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Sustainability reporting and assurance practices contribution to SDG disclosure: evidence from communication on progress (CoP)

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Abstract

Purpose – This study aims to investigate the impact of diverse practices in sustainability reporting and assurance on the disclosure of sustainable development goals (SDGs). Specifically, the authors examine the disclosure of SDGs along two dimensions: disclosure breadth, denoting the number of goals mentioned, and disclosure depth, encompassing the extent of actions disclosed to advance these goals.

Design/methodology/approach – Using a panel Tobit regression analysis, the authors analyse the communication on progress questionnaires from 299 companies (resulting in 1,015 firm-year observations) participating in the United Nations Global Compact from 2017 to 2021.

Findings – The findings revealed that greater adherence to Global Reporting Initiative standards increases SDG disclosure breadth; external assurance using publicly recognised standards, more than proprietary methods, is associated with SDG disclosure breadth and depth; and the review of information by multiple stakeholders improves the depth of SDG disclosure more than evaluation by a panel of peers.

Originality/value – The originality of this study lies in its examination of the intricate interplay between sustainability disclosure and assurance practices, on the one hand, and the disclosure of SDGs, on the other. Uniquely, the authors consider the various levels of implementation of these practices, allowing for a comprehensive assessment of their influence on SDG disclosure.

Keywords Communication on Progress, United Nations Global Compact, Sustainable Development Goals, SDG, Sustainability reporting, Assurance, Stakeholder engagement

Paper type Research paper

1. Introduction

The world is witnessing a historic moment in which sustainability disclosure, already widespread in many regions (KPMG, 2022), is gradually moving towards a phase of standardisation. This trend is demonstrated by regulatory innovations such as the Corporate Sustainability Reporting Directive (CSRD) in Europe and the incoming environmental, social and governance (ESG) disclosure rules in the USA. It is also evident in the

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collaboration of international standard-setters, such as the merging of the Sustainability Accounting Standards Board (SASB) and the Value Reporting Foundation (VRF) into the International Sustainability Standards Board (ISSB). Although full convergence seems unlikely in the near future (Stolowy and Paugam, 2023), a shared element among numerous reporting regulations and standards is the recognised importance of the sustainable development goals (SDGs) in advancing the 2030 Agenda.

Before the COVID-19 pandemic, substantial progress was achieved in areas such as poverty reduction, maternal and child health, access to electricity and gender equality. However, because of crises such as the COVID-19 outbreak and the war in Ukraine, those advancements are now in jeopardy. Progress in several areas – such as decreasing inequality, cutting carbon emissions and combating hunger – has either stagnated or reversed (UN, 2022). As a result, the world is not on track to meet the goals and targets set by the 2030 Agenda.

Along with governments and cities, businesses must commit to reducing their carbon emissions, conserving natural resources, creating better jobs, advancing gender equality and tackling growing poverty and inequalities (UN, 2021a). Given the imperative to expedite the transition to a sustainable development paradigm for companies, there has been a discernible uptick in the number of initiatives by regulatory and standard-setting bodies worldwide to promote sustainability disclosure. These endeavours are aimed at fostering greater comparability and reliability in disclosures (IFRS Foundation, 2021). Furthermore, they also elevate the pursuit of SDGs to a position of priority in corporate reporting (EFRAG, 2021).

Against this backdrop, the accounting literature has emphasised reporting standards that furnish a framework for sustainable disclosure. A notable example is the Global Reporting Initiative (GRI), widely adopted by international companies (KPMG, 2022). However, limited attention has been directed to other general guidelines and principles regarding sustainable disclosure practices (Nicolò *et al.*, 2024; Zampone *et al.*, 2022). For example, the Communication on Progress (CoP), which was formulated by the United Nations (UN), appears to be somewhat neglected (Lehmann *et al.*, 2010; Rasche and Waddock, 2014; Podrecca *et al.*, 2022).

Nevertheless, the United Nations Global Compact (UNGC) represents one of the main catalysts of the sustainable pathway required by the SDGs (Rosati and Faria, 2019b). The UNGC has started to collect data on business participants' contributions to the SDGs by adding two questions to the CoP questionnaire. Additionally, the UN has launched various initiatives to support business participants in integrating SDGs into their business strategies, such as SDG ambition and aligning the ten pillars of UNGC with the SDGs through SDG reporting.

