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Good for the Wallet - Good for the Planet: Do Environmental and Financial Performance Lead to Climate-related Disclosure of Asia-Pacific Companies?

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Abstract: *This study investigates the relationship between corporate environmental performance and climate-related disclosure, and whether financial performance mediates that relationship, based on the signalling theory and the legitimacy theory. The analysis was based on 5,258 firm-year observations from non-financial companies in the Asia-Pacific region that participated in the Carbon Disclosure Project (CDP) climate change disclosure survey during 2016–2023. The findings indicate that the company's environmental performance positively affects the level of climate-related disclosures. Further analysis reveals that the company's financial performance mediates the effect of environmental performance on climate-related disclosures.*

Keywords: *Climate-related Disclosure, Climate Change Disclosure, Environmental Performance, Financial Performance, Asia-Pacific*

Abstrak— *Penelitian ini menginvestigasi hubungan antara kinerja lingkungan perusahaan dan pengungkapan terkait iklim, serta menguji apakah kinerja keuangan memediasi hubungan tersebut, berdasarkan teori sinyal dan teori legitimasi. Analisis dilakukan pada 5.258 observasi tahun-perusahaan dari perusahaan non-keuangan di wilayah Asia-Pasifik yang berpartisipasi dalam survey pengungkapan perubahan iklim Carbon Disclosure Project (CDP) selama 2016–2023. Hasil penelitian menunjukkan bahwa kinerja lingkungan perusahaan berpengaruh positif terhadap pengungkapan terkait iklim. Analisis lebih lanjut menunjukkan bahwa pengaruh kinerja lingkungan terhadap pengungkapan terkait iklim dimediasi oleh kinerja keuangan perusahaan.*

Kata Kunci: *Pengungkapan Terkait Iklim, Pengungkapan Perubahan Iiklim Kinerja Lingkungan, Kinerja Keuangan, Asia-Pasifik*

1. Introduction

The World Economic Forum's 'Global Risks Report' highlights the failure to mitigate and to adapt to climate change as one of the most significant risks of the coming decade (World Economic Forum, 2024). As a result, companies are facing the

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increasing pressure from stakeholders to disclose their climate-related activities and strategies, a trend driven by initiatives such as the Task Force on Climate-related Financial Disclosures (TCFD) and the Carbon Disclosure Project (CDP) (CDP, 2024; TCFD, 2017; Daradkeh et al., 2023).

Climate-related disclosure[1] (CRD) has become increasingly vital in addressing climate risks (IPCC 2018), enabling companies to measure greenhouse gas emissions, to identify vulnerabilities, and to develop strategies to mitigate climate impacts (Bebbington & Larrinaga-González, 2008). These disclosures have garnered significant attention from investors, policymakers, and the wider communities (Deloitte, 2020; Flammer et al., 2021), and are believed to be able to enhance corporate legitimacy (Velte, 2020) and guide investment decisions with valuable insights into corporate sustainability efforts (Clarkson et al., 2013; Martin & Moser, 2016)

Given the increasing importance of climate change integration and stakeholder pressure, understanding the factors driving companies to disclose climate information has become a key research topic in accounting and finance (Aldoseri & Albaz, 2023; Ben-Amar et al., 2023; Daradkeh et al., 2023; Furtuna & Sönmez, 2024). Previous studies have documented various firm-level factors that influence climate change disclosure, such as shareholder activism (Flammer et al., 2021), board capital (Nathalia & Setiawan, 2022), managerial competence (Daradkeh et al., 2023), profitability (Caby et al., 2020), company size (Eleftheriadis & Anagnostopoulou, 2015), business strategy (Aldoseri & Albaz, 2023), institutional investors (Stanny & Ely, 2008), and gender diversity (Ben-Amar et al., 2017; Liao et al., 2015).

However, evidence regarding whether corporate environmental performance influences climate-related disclosure remains limited. Corporate environmental performance refers to the results of a company's strategic efforts to manage its

[1] Several studies use the terms climate-related information reporting (Jastrzębska, 2023), climate-related disclosure (Jastrzębska, 2023; Moreno & Caminero, 2022; Wedari et al., 2021), climate-related financial disclosure (Eccles & Krzus, 2017; Simsek et al., 2024), climate change disclosure (Cong et al., 2020; Kim et al., 2023; Kılıç & Kuzey, 2019; Nathalia & Setiawan, 2022; Shereni, 2023), as well as climate-related risks and opportunities disclosure (Bingler et al., 2022; Kim et al., 2023; Kouloukoui et al., 2019).

environmental impact (Walls et al., 2011, 2012). Meanwhile, climate-related disclosure refers to the company's efforts to communicate information about its environmental activities related to climate change (Li et al., 2018) and carbon emission control practices (Ambarwati et al., 2020; Blesia et al., 2023; Li et al., 2025). Whilst previous studies have investigated corporate environmental performance, they predominantly focused on general environmental performance and disclosures, with limited attention given to climate change, as a specific environmental issue (Agustine et al., 2024; Al-Tuwaijri et al., 2003; Deswanto & Siregar, 2018; Fontana et al., 2015; Li et al., 2017; Lu & Taylor, 2018; Tadros & Magnan, 2019; Wahyuningrum et al., 2020; Wulansari & Sholihin, 2017). Therefore, this study aims to fill the gap by re-examining the relationship between environmental performance and disclosure, focusing on the climate change context. The importance of this study lies in the fact that climate-related information is highly valuable to investors (Clarkson et al., 2013; Martin & Moser, 2016). In particular, this study investigates whether climate-related disclosures are used as a form of impression management, slegitimacy-seeking, or whether they reflect genuine sustainability commitments (Akbar & Deegan, 2021; Kuruppu et al., 2019).

Additionally, although the empirical link between corporate environmental performance and environmental disclosure has been widely examined (Al-Tuwaijri et al., 2004; Li et al., 2017; Lu & Taylor, 2018; Wahyuningrum et al., 2020), it remains an unresolved issue (Al-Tuwaijri et al., 2004). Previous findings present diverse outcomes, generally classified into two perspectives: the socio-political and the economic-based.

