effect	Yes		
CG Type Effect	Yes		
Obs.	12,432		
Pseudo R ²	0.160***	0.0000	

Note: Significance level: ***<0.01; **<0.5; *<0.1.

the tendency of companies to engage in disclosure but to enhance the quality of reporting, a strong governance environment is required. The findings in Table 6 support the empirical evidence provided by Uyar et al. (2021). Similar to this study, Uyar et al. (2021) employed two measurements representing the tendency and quality of sustainability reporting in the tourism sector. Uyar et al. (2021) emphasized that governance structure plays a pivotal role in enhancing the social-environmental performance (quality) of companies and encouraging transparency and accountability regarding their sustainability initiatives. Second, the variable RISK is not significant at any level. This supports the impression management theory that biodiversity reporting is still widely employed by management as a “favorable impression” towards external parties. This is indicated by the findings that companies with high risks tend to disclose biodiversity information, but the significance is not apparent in terms of quality.

We also performed supplementary analyses by categorizing the sample into specific groups, aiming to enhance the robustness and specificity of the empirical findings. This categorization also aims to delve deeper into the impact of environmental performance indices, state governance, and corporate governance, following the approach undertaken by Ben-Amar and Chelli (2018), Gallén and Peraita (2018), Moura-Leite et al. (2012), and Miniaoui et al. (2019).

4.4.1 | Sample division based on developed and developing countries

Research has been conducted on sustainability in both developed and developing countries, either specifically mentioning the context of the country or selecting a country as the study's location. These studies

have provided varied results. Hassan et al. (2020) found that companies in developing countries tend to increase biodiversity disclosure in an effort to maintain the company's image and influence stakeholder perceptions. However, other studies such as those by Bhatia and Makkar (2020) indicated that sustainability disclosure in developed countries is higher than in developing countries. The research focused on developed countries has also been extensively conducted by other researchers, such as in the United States (Hussain et al., 2018); Poland (Matuszak et al., 2019); and other European and American countries (Naciti, 2019).

In more developed countries, the emergence of NGOs and environmental social movement organizations is more significant than in less developed countries. These NGOs and environmental social movement organizations pressurize companies to behave responsibly in social and environmental matters (Campbell, 2007). Well-organized stakeholder groups also influence public expectations and concerns, reinforcing community voices on social and environmental issues. Consequently, a strong public voice increases pressure on companies to align their CSR practices with the demands and expectations of society (Uyar et al., 2021).

This research divides developed and developing countries based on the Human Development Index (HDI), as it is more relevant to the research topic than dividing them based on GDP or per capita income, as done by Hassan et al. (2020) and Gallén and Peraita (2018). The results (untabulated) show several interesting findings. Firstly, the environmental performance index affects the tendency of biodiversity reporting and the quality of reporting. In contrast, in developing countries, the opposite was found. Companies in developing countries with lower environmental performance indexes tend to disclose information. This finding is interesting as it could serve as a mediator among the research streams (developed and developing) discussed earlier, where biodiversity disclosure in developed countries is based on institutional environmental conditions, while in developing countries, it is more about how this disclosure creates a “favorable impression” for external parties (Hassan et al., 2020; Uyar et al., 2021).

Secondly, a deficient governance index impacts the inclination of enterprises in advanced economies to participate in biodiversity reporting. Conversely, a robust governance index amplifies the caliber of reporting in less developed nations. This corresponds with the findings of Bhatia and Makkar (2020). Due to the existence of institutional voids and inadequacies in law enforcement, coupled with weak governance and limited coordination among businesses, governments, and stakeholders, the progression of sustainability reporting is constrained in developing countries, unlike their counterparts in developed nations. Thirdly, concerning governance attributes in developed countries, similar to the main findings, dimensions such as board size and the existence of committees on the board are verified to heighten the propensity of firms to partake in biodiversity reporting and enhance the quality of such disclosure. Conversely, no governance attribute exerts an influence on biodiversity disclosure in developing countries. This underscores that the board's impact on biodiversity reporting is not as pronounced in developing nations.