This paper focuses on the factors that influence the level of SDG disclosure considering various choices that companies can make in terms of sustainability reporting and assurance practices. We analysed the CoP questionnaires submitted by 299 companies, covering the period 2017–2021, encompassing 1,015 firm-year observations. We measured SDG disclosure in two ways: disclosure breadth, described as the number of goals disclosed and disclosure depth, referring to the number of actions undertaken to advance the goals.

The findings demonstrate that:

- greater adherence to GRI standards was associated with higher SDG disclosure breadth (SDGDB);
- external assurance, when conducted using publicly recognised standards rather than proprietary methodologies, was linked to both SDGDB and SDG disclosure depth (SDGDD); and
- the review of information by multiple stakeholders rather than a panel of peers was associated with SDGDD.

The originality of this study lies in its examination of the intricate interplay between sustainability disclosure and assurance practices, on the one hand, and the disclosure of SDGs on the other. Uniquely, we consider the various levels of implementation of these practices, allowing for a comprehensive assessment of their influence on SDG disclosure. Unlike previous studies, which often treated SDG disclosure and related determinants in binary terms, our analysis moves beyond the mere mention of SDGs in disclosure or the presence or absence of specific practices. Instead, we delve deeper into the effect of different choices, examining how they impact the breadth and depth of disclosure regarding SDGs.

The paper is organised as follows: Section 2 presents a review of the literature, the research question and the hypotheses. Section 3 summarises the research design. The results are presented in Section 4 and discussed in Section 5. Section 6 offers concluding remarks and identifies implications for theory and practice.

2. Literature review and hypothesis development

2.1 Disclosure on the sustainable development goals

Business research on SDGs has mainly focused on their implementation, often adopting a managerial or accounting perspective (Mio *et al.*, 2020). The literature on SDG disclosure has examined the factors influencing the adoption of disclosure, often adopting a binary approach (Elalfy *et al.*, 2021). Rosati and Faria (2019a), for instance, analysed the institutional factors that influenced the disclosure of SDGs. They found that companies in countries with high levels of climate-change vulnerability and national corporate social responsibility or low levels of market coordination were most likely to report on SDGs. Concerning firm-level determinants, the presence of independent directors on the board, company expertise with non-financial disclosure and the length of the document all influenced SDG disclosure (Pizzi *et al.*, 2021). Additionally, early adoption of SDG disclosure seems to be related to a commitment to sustainability frameworks, such as UNGC, CDP, International Finance Corporation and International Organization for Standardization (Rosati and Faria, 2019b).

SDG disclosure is crucial for sustainable practices for several reasons. Firstly, it may facilitate companies in openly communicating their sustainability efforts, which is vital for building trust with stakeholders and demonstrating a genuine commitment to sustainable development goals. This transparency helps prevent accusations of greenwashing or SDG-washing (Heras-Saizarbitoria *et al.*, 2022).

Engaging stakeholders through comprehensive SDG disclosure is another significant benefit. It helps companies identify material issues and fosters collaboration, ensuring that their sustainability initiatives align with broader societal goals and stakeholder expectations. This alignment drives improvements in both policy and practice (Adams and Mueller, 2022), leading to more robust and targeted sustainable practices and enhancing the overall effectiveness of a company's sustainability strategy. Effective stakeholder engagement ensures that a company's SDG initiatives are aligned with broader societal goals and expectations, promoting a more integrated approach to sustainability (Hummel and Szekely, 2022). Moreover, regular SDG disclosure enables firms to benchmark their performance against industry standards and best practices, driving continuous improvement. This benchmarking helps companies identify areas for enhancement and track their progress over time, contributing to more effective and efficient sustainable practices (KPMG, 2022).

SDG disclosure also aids in identifying and managing risks associated with ESG factors. By disclosing these risks and the measures taken to mitigate them, companies demonstrate their resilience and preparedness for future challenges, which is crucial for long-term sustainability (De Silva Lokuwaduge and De Silva, 2022). This proactive approach to risk

management can lead to more sustainable business operations, fostering a more holistic approach to sustainability (Cuadrado-Ballesteros *et al.*, 2017; Tsalis *et al.*, 2020).