The socio-political perspective suggests that companies with poor environmental performance are more inclined to disclose information to influence public perception in response to social and political pressures (Cho et al., 2012). In contrast,the economic perspective argues that companies with good performance are motivated to differentiate themselves by providing more comprehensive environmental information (Giannarakis et al., 2017; Oates & Moradi-Motlagh, 2016). As a result, the socio-political perspective predicts a negative relationship between corporate environmental performance and environmental disclosure (e.g., Doan & Sassen, 2020, and Fontana et al., 2015), while

the economic perspective posits a positive one (e.g., Datt et al., 2020; Giannarakis et al., 2017; Lu & Taylor, 2018; Oates & Moradi-Motlagh, 2016; Tadros & Magnan, 2019; Velte, 2021)

To reconcile the inconclusive findings regarding the relationship between environmental performance and climate-related disclosure, this study examines the mediating role of financial performance in the relationship between environmental performance and climate-related disclosure(Mahrani & Soewarno, 2018). Drawing on the "pay to be green" concept (Clarkson et al., 2011), which suggests that investments in environmental improvements can create mutually beneficial outcomes (Figge, 2005), it is argued that improved investments can generate mutually beneficial outcomes (Clarkson et al., 2011; Muhammad et al., 2015; Qi et al., 2014). Furthermore, several studies have found that financial performance also affects climate-related disclosures (Ahmadi & Bouri, 2017; Kouloukoui et al., 2019; Neu et al., 1998; Stanwick & Stanwick, 2000).

Based on those findings, this study proposes that financial performance mediates the relationship between environmental performance and climate-related disclosure. Therefore, this study addresses the following research questions: (1) Does environmental performance positively affect the level of climate-related disclosure? (2) Does financial performance positively affect the level of climate-related disclosure? and (3) does financial performance mediate the relationship between environmental performance and climate-related disclosure?

This study employed all non-financial companies in the Asia-Pacific region that responded to the climate change disclosure questionnaire by CDP (Carbon Disclosure Project) from 2016 to 2023. Asia-Pacific provides an important setting for this study for the following reasons. First, the Asia-Pacific region has experienced significant growth in CO2 emissions alongside its economic development, with many countries still heavily reliant on fossil fuels (UNDP, 2024; ADB, 2017). Second, the region is highly affected by climate change, experiencing extreme weather events and rising temperatures at a rate faster than the global average (ESCAP 2022; IMF 2023). Third, although highly susceptible to the negative impacts of climate change, businesses and

cities in this region have not yet fully taken the required actions to achieve the goals established by the 2015 Paris Climate Agreement. Lastly, there are several challenges to adopting IFRS sustainability standards in Asia-Pacific, including the lack of a suitable financial reporting framework, high compliance costs, and emission-related financing issues (Yoon et al., 2024).

This study finds a positive relationship between environmental performance and the level of climate-related disclosure, with financial performance mediating that relationship. This study offers several significant contributions. First, it expands the literature on climate-related disclosures, distinguishing itself from previous studies on general environmental performance and environmental disclosures (Deswanto & Siregar, 2018; Lu & Wang, 2021; Tadros & Magnan, 2019). Second, it addresses the ongoing debate over the inconsistent findings regarding the link between environmental performance and environmental disclosure (Deswanto & Siregar, 2018; Lu & Wang, 2021; Tadros & Magnan, 2019), clarifies that disclosures should be viewed as a strategic decision by companies to communicate their performance (Meng et al., 2019), in line with an economics-based perspective (Verrecchia 1983; Dye, 1985). Third, this study integrates existing research to offer deeper insights into climate-related disclosures, such as the impact of environmental performance on disclosure levels (Al-Tuwaijri et al., 2004; Deswanto & Siregar, 2018; Li et al., 2017; Lu & Taylor, 2018; Wahyuningrum et al., 2020), the connection between environmental performance and financial performance (Horváthová, 2010; Iwata & Okada, 2011; Li et al., 2017; Nguyen et al., 2021; Nishitani et al., 2017; Setiawan & Honesty, 2021), and the influence of financial performance on disclosure levels (Elsayed, 2023; Li et al., 2017; Lu & Taylor, 2018; Wahyuningrum et al., 2020). In doing so, it establishes the connection between environmental performance and financial performance as crucial factors driving climate-related disclosures.

The remainder of this paper is organized as follows: Section 2 presents a literature review and the development of the hypothesis. Section 3 discusses the methodology. Section 4 presents and discusses the results. Finally, section 5 provides conclusions, limitations, and implications.

2. Literature Review and Hypothesis Development

Theoretically, there are two alternative perspectives on the relationship between environmental performance and disclosure. The first perspective views disclosure as a managerial tool to reduce political and social pressure, particularly for companies with poor environmental performance (Deegan, 2002; Gray et al., 1995). Consequently, companies with lower environmental performance are more prone to disclose additional information (Braam et al., 2016; Hummel & Schlick, 2016) to alleviate social pressure (Patten, 2002). The second perspective posits that good environmental performance positively influences environmental disclosure (Dye, 1985; Verrecchia, 1983) as a way for companies to set themselves apart from those with poorer environmental performance (Dye, 1985; Verrecchia, 1983) and to avoid the negative consequences of adverse selection (Dye, 1985; Li et al., 1997). Reconciling these views, Freedman & Wasley (1990), Gray et al. (1995), Hummel & Schlick (2016), and Tadros & Magnan (2019) suggest that high-performing companies disclose positive activities to reinforce legitimacy, while low-performing companies disclose to gain legitimacy.

The economic-based perspective, such as the signaling theory, proposes that companies with high environmental performance are more inclined to share comprehensive information to showcase their proactive strategies and favorable attributes to external stakeholders (Cho et al., 2012; Clarkson et al., 2008). Such disclosures not only decrease the information gap between managers and stakeholders but also enhance financial transparency while helping to monitor managerial behavior and mitigate agency costs associated with self-serving actions (Mahmoudian et al., 2021; Tadros & Magnan, 2019; Uyar et al., 2020).

Additionally, the legitimacy theory also supports the positive connection between environmental performance and environmental disclosure. This is explained by the idea that companies disclose environmental performance information to signal to investors that they are responsible entities actively addressing environmental conservation (Jaggi et al., 2018; Ratmono et al., 2024), thereby enhancing their reputation (Ananzeh et al., 2023; Deb et al., 2023; Altarawneh, 2023). Managers aim to project a positive image to shareholders and stakeholders, ensuring the company is perceived favorably and

achieves optimal performance (Ratmono et al., 2024). Moreover, a study conducted in US companies by Al-Tuwaijri et al. (2004) found that companies with strong environmental performance tend to exhibit greater transparency and honesty in their disclosures. This finding is supported by other research (Ahmadi & Bouri, 2017; Giannarakis et al., 2017; Ifada et al., 2021; Qiu et al., 2016), showing that better environmental performances lead to higher environmental disclosures. Based on this, the first hypothesis of this study is formulated as follows:

H1: Environmental performance positively affects the level of climate-related disclosure.