Overall, these findings are in line with the suggestions of Bhatia and Makkar (2020) in their study that governments in developing countries should emphasize environmental regulatory improvements. Governments in developing countries should also take a proactive role in sustainability reporting. Furthermore, governments should enhance corporate awareness of sustainability, gradually integrating the concept of sustainability into the country's culture.

4.4.2 | Sample division based on megadiverse countries

Megadiverse countries contribute 70% of Earth's total biodiversity, including rainforests, coral reefs, and other biodiversity-rich ecosystems. Megadiverse nations like Indonesia, the Philippines, and Brazil wield significant influence on the world, impacting climate, biodiversity resources, human well-being, and broader health on a global scale (Von Rintelen et al., 2017). However, despite this, there is scarce empirical evidence regarding corporate biodiversity disclosures in this region (Skouloudis et al., 2019). Therefore, this study strives to be the first driver exploring the roles of environmental indices, state governance, and corporate governance in biodiversity disclosure.

This research employs categorization based on <https://biodiversitya-z.org/> for megadiverse countries. There are 17 countries that possess substantial global biodiversity. These countries include the United States, Mexico, Colombia, Ecuador, Peru, Venezuela, Brazil, the Democratic Republic of Congo, South Africa, Madagascar, India, Malaysia, Indonesia, the Philippines, Papua New Guinea, China, and Australia.

The results (untabulated) show that in megadiverse countries, when their environmental index declines, companies tend to engage in disclosure. This is due to increased external pressures. Conversely, in non-megadiverse countries, disclosure tendencies rise as the environmental index increases. Thus, stakeholder theory better explains disclosure escalation in megadiverse countries, while institutional theory better explains the phenomenon in non-megadiverse countries. Furthermore, concerning corporate governance attributes, board size and the presence of sustainability committees are pivotal factors influencing biodiversity disclosure tendencies. The same applies in non-megadiverse countries, albeit with the negative impact of independent board proportion. Lastly, it's noteworthy that for the first time, the variable BGENDER is significant for biodiversity reporting quality in megadiverse countries. This demonstrates that the role of women on boards is not universal but context-dependent. Liao et al. (2015) propose that women generally display more concern and tend to take action to mitigate perceived environmental risks. This aligns with the context of megadiverse countries, where not only do they possess rich biodiversity, but also face considerable environmental risks and biodiversity loss (Von Rintelen et al., 2017). This study supports other research conducted in similar contexts, such as in the United States (Hussain et al., 2018; Naciti, 2019) and Australia (Rao & Tilt, 2016).

4.4.3 | Sample division based on environmental impact industries

The characteristics of industries have been hypothesized in numerous studies to be a primary influence on corporate environmental and social reporting (e.g., Amran et al., 2021; Hassan et al., 2020; Moura-Leite et al., 2012). Industries play a role in the intensity of a company's social and environmental responsibilities due to stakeholder pressure for enhanced social responsiveness. Moreover, according to institutional theory, companies in specific industries with direct social and environmental impacts will face stricter government regulations (de Grosbois & Fennell, 2022). Additionally, companies successfully developing resources that generate competitive advantages often induce others to mimic those advantages to narrow the competitive gap (Moura-Leite et al., 2012).

Another underlying assumption for this hypothesis is that companies with a higher tendency for pollution are required to comply with more stringent legal requirements (Hassan et al., 2020). These companies are perceived as causing environmental harm and thus face greater pressure from stakeholders. Therefore, they possess stronger incentives to disclose more environmental information. Kumar et al. (2021) investigated potential determinants influencing corporate sustainability disclosure in India. One of their hypotheses examined whether industries categorized as "environmental polluters" would disclose more sustainability reports than other companies. The results indicated that "environmental polluter" industries reported more sustainability information across all ESG dimensions and overall sustainability reporting. In this context, this study employs the categorization of impact industries based on research by Boiral (2013), and Kumar et al. (2021).

The results (untabulated) show that, for the country-level factor, in companies within impact industries, the governance index negatively affects biodiversity reporting. Meanwhile, in non-impact industries, the environmental index positively influences such reporting. This indicates that non-impact industries, such as financial and service sectors, will engage in disclosure only when the country's environmental index experiences an increase (improvement). Conversely, for impact industries, this index is not a significant driver.

Another significant finding is the strong impact of the BGENDER variable. This further reinforces that under specific conditions, the role of women is crucial in encouraging companies to disclose their biodiversity information. This is especially notable in impact industries. This supports the assumption that women are generally more concerned and inclined to take action to mitigate perceived environmental risks (Liao et al., 2015).

4.5 | Sensitivity analysis

This analysis is utilized to strengthen and validate the findings of the main model. In this case, measurements of institutional factors, namely the environmental performance index and national

governance index, will be replaced. Firstly, the environmental performance index represents the cumulative environmental performance of a country. One component of the environmental performance index is conservation performance concerning biodiversity and habitat (Wendling et al., 2022). This data is extracted from the EPI index (<https://epi.yale.edu/>). Secondly, for the national governance index, this study employed principal component analysis (PCA) on the six components of the national governance index released by the World Bank. PCA is widely used to create a new index from multiple components by simplifying data variation within those components (e.g., de Villiers & Marques, 2016).

The model for sensitivity testing is as follows:

$$\begin{aligned} \text{BIODIS}_{it} = & \beta_0 + \beta_1 \text{BDH}_{it} + \beta_2 \text{PCA}_{it} + \beta_3 \text{BSIZE}_{it} + \beta_4 \text{BINDEP}_{it} \\ & + \beta_5 \text{BGENDER}_{it} + \beta_6 \text{SUSCOM}_{it} + \beta_7 \text{SIZE}_{it} + \beta_8 \text{ROA}_{it} \\ & + \beta_9 \text{RISK}_{it} + \beta_{10} \text{GDP}_{it} + \beta_{11} \text{INF}_{it} + \text{Year Dummies} \\ & + \text{Board Type Dummies} + \mu_{it}, \end{aligned}$$

where BDH is the country's biodiversity performance score and PCA is the result of a new simplified index of state governance.

The outcomes presented in Table 7 mirror the primary analyses' outcomes. It is evident that the impact of the nation's biodiversity index on corporate biodiversity disclosures is even more pronounced and positive. Simultaneously, the factors within corporate governance that influence biodiversity disclosure encompass both the board's size and the existence of a sustainability committee. To strengthen the robustness of the results, we also have performed the endogeneity

test using the 2SLS regression for the possibility of the endogeneity issues between corporate governance factors and biodiversity disclosure. The results show that there is no endogeneity problems in terms of simultaneity of the two variables (Table 8).

5 | CONCLUSION

This study investigated the factors influencing biodiversity reporting in 37 countries. Biodiversity reporting was measured using two approaches. Firstly, a binary dummy variable of 1 and 0 was employed to assess the tendency of companies to disclose biodiversity information. Secondly, a scale of 0–100 was used to determine the quality of reporting over the period of 2016–2020.

Factors affecting companies' inclination to disclose their biodiversity information include environmental performance index, board size, the presence of a sustainability committee, company size, and company risk. Conversely, the national governance index and the proportion of independent board members have a negative impact on corporate biodiversity reporting. The findings extend the literature on biodiversity disclosure from the lens of institutional theory, stakeholder theory, and impression management theory. From the institutional theory perspective, the Environmental Performance Index (H1) reflects how effectively environmental issues are addressed in a country. This can then become ingrained in the culture of the country's population to be more aware and caring towards the environment. On the other hand, the role of the state will become stricter by issuing regulations that are pro-environmental conservation. Ultimately, companies will try to meet the expectations and demands of external

TABLE 7 Panel data regression results (biodiversity disclosure quality).