Previous research (e.g., Dowell et al., 2000) has highlighted a strong association between superior environmental standards and higher market valuations. Similarly, studies by Iwata & Okada (2011), King & Lenox (2002), Stefan & Paul (2008), and Wahba (2008) have observed a consistent positive relationship between environmental performance and financial performance. This connection can be explained through stakeholder theory (e.g., Freeman, 2010; Orlitzky et al., 2003), which suggests that by addressing and prioritizing the interests of various stakeholder groups, managers can enhance stakeholder satisfaction and improve their organization's capacity to effectively meet external demands (Orlitzky et al., 2003). Moreover, Stefan & Paul, (2008) argue that improved environmental performance contributes to better financial outcomes through both revenue-related benefits (e.g., enhanced market access, product differentiation, and the commercialization of pollution-control technologies and the cost-saving benefits (e.g., enhanced risk management, better relationships with external stakeholders, reduced costs for materials, energy, and services, along with lower capital and labor costs). Based on the prior empirical findings, we propose the following hypothesis:

H2: Environmental performance positively affects financial performance

According to legitimacy theory, Magness (2006) suggests that profitable companies face greater challenges in maintaining legitimacy due to higher public expectations. Therefore, profitable companies are more inclined to provide more information to distinguish themselves from less profitable competitors, thereby

lowering the risk of adverse selection (Akerlof, 1970). On the other hand, Heinze (1976) finds that profitability enables management to report corporate social responsibility (CSR) activities more flexibly to stakeholders. Profitable companies are better equipped to manage the costs associated with emission reductions and related disclosures (Bewley & Li, 2000; Cormier et al., 2005), as they can allocate resources across various aspects (Deswanto & Siregar, 2018; Lu & Abeysekera, 2014). Stanny & Ely (2008) also note that companies with high profitability are better equipped to manage the costs associated with climate change and signal positively to investors, thereby enhancing their ability to access resources.

Furthermore, research also indicates that higher profitability is linked to increased environmental disclosures (Kansal et al., 2014; Lu & Abeysekera, 2014; Muttakin et al., 2015), including disclosures on carbon emissions (He et al., 2016). These disclosures, however, involve substantial costs, including system setup, identification, measurement, and reporting of information. Therefore, it is likely that only profitable companies are able to bear these costs (Qiu et al., 2016). Therefore, the third hypothesis is:

H3: Financial performance positively affects the level of climate-related disclosure.

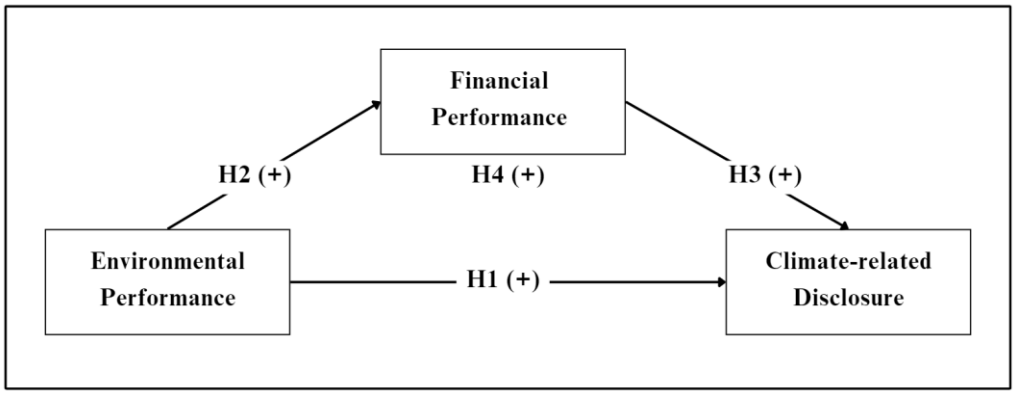
Building on the previous hypotheses, several prior studies have documented the impact of environmental performance on disclosure (Al-Tuwaijri et al., 2004; Deswanto & Siregar, 2018; Li et al., 2017; Lu & Taylor, 2018; Wahyuningrum et al., 2020); the relation of environmental performance and financial performance (Horváthová, 2010; Iwata & Okada, 2011; Li et al., 2017; Nguyen et al., 2021; Nishitani et al., 2017; Setiawan & Finomia Honesty, 2021), as well as the impact of financial performance on climate-related disclosures (Elsayed, 2023; Li et al., 2017; Lu & Taylor, 2018; Wahyuningrum et al., 2020). This study further argues that financial performance can act as a mediating variable to enhance the effect of environmental performance on climate-related disclosure. Environmental disclosures involve high costs, including the establishment of systems, as well as the identification, measurement, and reporting of information. As a result, only companies with profitability are capable of absorbing these costs. Meanwhile, environmental performance can generate incentives to improve

profitability. As such, this profitability can encourage companies to disclose climate-related information. Therefore, the fourth hypothesis in this study is as follows:

H4: Financial performance mediates the effect of environmental performance on the level of climate-related disclosure.

Figure 1 presents the research framework for this study.

Figure 1.
Research framework.



3. Research Method

3.1 Data

The environmental and financial data used in this study were collected from Refinitiv databases, while climate-related disclosure scores were obtained from the CDP report and/or website. The population includes all companies in the Asia-Pacific region, and the samples were selected using purposive sampling approach. The inclusion criteria are as follows: (1) the company is a non-financial entity that responded to CDP's climate change disclosure questionnaires between 2016 and 2023; (2) the climate change disclosure score is publicly available; and (3) complete data for each variable is available.

The year 2016 was chosen as the starting year for the observation period because it marked the first year that the CDP's climate change performance band was consistently applied to publicly available data for the Asia-Pacific region (CDP, 2015). This choice ensures consistency in scores, avoiding discrepancies between the pre-2015

numerical scores and post-2015 band scores. Additionally, 2016 was the year after the UN Climate Change Regional Collaboration Centres (RCC) were established in the Asia-Pacific region by UN Climate Change and the Institute for Global Environmental Strategies (IGES) in September 2015. These centers were created to support the goals of the UN Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Climate Agreement, signaling an increased expectation for the region to raise climate change awareness. The observation period ends in 2023, the final year for CDP score issuance during the study. It is also the year the IFRS S2 climate change reporting standards were released, before their implementation on January 1, 2024.

3.2 Measurement

3.3.1 Dependent variable

The dependent variable used in this study is climate-related disclosure (CRD), measured by the company's climate change disclosure score from the CDP website and/or report (Daradkeh et al., 2023; Hossain & Farooque, 2019; Kılıç & Kuzey, 2019). The CDP disclosure score was chosen because it is regarded as one of the most reliable rankings globally (GlobeScan & SustainAbility, 2014) and covers half of the global market capitalization (Jeanne et al., 2023). Unlike previous studies that only assigned a binary value of 1 for companies that provide and release information, while assigning 0 to companies that fail to do so (Jeanne et al., 2023; Furtuna & Sönmez, 2024; Luo et al., 2012; Mateo-Márquez et al., 2022), this study follows Daradkeh et al. (2023) and uses a disclosure scale in the form of scores. CDP classifies companies into nine levels (A, A-, B, B-, C, C-, D, D-, and F), from highest to lowest, according to the comprehensiveness of their climate change disclosures. In this study, each level is assigned a score, with A receiving the highest score of 8 and F the lowest score of 0 (Daradkeh et al., 2023). Furthermore, to reduce concerns about scale dependency, the CDP scores are converted into percentile ranks. Consistent with Barth et al. (2017), the percentile rank is derived as (firm rank – 1) / (total firms – 1). This transformation standardizes the disclosure score on a scale from 0, representing the lowest-ranked firm, to 1, representing the highest-ranked firm.

3.3.2 Independent variables

First, the independent variable tested in this study is environmental performance (EP), which refers specifically to environmental performance in the context of climate, namely the company's CO2 emissions level, determined by the natural logarithm of the company's annual CO2 emissions, measured in tons (Guenther et al., 2016; Jeanne et al., 2023; Luo & Tang, 2014; Velte, 2021; Vieira et al., 2023). Therefore, a high carbon emission value indicates that a company generates a large amount of carbon pollution, thereby reflecting poor environmental performance (Datt et al., 2019; Kim & Kim, 2022; Qian & Schaltegger, 2017). CO2 emissions are considered the primary cause of global warming (IPCC, 2021), and they are also one of the key sub-pillars of environmental performance (Velte, 2021).

Second, financial performance (FP) was measured using an accounting-based measure represented by ROA (return on assets) (DasGupta & Roy, 2023; Velte, 2020; Wang & Sarkis, 2017), the ratio of net income to total assets, which reflects how effectively the company leverages its assets to produce profits (Wisner et al., 2009). In this study, FP is also treated as the mediating variable. As an important indicator in evaluating financial performance, ROA also serves as a relevant assessment tool in studies on CSR and environmental reporting practices (Guenster et al., 2011; Minutolo et al., 2019; Roberts & Dowling, 2002; Yang & Baasandorj, 2017).

3.3.3 Control variable(s)

This study controls for various firm-level factors such as firm size (SIZE), firm age (AGE), firm growth (GRO), and financial leverage (LEV). In addition, industry fixed effects are applied to control for unobserved differences across industries that remain stable (Ringov & Zollo, 2007). Furthermore, as this is a cross-country study, macroeconomic variables such as inflation rate (INF), gross domestic product (GDP) per capita (GDP_Percap), and GDP growth (GDP_Gro) are sourced from World Bank data to control for the influence of country-level factors in the analysis. Additionally, country domicile is measured by classifying countries into two categories (Con_Cla): developed and developing countries, based on indicators such as economic growth and GDP per capita (Amran et al., 2014; United Nations, n.d.)

Following Jeanne et al. (2023), this study includes regulatory factors such as the number of laws and policies associated with climate change (LP) and the climate change-environmental performance index (CC EPI), which relate to countries' progress in mitigating climate change, as control variables. Moreover, the observation period for this study is from 2016 to 2023, with the COVID-19 pandemic crisis period (2020-2021) recognized for its significant impact on the global economy. To isolate the effects of the main variables, the pandemic period is coded as "1," while the pre- and post-pandemic periods are coded as "0" (El Khoury et al., 2022; Opuni-Frimpong et al., 2024; Suk Kim & Sung Suk, 2023).

Table 1.
Research Variables

Variable	Label	Measurement
Dependent variable		
Climate-related disclosure	CRD	CDP disclosure score, converted to percentile rank (0–1) based on bands A–F
Independent variables		
Environmental performance	EP	Natural logarithm of annual CO_2 emissions (tons); higher values = poorer performance
Financial performance	ROA	Return on assets = net income/ total assets
Control variables		
Firm size	SIZE	Natural logarithm of total assets
Firm age	AGE	Years since incorporation
Firm growth	GRO	Annual growth rate of total assets or sales
Financial leverage	LEV	Ratio of total debt to total assets
Industry	IND_FE	Dummy variables by industry sector
Inflation rate	INF	Country-level annual inflation rate
GDP per capita	GDP_Percap	Country-level GDP per capita (USD)
GDP growth	GDP_Gro	Country-level annual GDP growth (%)
Country classification	Con_Cla	Developed vs. Developing countries (dummy)
Laws & policies	LP	Number of laws/policies related to climate change
Climate change (EPI)	CC_EPI	Climate change–environmental performance index
COVID-19 period	COVID	Dummy variable: 1 = 2020–2021; 0 = otherwise

3.3 Research Model

This empirical study employs four research models to assess the impact of environmental and financial performance on the level of climate-related disclosure. The

first model examines the effect of the environmental performance (EP) on the level of climate-related disclosure (CRD). The second model examines the effect of the environmental performance (EP) on the financial performance (FP). The third model examines the effect of financial performance (FP) on the level of climate-related disclosure (CRD). Lastly, the fourth model analyzes the mediating role of financial performance (FP) in the relationship between environmental performance (EP) and climate-related disclosure (CRD). The equations for the four models are presented as follows.