Variables	Coefficient	p-Value
EPI	0.147***	0.0095
WGI	8.931**	0.0315
BSIZE	0.316**	0.024
BINDEP	2.785	0.1375
BGENDER	−2.905	0.2085
SUSCOM	6.615***	0.000
SIZE	2.453***	0.0055
ROA	−2.188	0.269
RISK	−1.745	0.21
GDP	−6.685*	0.0785
INF	0.093	0.365
Constant	131.158	0.320
Year Effect	Yes	
CG Type Effect	Yes	
Obs.	10,112	
R ²	0.062	
Prob > F	28.84	0.0000

Note: Significance level: ***<0.01; **<0.5; *<0.1.

TABLE 8 Sensitivity test results.

Variables	BIODIS	p-Value
BDH	0.01***	0.000
PCA1	−0.107***	0.000
BSIZE	0.023***	0.001
BINDEP	−0.286***	0.003
BGENDER	−0.191	0.138
SUSCOM	1.65***	0.000
SIZE	0.231***	0.000
ROA	0.129	0.338
RISK	0.564***	0.000
GDP	0.012	0.325
INF	0.054***	0.000
Constant	−8.499***	0.000
Year Effect	Yes	
CG Type Effect	Yes	
Obs.	12.432	
Pseudo R ²	0.1616	
Wald χ^2/F	1860.66	0.000

Note: Significance level: ***<0.01; **<0.5; *<0.1.



stakeholders while also using it as a means of communication to show that the company also has “good intentions” towards environmental conservation. Furthermore, board size (H3) has also been found to have a positive influence on biodiversity reporting. A large board size represents the diversity of experience, competence, and background that represent a broader stakeholder base. A large board size will also tighten board oversight of management, leading management to be more cautious in running company operations. Lastly, the governance attribute that positively influences biodiversity reporting is the existence of a sustainability committee on the board (H6). The presence of this sustainability committee indicates a greater concern from the company to ensure that corporate goals set based on stakeholder expectations are met and sustainability-related risks are well managed.

Contrary to the expectations of this study, the country's governance index (H2) and the proportion of independent directors (H4) have a negative impact on biodiversity reporting. The logical reason for these results is that the country's governance index is too complex and not directly related to very specific biodiversity reporting. The governance index may affect sustainability reporting but not biodiversity reporting. Meanwhile, the negative effect of the proportion of independent directors is due to the reputation risk that may arise when they report information that is not true as done by management. Based on impression management theory, this reporting is only used as a “good impression” by management, which is contrary to the purpose of having independent directors. As for the proportion of female directors (H5), this study did not find significant evidence of its influence on biodiversity reporting except in megadiversity countries and in industries directly impacting the environment.

This research also brings practical implications for several parties. For companies, since the findings indicate that corporate biodiversity reporting remains relatively low, there is a strong hope for companies to engage in biodiversity reporting and continually improve it. Companies can also increase the number of board members and establish dedicated committees to address sustainability issues, such as biodiversity conservation. From the demand side, stakeholders are encouraged to persistently urge companies to report information regarding their biodiversity. Stakeholders play a crucial role in biodiversity conservation by potentially boycotting companies contributing to biodiversity loss. Consequently, companies will be more motivated to earnestly meet stakeholder expectations and contribute to environmental preservation. As for the government, the country's environmental index has been shown to significantly impact corporate biodiversity reporting. Therefore, the government's role as a policy-maker becomes pivotal in enhancing the quantity and quality of biodiversity reporting. This begins with refining the index through regulations that are more environmentally friendly and extend to tangible governmental actions, including programs and support for environmental conservation. As the environmental performance index improves, companies within the country are also incentivized to contribute to environmental preservation and biodiversity conservation.

This study is not without limitations. It relied on measurements available from Thomson Reuters and Refinitiv Eikon. While some

other studies (Boiral & Heras-Saizarbitoria, 2017; Rimmel & Jonäll, 2013; Van Liempd & Busch, 2013; Velte, 2023) have attempted to create disclosure and biodiversity performance indices, future research could use these indices to gain a clearer understanding of corporate biodiversity disclosure. Secondly, the size of the board, the proportion of independent board members, and the proportion of female board members were used in this research as proxies for governance. Numerous sustainability studies have already examined the influence of board members' backgrounds, such as their education and experience. Future studies in biodiversity accounting could employ this as a representation of corporate governance. Diversity within the board can also be explored rather than limited solely to gender, hence it can encompass variations in culture and nationality among board members. For a deeper understanding, future research might consider qualitative approaches, such as conducting interviews with company management. This method is essential for revealing the reasons behind the influence of board size and the existence of a sustainability committee on biodiversity performance, as highlighted by the outcomes of this study.