Model 1 (EP – CRD):

$$CRD_{i,t} = \alpha + \beta_1\ EP_{i,t} + \beta_2\ SIZE_{i,t} + \beta_3\ AGE_{i,t} + \beta_4\ GRO_{i,t} + \beta_5\ LEV_{i,t} + \beta_6\ INF_{i,t} + \beta_7\ GDP\_Percap_{i,t} + \beta_8\ GDP\_Gro_{i,t} + \beta_9\ Con\_Cla_{i,t} + LP + CC\ EPI + COV + industry - fixed\ effect + year - fixed\ effect + \varepsilon_{i,t}$$

Model 2 (EP - FP):

$$FP_{i,t} = \alpha + \beta_1\ EP_{i,t} + \beta_2\ SIZE_{i,t} + \beta_3\ AGE_{i,t} + \beta_4\ GRO_{i,t} + \beta_5\ LEV_{i,t} + \beta_6\ INF_{i,t} + \beta_7\ GDP\_Percap_{i,t} + \beta_8\ GDP\_Gro_{i,t} + \beta_9\ Con\_Cla_{i,t} + LP + CC\ EPI + COV + industry - fixed\ effect + year - fixed\ effect + \varepsilon_{i,t}$$

Model 3 (FP – CRD):

$$\begin{aligned} CRD_{i,t} = \alpha &+ \beta_1\ FP_{i,t} + \beta_2\ SIZE_{i,t} + \beta_3\ AGE_{i,t} + \beta_4\ GRO_{i,t} + \beta_5\ LEV_{i,t} \\ &+ \beta_6\ INF_{i,t} + \beta_7\ GDP\_Percap_{i,t} + \beta_8\ GDP\_Gro_{i,t} \\ &+ \beta_9\ Con\_Cla_{i,t} + LP + CC\ EPI + COV + industry \\ &- fixed\ effect + year - fixed\ effect + \varepsilon_{i,t} \end{aligned}$$

Model 4 (EP – FP – CRD):

$$\begin{aligned} CRD_{i,t} = \alpha &+ \beta_1\ EP_{i,t} + \beta_2\ FP_{i,t} + \beta_3\ SIZE_{i,t} + \beta_4\ AGE_{i,t} + \beta_5\ GRO_{i,t} \\ &+ \beta_6\ LEV_{i,t} + \beta_7\ INF_{i,t} + \beta_8\ GDP\_Percap_{i,t} + \beta_9\ GDP\_Gro_{i,t} \\ &+ \beta_{10}\ Con\_Cla_{i,t} + LP + CC\ EPI + COV + industry \\ &- fixed\ effect + year - fixed\ effect + \varepsilon_{i,t} \end{aligned}$$

4. Results and Discussion

Table 2
Sampling results

Sample Selection Process	Number of Observations
Initial observations:	
Companies in the Asia-Pacific region responding to the CDP questionnaire from 2016 to 2023	16,666
Less: Non-public responses[2]	(9,477)
Less: Financial companies	(693)
Less: Incomplete independent variable data	
(a) Incomplete data for EP	(951)
(a) Incomplete data for FP	
Less: Incomplete control variable data	
a) Incomplete data for *SIZE*	
b) Incomplete data for LEV	
c) Incomplete data for AGE	
d) Incomplete data for GRO	
e) Incomplete data for IND	(286)
f) Incomplete data for INF	
g) Incomplete data for GDP_PerCap	
h) Incomplete data for GDP_Gro	
i) Incomplete data for Con_Cla	
j) Incomplete data for LP	
k) Incomplete data for CC EPI	
Less: Companies from countries with fewer than 10 samples during the observation period[3]	(1)
Final observations	**5,258**

Table 2 presents the sample selection procedure employed in this study to ensure a valid and suitable dataset for analysis. The process begins with an initial observation that includes 16,666 firm-year observations over an eight-year sample period (2016-2023). After applying the purposive sampling criteria, the final dataset consists of 5,258

[2] For first-time respondents to the questionnaire, CDP offers the option to keep their scores confidential. This ensures that the scores will not be published on the CDP website or disclosed to Capital Market Signatories (CDP, 2024).
[3] One company from Vietnam

firm-year observations. These observations include non-financial companies that participated in and publicly shared their responses to the CDP climate change disclosure survey, with complete data provided for all independent and control variables.

Table 3 shows the sample distribution by country in this study, which includes 5,258 observations from 12 countries in the Asia-Pacific region. Japan dominates the sample with the largest number of observations, totaling 3,440 observations (65.42%), reflecting the significant contribution of Japanese companies in responding to the CDP questionnaire on climate change disclosure.

Table 3
Sample distribution by country

No.	Country Name	Frequency	Percentage	Cumulative
1	Australia	250	4.75%	4.75%
2	China	393	7.47%	12.23%
3	Hong Kong	53	1.01%	13.24%
4	India	117	2.23%	15.46%
5	Indonesia	34	0.65%	16.11%
6	Japan	3,440	65.42%	81.53%
7	Malaysia	60	1.14%	82.67%
8	New Zealand	112	2.13%	84.80%
9	Philippines	66	1.26%	86.06%
10	Singapore	69	1.31%	87.37%
11	Taiwan	567	10.78%	98.16%
12	Thailand	97	1.84%	100.00%
Total Sample		**5,258**	**100.00%**	**100.00%**

4.1 Descriptive statistics

Table 4 presents the descriptive statistics for all the research variables. CRD, measured on a percentile rank scale (0 = lowest, 1 = highest), has a mean of 0.642 (SD = 0.261). Firms, on average, disclose at the 64th percentile. Scores range from 0.000 (no disclosure) to 1.000 (full disclosure), with a median of 0.684, meaning half of the firms disclose at or above the 68th percentile. Overall, these results indicate that although many firms provide relatively high levels of disclosure, there is still substantial variation in disclosure practices across companies.

Table 4
Descriptive statistic

Variabel[a]	n	Mean	St. Dev	Min.	Median	Maks.
CRD	5,258	0.642	0.261	0.000	0.684	1.000
EP	5,258	8.180	6.512	0.000	11.250	21.778
FP	5,258	0.042	0.197	-9.920	0.045	0.731
SIZE	5,258	0.113	1.634	-9.920	0.045	90.032
LEV	5,258	0.222	0.344	0.000	0.198	21.300
AGE	5,258	50.930	33.640	-8.000	47.000	142.000
GRO	5,258	0.051	0.487	-1.000	0.017	32.226
IND[b]	5,257	0.670	0.470	0.000	1.000	1.000
INF	5,258	1.842	1.648	-9.518	1.974	7.581
GDP_Percap	5,258	2.009	2.675	-. 10.978	2.326	14.362
GDP_Gro	5,258	2.000	2.767	-9.518	1.923	7.030
Con_Cla	5,258	1.702	0.458	1.000	2.000	2.000
LP	5,258	58.853	21.846	5.000	65.000	98.000
CC_EPI	5,258	54.118	8.241	32.100	59.700	59.700
COV[b]	5,258	0.220	0.410	0.000	0.000	1.000

Notes: CRD *(climate-related disclosure) refers to the climate change disclosure score from the CDP report;* ***EP*** *(environmental performance) is the natural logarithm of annual carbon emissions (CO2) in tons;* ***FP*** *(financial performance) refers to the Return on Assets (ROA) score, which is computed by dividing the company's net profit by its total asset;* ***SIZE*** *(firm size) is the natural logarithm of total assets at the end of the fiscal year;* ***LEV*** *(firm leverage) is the ratio of total debt to total assets at the end of the fiscal year;* ***AGE*** *(firm age) is the natural logarithm of (current year - company founding year);* ***GRO*** *(firm growth) is the total assets in the current year (P1) minus the total assets in the previous year (P0) divided by the total assets in the previous year (P0);* ***IND*** *(industry classification) is a dummy variable that takes the value 1 for industries with high carbon emission impacts and 0 for those with low impact;* ***INF*** *(inflation) is the inflation rate of the country;* ***GDP_Percap*** *(gross domestic product per capita) is a measure representing the average income per capita in a country, calculated by dividing the country's total GDP by its population;* ***GDP_Gro*** *(gross domestic product growth) is the annual percentage change in a country's GDP;* ***Con_Cla*** *(country classification) is the classification of countries as developed or developing according to the United Nations World Economic Situation and Prospects;* ***LP*** *(law and policy) refers to the number of laws and policies related exclusively to climate change;* ***CC EPI*** *(climate change - environmental performance index) is a score between 0 and 100 that evaluates countries' efforts in addressing global climate change; and* ***COV*** *(COVID-19) is a dummy variable that takes the value 1 for observations from 2020 and 2021, and 0 for other years.*

[a] All continuous variables are winsorized at the 1st and 99th percentile levels.

[b] A dummy variable, indicating the proportion of observations with a value of 1.

Meanwhile, EP has an average value of 8.180 with a standard deviation of 6.512, suggesting significant variation in environmental performance across companies. This carbon emission proxy has an inverse relationship with environmental performance: the higher EF value, the higher level of carbon emissions produced, resulting in poorer

environmental performance (i.e., high CO_2 = low EP) (Bui et al., 2020; Dan et al., 2023; Gallego-Álvarez et al., 2011; Mardini & Lahyani, 2024). Conversely, the lower the EF value, the lower the carbon emissions generated, signifying better environmental performance. The minimum value of 0 indicates companies that do not produce any carbon emissions in their business processes, thus having relatively high environmental performance.

Furthermore, FP shows an average value of 0.042 with a standard deviation of 0.197. This value reflects that most companies have lower or negative financial performance, with a range of values between -9.920 and 0.731. This may reflect the presence of companies with very poor financial performance or even losses, as well as some companies with positive but still limited financial performance.

Subsequently, multicollinearity test results for the four models indicate that the VIF values for the variables in the regression model are below 10, and the tolerance values are above 0.10. Therefore, the research model is not subject to significant multicollinearity between the independent variables.

4.2 Hypothesis testing

Table 5 presents a summary of the results of the main regression analysis used to test the hypotheses in this study. Following Muijs (2004) and Ofoegbu et al. (2018), who categorize goodness of fit with adjusted R-squared as: < 0.1 (poor), 0.11–0.3 (modest), 0.31–0.5 (moderate), and > 0.5 (strong), the model fit test shows strong results. Table 4 presents R-squared values for models 1, 3, and 4 as 0.672, 0.599, and 0.677, respectively, with adjusted R-squared values of 0.656, 0.583, and 0.661. This indicates that the independent variables collectively explain more than 50% of the variation in CRD. The F-statistics for models 1, 3, and 4 (28.59, 25.27, and 25.90, respectively) with p-values less than 0.01 confirm that the models significantly predict CRD, demonstrating a good fit for the data.

Table 5.
Regression analysis results

Variable	Predicted Sign.	Model (1) *CRD*	Model (2) *FP*	Model (3) *CRD*	Model (4) *CRD*
Constant (α)		2.769***	0.346***	4.267***	2.766***
EP	-[4]	-0.063***	-0.001**		-0.627***
FP	+			0.222**	0.071***
SIZE	+	0.007	-0.002***	0.000	0.007
LEV	+	-0.087	-0.14	-0.111	-0.096
AGE	+	0.007***	0.000***	0.009***	0.007***
GRO	+	-0.494***	0.027*	-0.288***	-0.521***
INF	-	0.05***	-0.003	0.160	0.051***
GDP_Percap	+	0.12***	0.004	0.128***	0.118**
GDP_Gro	+	0.14***	-0.005***	0.139***	-0.136**
Con_Cla	+	0.201	-0.383***	0.353	0.177
COV	-	0.105***	-0.025***	-0.182***	-0.096
LP	+	-0.004	0.002***	-0.007***	-0.003
CC EPI	+	0.025***	0.017***	0.005	0.026**
Year Fixed Effect		Ya	Ya	Ya	Ya
Industry Fixed Effect		Ya	Ya	Ya	Ya
n		5,258	5,258	5,258	5,258
Wald-Chi2		452.95	104.28	109.75	465.70
Prob> CHi2		0.0000	0.0000	0.0000	0.0000
Goodness of fit					

[4] The negative predicted sign of EP reflects the inverse relationship between actual environmental performance and its measurement proxy, carbon emissions, whereby better environmental performance corresponds to lower carbon emissions (i.e., high CO_2 = weak EP; low CO_2 = strong EP)

Variable	Predicted Sign.	Model (1)	Model (2)	Model (3)	Model (4)
R^2		***CRD***	***FP***	***CRD***	***CRD***
Adjusted R Square		0.656	0.170	0.583	0.661
F-statistics		28.59	7.55	25.27	25.90
Sig F-stat		0.0000	0.0000	0.0000	0.0000