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REFERENCES

- Addison, P. F. E., Stephenson, P. J., Bull, J. W., Carbone, G., Burgman, M., Burgass, M. J., Gerber, L. R., Howard, P., McCormick, N., McRae, L., Reuter, K. E., Starkey, M., & Milner-Gulland, E. J. (2020). Bringing sustainability to life: A framework to guide biodiversity indicator development for business performance management. *Business Strategy and the Environment*, 29(8), 3303–3313. <https://doi.org/10.1002/bse.2573>
- Aksoy, M., Yilmaz, M. K., Tatoglu, E., & Basar, M. (2020). Antecedents of corporate sustainability performance in Turkey: The effects of ownership structure and board attributes on non-financial companies. *Journal of Cleaner Production*, 276, 124284. <https://doi.org/10.1016/j.jclepro.2020.124284>
- Amran, A., Lee, S. P., & Devi, S. S. (2014). The influence of governance structure and strategic corporate social responsibility toward sustainability reporting quality. *Business Strategy and the environment*, 23(4), 217–235.
- Amran, A., Iranmanesh, M., Foroughi, B., & Mahyuddin, E. F. B. H. (2021). The impact of board and hotel characteristics on biodiversity reporting: Market diversification as a moderator. *Social Responsibility Journal*, 18, 403–423. <https://doi.org/10.1108/SRJ-02-2019-0072>
- Bae, S. M., Masud, M., Kaium, A., & Kim, J. D. (2018). A cross-country investigation of corporate governance and corporate sustainability disclosure: A signaling theory perspective. *Sustainability*, 10(8), 2611. <https://doi.org/10.3390/su10082611>
- Baldini, M., Maso, L. D., Liberatore, G., Mazzi, F., & Terzani, S. (2018). Role of country-and firm-level determinants in environmental, social, and governance disclosure. *Journal of Business Ethics*, 150, 79–98.
- Belkaoui, A., & Karpik, P. G. (1989). Determinants of the corporate decision to disclose social information. *Accounting, Auditing & Accountability Journal*, 2(1), 0–0.



- Ben-Amar, W., & Chelli, M. (2018). What drives voluntary corporate water disclosures? The effect of country-level institutions. *Business Strategy and the Environment*, 27(8), 1609–1622. <https://doi.org/10.1002/bse.2227>
- Bhatia, A., & Makkar, B. (2020). CSR disclosure in developing and developed countries: A comparative study. *Journal of Global Responsibility*, 11(1), 1–26.
- Boiral, O. (2013). Sustainability reports as simulacra? A counter-account of A and A+ GRI reports. *Accounting, Auditing & Accountability Journal*, 26(7), 1036–1071.
- Boiral, O., & Heras-Saizarbitoria, I. (2017). Corporate commitment to biodiversity in mining and forestry: Identifying drivers from GRI reports. *Journal of Cleaner Production*, 162, 153–161. <https://doi.org/10.1016/j.jclepro.2017.06.037>
- Campbell, J. L. (2007). Why would corporations behave in socially responsible ways? An institutional theory of corporate social responsibility. *Academy of Management Review*, 32(3), 946–967.
- Corazza, L., Truant, E., Scagnelli, S. D., & Mio, C. (2020). Sustainability reporting after the Costa Concordia disaster: A multi-theory study on legitimacy, impression management and image restoration. *Accounting, Auditing & Accountability Journal*, 33(8), 1909–1941. <https://doi.org/10.1108/AAAJ-05-2018-3488>
- de Grosbois, D., & Fennell, D. A. (2022). Determinants of climate change disclosure practices of global hotel companies: Application of institutional and stakeholder theories. *Tourism Management*, 88, 104404.
- da Oliveira, J. S., do Azevedo, G. M. C., & Silva, M. J. P. C. (2019). Institutional and economic determinants of corporate social responsibility disclosure by banks. *Meditari Accountancy Research*, 27(2), 196–227. <https://doi.org/10.1108/MEDAR-01-2018-0259>
- de Villiers, C., & Marques, A. (2016). Corporate social responsibility, country-level predispositions, and the consequences of choosing a level of disclosure. *Accounting and Business Research*, 46(2), 167–195. <https://doi.org/10.1080/00014788.2015.1039476>
- de Villiers, C., Naiker, V., & van Staden, C. J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management*, 37(6), 1636–1663. <https://doi.org/10.1177/0149206311411506>
- DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, 48(2), 147. <https://doi.org/10.2307/2095101>
- Dye, R. A. (2001). An evaluation of “essays on disclosure” and the disclosure literature in accounting. *Journal of accounting and economics*, 32(1–3), 181–235.
- Eiadat, Y., Kelly, A., Roche, F., & Eyadat, H. (2008). Green and competitive? An empirical test of the mediating role of environmental innovation strategy. *Journal of World business*, 43(2), 131–145.
- Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The Journal of Law and Economics*, 26(2), 301–325.
- Fuente, J. A., García-Sánchez, I. M., & Lozano, M. B. (2017). The role of the board of directors in the adoption of GRI guidelines for the disclosure of CSR information. *Journal of Cleaner Production*, 141, 737–750. <https://doi.org/10.1016/j.jclepro.2016.09.155>
- Gallén, M. L., & Peraita, C. (2018). The effects of national culture on corporate social responsibility disclosure: A cross-country comparison. *Applied Economics*, 50(27), 2967–2979. <https://doi.org/10.1080/00036846.2017.1412082>
- García-Meca, E., & Palacio, C. J. (2018). Board composition and firm reputation: The role of business experts, support specialists and community influential. *BRQ Business Research Quarterly*, 21(2), 111–123. <https://doi.org/10.1016/j.brq.2018.01.003>
- García-Sánchez, I. M., Gómez-Miranda, M. E., David, F., & Rodríguez-Ariza, L. (2019). Board independence and GRI-IFC performance standards: The mediating effect of the CSR committee. *Journal of Cleaner Production*, 225, 554–562.