Notes: CRD *(climate-related disclosure) refers to standardized percentile rank of CDP climate change disclosure scores;* ***EP*** *(environmental performance) is the natural logarithm of annual carbon emissions (CO2) in tons;* ***FP*** *(financial performance) refers to the Return on Assets (ROA) score, which is computed by dividing the company's net profit by its total asset;* ***SIZE*** *(firm size) is the natural logarithm of total assets at the end of the fiscal year;* ***LEV*** *(firm leverage) is the ratio of total debt to total assets at the end of the fiscal year;* ***AGE*** *(firm age) is the natural logarithm of (current year - company founding year);* ***GRO*** *(firm growth) is the total assets in the current year (P1) minus the total assets in the previous year (P0) divided by the total assets in the previous year (P0);* ***IND*** *(industry classification) is a dummy variable that takes the value 1 for industries with high carbon emission impacts and 0 for those with low impact;* ***INF*** *(inflation) is the inflation rate of the country;* ***GDP_Percap*** *(gross domestic product per capita) is a measure representing the average income per capita in a country, calculated by dividing the country's total GDP by its population;* ***GDP_Gro*** *(gross domestic product growth) is the annual percentage change in a country's GDP;* ***Con_Cla*** *(country classification) is the classification of countries as developed or developing according to the United Nations World Economic Situation and Prospects;* ***LP*** *(law and policy) refers to the number of laws and policies related exclusively to climate change;* ***CC EPI*** *(climate change - environmental performance index) is a score between 0 and 100 that evaluates countries' efforts in addressing global climate change; and* ***COV*** *(COVID-19) is a dummy variable that takes the value 1 for observations from 2020 and 2021, and 0 for other years.*

***; **; and * indicate significance at the 0.01, 0.05, and 0.10 levels, respectively.

4.2.1 Environmental performance and climate-related disclosure

Based on the regression results for equation model (1), it was found that environmental performance (EP) has a significant negative relationship with climate-related disclosure (CRD) (β = -0.063; p-value $\leq$ 0.01). Since EP is measured as the logarithm of carbon emissions, this negative coefficient should be interpreted intuitively: higher CO_2 emissions indicate weaker environmental performance, while lower CO_2 emissions indicate stronger environmental performance (Kim & Kim, 2022). Accordingly, firms with better environmental performance (i.e., lower emissions) are more likely to provide higher levels of climate-related disclosure. These results are consistent with hypothesis H1, which predicts that environmental performance positively contributes to the extent of climate-related disclosure.

This finding reflects a stronger commitment to sustainability, as companies not only focus on achieving good environmental performance but also seek to demonstrate their social responsibility through transparency. This transparency indicates that companies aim to communicate their positive environmental performance (in the

context of climate) to stakeholders through climate-related disclosures. The results are consistent with prior research, which has established a positive relationship between environmental performance and environmental disclosure in general (Al-Tuwaijri et al., 2004; Deswanto & Siregar, 2018; Fontana et al., 2015; Li et al., 2017; Lu & Taylor, 2018; Oates & Moradi-Motlagh, 2016; Tadros & Magnan, 2019; Wahyuningrum et al., 2020).

In addition to reinforcing the consistency of findings from previous studies, this research also expands the context by focusing not only on general environmental issues but also on climate change. Thus, these findings are consistent with signaling theory, which suggests that companies use information disclosures as signals to stakeholders (Al-Tuwaijri et al., 2004; Li et al., 2017). In this case, companies with good environmental performance disclose climate-related information to send positive signals to the market and investors, showing their dedication to sustainability and awareness of climate change (Giannarakis et al., 2017). Climate-related disclosures can act as signals, providing stakeholders, including investors, with details regarding the company's environmental performance (Giannarakis et al., 2017; Luo & Tang, 2014). This information is valuable because investors consider environmental factors in their decision-making, which has the potential to enhance the company's value (Luo & Tang, 2014).

4.2.2 Environmental performance and financial performance

An interesting finding emerged from the regression results for equation model (2), where a notable negative relationship between environmental performance (EP) and financial performance was found (FP) (β = -0.001; p-value $\leq$ 0.05). This finding suggests empirical support for hypothesis H2 in the data analyzed in this study. The inverse relationship between environmental performance (EP) and financial performance (FP) suggests that lower EP values (indicating reduced carbon emissions or improved environmental performance) are linked to better financial performance. This is consistent with the view that companies committed to sustainability will achieve competitive advantages that strengthen their financial performance over the long term (Bătae et al., 2021; Chen et al., 2023; Naeem et al., 2022; Shabbir & Wisdom, 2020).

4.2.3 Financial performance and climate-related disclosure

Equation (3) also shows that a company's good financial performance tends to increase the level of climate-related disclosure ($\beta = 0.222$; p-value ≤ 0.05), supporting H3. This finding suggests that having strong financial performance encourages companies to be more active in disclosing climate-related information. With good financial performance, companies have more resources to allocate towards sustainability practices, including climate-related disclosures for transparency.

Moreover, this finding suggests that financially successful companies are more inclined to share climate-related information, demonstrating that their focus extends beyond financial performance to include responsibility for the environmental impact of their operations (Kansal et al., 2014; Lu & Abeysekera, 2014; Muttakin et al., 2015). This result is closely related to the expansion of the legitimacy theory (Magness, 2006; Mateo-Márquez et al., 2022; Stanny & Ely, 2008). According to this theory, organizations seek to gain social legitimacy by meeting societal and stakeholder expectations on essential issues, including sustainability and environmental impacts (Brønn & Vidaver-Cohen, 2009; Dowling & Pfeffer, 1975). Financially successful companies, with larger resources, are capable of managing and disclosing these issues, which, in turn, strengthens their legitimacy in the eyes of the public and stakeholders (Magness, 2006).

4.2.4 Environmental performance, financial performance, and climate-related disclosure

Finally, the three relationships analyzed in equations (1), (2), and (3) were integrated into the regression results for equation (4). Based on the regression analysis results for equation (4), H4 is supported. The regression analysis shows that there is an indirect effect of the company's environmental performance on the level of climate-related disclosure through the mediation process ($\beta EP = -0.627$; p-value ≤ 0.01, and $\beta FP = 0.071$; p-value ≤ 0.01). Thus, environmental performance continues to make a positive contribution to the level of climate-related disclosure, both directly and indirectly. Referring to (Zhao et al., 2010), the role of financial performance as a mediator in the relationship between environmental performance and climate-related

disclosure is categorized as complementary mediation. In this case, both the mediated effect (the effect of environmental performance on climate-related disclosure through financial performance) and the direct effect (the effect of environmental performance on climate-related disclosure) exist and point in the same direction. In other words, both the mediated effect (where the independent variable influences the dependent variable through a mediator) and the direct effect (where the independent variable directly impacts the dependent variable without a mediator) collaborate to reinforce or enhance the connection between these variables. In this indirect relationship, these findings confirm that companies often receive additional incentives when they have good environmental performance. These incentives tend to be linked to financial gains, which often improve their financial performance. Subsequently, with good financial performance, they tend to have more resources to perform transparency through climate-related disclosures. Therefore, these companies are not only managing their financial performance but also paying attention to their environmental impact and seeking to gain social legitimacy through transparent disclosures on sustainability issues, particularly climate change.

4.3 Robustness Test

This study performs a robustness check using an alternative proxy for environmental performance, namely carbon emission intensity. This metric is calculated as total carbon emissions (Scope 1 + Scope 2) divided by total revenue (in thousands of US dollars). To measure changes (Δ) in emission intensity, the sign is inverted to reflect changes in performance (Toukabri & Jilani, 2022; Toukabri, 2025). As reported in Table 6, the robustness check yields results that are consistent with the main analysis in both direction and significance, further strengthening the validity of the findings.

As shown in Table 7, this study also separates the subsample into developed countries (n = 3,690) and developing countries (n = 1,818) to enable a more nuanced comparison of the relationships across different economic contexts. The results reveal that the effects are positive and statistically significant in both groups. However, the magnitude is stronger in developed countries, indicating that firms in more advanced economies may possess greater capacity, resources, and institutional support to translate

environmental and financial performance into more extensive climate-related disclosures compared to firms in developing economies.

5. Conclusion, Implication, and Limitation

5.1 Conclusion

This study addresses unresolved issues regarding the relationship between environmental performance and environmental disclosure, as identified in previous studies (Hughes et al., 2001; Al-Tuwaijri et al., 2003; Qi et al., 2014; Luo & Tang 2014; Li et al., 2017; Lu & Taylor 2018; Wahyuningrum et al., 2020). Specifically, it focuses on contextualizing this relationship within the framework of climate change. The findings indicate that environmental performance (in the context of climate) is positively related to the level of climate-related disclosure. Companies with stronger environmental performance are more likely to share greater climate-related information, in line with signaling theory.

Furthermore, this study shows that climate-related disclosure increases as financial performance improves. This highlights the importance of financial performance as a crucial resource that motivates companies to increase investments in climate change mitigation and adaptation. The positive impact of environmental performance on climate-related disclosure is stronger when environmental performance translates into financial performance. This result supports ethical practices, where good environmental performance is rewarded with enhanced financial performance. Therefore, financial performance acts as an intermediary in strengthening the positive link between environmental performance and climate-related disclosure.

5.2 Implications

This empirical study offers both theoretical and practical implications. Theoretically, the positive direct effect of environmental performance on the level of climate-related disclosure reinforces the relevance of signaling theory in explaining the relationship between the two. Signaling theory explains that climate-related disclosure serve as a credible positive signal to stakeholders about the company's commitment to sustainability (good environmental performance). Furthermore, the study reveals an

indirect pathway, whereby financial performance mediates this relationship. The results of this study show that financial performance acts as a linking mechanism between environmental performance and the level of climate-related disclosure. It explains how a company's financial situation can enhance its ability to disclose climate-related information based on its environmental performance. Therefore, future research can examine the effect of environmental performance on the level of climate-related disclosure by considering the existence of a specific mechanism explaining the relationship between the two, such as corporate governance mechanisms serving as a mediator.

Practically, these findings suggest important implications for multiple stakeholders. For regulators in the Asia-Pacific, the results highlight the need to strengthen disclosure frameworks to enhance comparability and reduce selective reporting. At the same time, policymakers need to recognize that firms with stronger financial resources are better able to translate environmental performance into credible disclosures. For investors, high disclosure quality can be serve as a dual signal of environmental commitment and financial strength. This dual signal helps them assess genuine sustainability performance and mitigate the risk of greenwashing, thereby improving ESG integration and capital allocation. For corporate managers, the results highlight that strong environmental performance must be supported by adequate financial capacity to ensure transparent and consistent reporting. Managers should therefore integrate environmental and financial strategies, allocate sufficient resources, and embed disclosure within governance systems. They can also use voluntary platforms such as CDP strategically while preparing for mandatory disclosure regimes.

5.3 Limitations and future research directions

This research has several limitations. First, the sample in this study is limited to companies in the Asia-Pacific region that responded to the CDP questionnaire. As a result, the sample may exclude other companies that disclose climate-related information but did not participate in the CDP questionnaire. This limitation may affect the generalization of the study's findings because the results only represent companies that actively participate in CDP reporting. Companies with different disclosure methods

or motivations may have distinct characteristics or disclosure patterns. Therefore, future research is recommended to conduct content analysis on annual reports, sustainability reports, and other relevant reports as proxies for measuring climate-related disclosure variables.

Second, the environmental performance proxy in this study is limited to carbon emissions. Although this indicator is relevant and widely used in prior studies, it does not fully capture environmental performance in the broader context of climate change. Therefore, future research could consider other environmental performance indicators, such as greenhouse gas (GHG) emissions, the use of renewable energy, water conservation, and waste disposal management, to offer a more complete view of a company's environmental impact on climate change (Setiawan & Honesty, 2021; Li et al., 2017; Al-Tuwaijri et al., 2003; Horváthová 2010; Xie et al., 2019; Nguyen et al., 2021; Iwata & Okada 2011)..

Third, this study does not address potential methodological limitations such as omitted variable bias, measurement error, and endogeneity, which may compromise the robustness of the findings. Future research could employ longitudinal or mixed-method designs and apply more rigorous econometric techniques, such as instrumental variables, fixed effects, or difference-in-differences (DiD), to capture dynamic effects and reduce bias.

Finally, this study does not consider evolving disclosure frameworks, such as the ISSB (IFRS S1 and S2), which are reshaping global sustainability reporting. Future research should assess how these standards affect disclosure practices and stakeholder responses, while also leveraging textual analysis (e.g., natural language processing (NLP) on CDP or sustainability reports) and ESG engagement strategies to deepen insights into sustainability signaling.

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