- Gerged, A. M., Beddewela, E. S., & Cowton, C. J. (2023). Does the quality of country-level governance have an impact on corporate environmental disclosure? Evidence from Gulf Cooperation Council countries. *International Journal of Finance & Economics*, 28(2), 1179–1200. <https://doi.org/10.1002/ijfe.2469>
- Giannarakis, G. (2014). The determinants influencing the extent of CSR disclosure. *International Journal of Law and Management*, 56, 393–416.
- Glass, C., Cook, A., & Ingersoll, A. R. (2016). Do women leaders promote sustainability? Analyzing the effect of corporate governance composition on environmental performance. *Business Strategy and the Environment*, 25(7), 495–511.
- Gray, R., Kouhy, R., & Lavers, S. (1995). Corporate social and environmental reporting: A review of the literature and a longitudinal study of UK disclosure. *Accounting, auditing & accountability journal*, 8(2), 47–77.
- Guenther, E., Guenther, T., Schiemann, F., & Weber, G. (2015). Stakeholder relevance for reporting: Explanatory factors of carbon disclosure. *Business & Society*, 55(3), 361–397. <https://doi.org/10.1177/0007650315575119>
- Haniffa, R. M., & Cooke, T. E. (2005). The impact of culture and governance on corporate social reporting. *Journal of accounting and public policy*, 24(5), 391–430.
- Haque, F., & Jones, M. J. (2020). European firms' corporate biodiversity disclosures and board gender diversity from 2002 to 2016. *The 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>
- Hoechle, D. (2007). Robust standard errors for panel regressions with cross-sectional dependence. *The stata journal*, 7(3), 281–312.
- Houdet, J., Ding, H., Quétier, F., Addison, P., & Deshmukh, P. (2020). Adapting double-entry bookkeeping to renewable natural capital: An application to corporate net biodiversity impact accounting and disclosure. *Ecosystem Services*, 45, 101104. <https://doi.org/10.1016/j.ecoser.2020.101104>
- Hussain, N., Rigoni, U., & Orij, R. P. (2018). Corporate governance and sustainability performance: Analysis of triple bottom line performance. *Journal of Business Ethics*, 149(2), 411–432. <https://doi.org/10.1007/s10551-016-3099-5>
- Jamali, D., Safieddine, A. M., & Rabbath, M. (2008). Corporate governance and corporate social responsibility synergies and interrelationships. *Corporate governance: an international review*, 16(5), 443–459.
- Jensen, J. C., & Berg, N. (2012). Determinants of traditional sustainability reporting versus integrated reporting. An institutional approach. *Business Strategy and the Environment*, 21(5), 299–316. <https://doi.org/10.1002/bse.740>
- Jones, M. J., Gaia, S., & Jones, M. J. (2020). Biodiversity reporting for governmental organisations. *Accounting, Auditing & Accountability Journal*, 33(1), 1–31. <https://doi.org/10.1108/AAAJ-05-2018-3472>
- Kılıç, M., Uyar, A., & Karaman, A. S. (2019). What impacts sustainability reporting in the global aviation industry? An institutional perspective. *Transport Policy*, 79, 54–65. <https://doi.org/10.1016/j.tranpol.2019.04.017>
- Kumar, K., Kumari, R., Poonia, A., & Kumar, R. (2021). Factors influencing corporate sustainability disclosure practices: Empirical evidence from Indian National stock exchange. *Journal of Financial Reporting and Accounting*, 21(2), 300–321.
- Kuzey, C., & Uyar, A. (2017). Determinants of sustainability reporting and its impact on firm value: Evidence from the emerging market of Turkey. *Journal of cleaner production*, 143, 27–39.
- Liao, L., Luo, L., & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review*, 47(4), 409–424.



- Mahmud, A., Ding, D., Kiani, A., & Hasan, M. M. (2020). Corporate social responsibility programs and community perceptions of societal progress in Bangladesh: A multimethod approach. *SAGE Open*, 10(2), 2158244020924046. <https://doi.org/10.1177/2158244020924046>
- Matuszak, Ł., Różańska, E., & Macuda, M. (2019). The impact of corporate governance characteristics on banks' corporate social responsibility disclosure. *Journal of Accounting in Emerging Economies*, 9, 75–102.
- McLellan, R., Iyengar, L., Jeffries, B., & Oerlemans, N. (2014). *Living planet report 2014: Species and spaces, people and places*. WWF International.
- Miniaoui, Z., Chibani, F., & Hussainey, K. (2019). The impact of country-level institutional differences on corporate social responsibility disclosure engagement. *Corporate Social Responsibility and Environmental Management*, 26(6), 1307–1320. <https://doi.org/10.1002/csr.1748>
- Moura-Leite, R. C., Padgett, R. C., & Galan, J. I. (2012). Is social responsibility driven by industry or firm-specific factors? *Management decision*, 50(7), 1200–1221.
- Naciti, V. (2019). Corporate governance and board of directors: The effect of a board composition on firm sustainability performance. *Journal of Cleaner Production*, 237, 117727. <https://doi.org/10.1016/j.jclepro.2019.117727>
- Nasih, M., Harymawan, I., Paramitasari, Y. I., & Handayani, A. (2019). Carbon emissions, firm size, and corporate governance structure: Evidence from the mining and agricultural industries in Indonesia. *Sustainability*, 11(9), 2483. <https://doi.org/10.3390/su11092483>
- O'Connor, A., & Shumate, M. (2010). An economic industry and institutional level of analysis of corporate social responsibility communication. *Management Communication Quarterly*, 24(4), 529–551. <https://doi.org/10.1177/0893318909358747>
- Rao, K., & Tilt, C. (2016). Board composition and corporate social responsibility: The role of diversity, gender, strategy and decision making. *Journal of business ethics*, 138, 327–347.
- Rimmel, G., & Jonäll, K. (2013). Biodiversity reporting in Sweden: Corporate disclosure and preparers' views. *Accounting, Auditing & Accountability Journal*, 26, 746–778. <https://doi.org/10.1108/AAAJ-02-2013-1228>
- Roberts, L., Hassan, A., Elamer, A., & Nandy, M. (2021). Biodiversity and extinction accounting for sustainable development: A systematic literature review and future research directions. *Business Strategy and the Environment*, 30(1), 705–720. <https://doi.org/10.1002/bse.2649>
- Roberts, R., Jang, D., & Mubako, G. (2023). Pandemic risk disclosure in integrated reports: After COVID-19 is hindsight 2020? *Accounting & Finance*, 63(2), 1739–1758. <https://doi.org/10.1111/acfi.12925>
- Russo, A., & Perrini, F. (2010). Investigating stakeholder theory and social capital: CSR in large firms and SMEs. *Journal of Business ethics*, 91, 207–221.
- Samkin, G., Schneider, A., & Tappin, D. (2014). Developing a reporting and evaluation framework for biodiversity. *Accounting, Auditing & Accountability Journal*, 27, 527–562. <https://doi.org/10.1108/AAAJ-10-2013-1496>
- 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, 888–901. <https://doi.org/10.1016/j.ecolind.2018.11.060>
- Sun, Y., Ip, P. S., Jones, M., Wang, J. J., & An, Y. (2021). Determinants of animal welfare disclosure practices: Evidence from China. *Sustainability*, 13(4), 2200. <https://doi.org/10.3390/su13042200>
- Talbot, D., & Boiral, O. (2018). GHG reporting and impression management: An assessment of sustainability reports from the energy sector. *Journal of Business Ethics*, 147, 367–383.
- Terjesen, S., Couto, E. B., & Francisco, P. M. (2016). Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity. *Journal of Management & Governance*, 20, 447–483.
- Tilt, C. A. (1994). The influence of external pressure groups on corporate social disclosure: Some empirical evidence. *Accounting, Auditing & Accountability Journal*, 7(4), 47–72.
- United Nations (UN). (2019). *World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100*. <https://www.un.org/en/desa/world-population-projected-reach-98-billion-2050-and-112-billion-2100>
- Uyar, A., Karaman, A. S., & Kilic, M. (2021). Institutional drivers of sustainability reporting in the global tourism industry. *Tourism Economics*, 27(1), 105–128. <https://doi.org/10.1177/1354816619886250>
- Van Liempd, D., & Busch, J. (2013). Biodiversity reporting in Denmark. *Accounting, Auditing & Accountability Journal*, 26, 833–872. <https://doi.org/10.1108/AAAJ-02-2013-1232>
- Velte, P. (2023). Sustainable institutional investors and corporate biodiversity disclosure: Does sustainable board governance matter? *Corporate Social Responsibility and Environmental Management*, 30(6), 3063–3074.
- Verrecchia, R. E. (2001). Essays on disclosure. *Journal of accounting and economics*, 32(1–3), 97–180.
- Von Rintelen, K., Arida, E., & Häuser, C. (2017). A review of biodiversity-related issues and challenges in megadiverse Indonesia and other Southeast Asian countries. *Research Ideas and Outcomes*, 3, e20860.
- Wendling, Z. A., Jacob, M., Esty, D. C., & Emerson, J. W. (2022). Explaining environmental performance: Insights for progress on sustainability. *Environmental Development*, 44, 100741.
- Xiao, C., Wang, Q., van der Vaart, T., & van Donk, D. P. (2018). When does corporate sustainability performance pay off? The impact of country-level sustainability performance. *Ecological Economics*, 146, 325–333. <https://doi.org/10.1016/j.ecolecon.2017.11.025>
- Zhang, L., Tang, Q., & Huang, R. H. (2021). Mind the gap: Is water disclosure a missing component of corporate social responsibility? *The British Accounting Review*, 53(1), 100940. <https://doi.org/10.1016/j.bar.2020.100940>

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