In the field of voluntary sustainability disclosure, such as the disclosure of SDG-related information, legitimacy theory is a widely adopted theoretical framework (Nasreen *et al.*, 2023; Manes-Rossi and Nicolò, 2022; Nicolò *et al.*, 2022). Legitimacy theory proposes that organisations must maintain a virtual social contract with the society in which they operate (Deegan, 2002). In other words, an organisation's ability to conduct activities depends on its ability to obtain social legitimacy. An organisation's perceived legitimacy is thus a conferred status; the public must approve of the company so that it can continue accessing the capital and human resources it needs to perform its activities and the value creation processes (Suchman, 1995). Organisations must display socially responsible behaviours and conform to the codes established by society to gain or maintain legitimacy.

To demonstrate congruence between corporate operations and socially accepted norms, managers can use voluntary disclosure as the main instrument (O'Dwyer, 2002). Voluntary disclosure reduces the possibility that the company may incur adverse normative restrictions and boycotts that could hamper its continued viability (De Villiers and Van Staden, 2006). Corporate managers should assume a proactive role in recognising any deviation of the organisation's conduct from the social contract. Managers should also implement remedial strategies to fill any legitimacy gaps that could threaten the organisation's existence (Silva, 2021). Legitimacy concerns drive sustainability disclosure (Hahn and Kühnen, 2013); in this sense, since no company is created with inherent rights to operate (Demuijnck and Fasterling, 2016), the adoption of SDGs could allow an organisation to be granted such a right. Legitimacy theory is thus well suited to explain voluntary corporate sustainability disclosure (van der Laan, 2009). Given the voluntary regimen that characterises SDG disclosure in most countries, we drew on legitimacy theory to develop the theoretical apparatus for this study.

Critical opinions are documented in the literature concerning the search for legitimacy through the inclusion of SDGs in corporate disclosures. Concerns emerged related to the symbolic rather than substantive use of SDG disclosure (García-Meca and Martínez-Ferrero, 2021), poor transparency regarding contributions to the SDGs (Pizzi *et al.*, 2022) or the lack of quantitative and forward-looking SDG-related information (Hummel and Szekely, 2022). Some authors have raised concerns about companies tending to "cherry-pick" the SDGs they feel comfortable with, which can reduce the goals to tools for public relations (Heras-Saizarbitoria *et al.*, 2022). Another symbolic display of commitment to sustainable development is referred to as "SDG washing". This happens when companies demonstrate a superficial engagement by mentioning the goals in their disclosures, without detailing their approach to advancing the SDGs (Heras-Saizarbitoria *et al.*, 2022). Bebbington and Unerman (2018) argued that the SDGs could be used to display the company in a favourable light, masking a lack of effort. This point suggests that research could provide value in understanding the differences between rhetoric versus meaningful action. Linking corporate actions to SDGs may be a symbolic rather than substantive change if the goals are mentioned but no information is given about the company's actions towards their advancement (Silva, 2021).

Hence, many studies have considered SDG disclosure practices in relation to the adoption of SDGs, or the number of goals mentioned in the disclosures. Less is known about how companies factually contribute to the SDGs. As a unique contribution, we consider companies' actions to advance the SDGs. Such actions may refer to the identification of opportunities and responsibilities connected to SDGs, the company's priorities regarding various goals, the definition of indicators and objectives, the integration of SDGs in the

company's business model, the company's expected influence regarding SDGs and cooperation with other parties to advance the SDGs.

To contribute to the topic of SDG disclosure, this research examines the CoP questionnaires submitted by companies that adhere to the UNGC. The CoP is a public report to stakeholders about companies' efforts to implement the ten principles of the Global Compact and support the 17 SDGs (UN, 2012). To date, more than 17,000 entities worldwide – mostly companies – have participated in the initiative, which represents a vast source of corporate sustainability practices across the world (UN, 2021b). The CoP questionnaire is compiled yearly, with companies completing an online survey based on their strategy, operations and disclosure practices as relevant to the SDGs and UNGC principles. The questionnaire items are divided into standard and narrative answers. The answers provided must be consistent with the organisation's sustainability report, which must be attached to the survey and become part of the CoP, which is freely accessible at the UNGC website.

To address the identified research gap, this study examines companies' CoP questionnaires to assess the SDG disclosure. We consider both the number of goals included in the report (breadth) and the actions undertaken to advance those goals (depth). The aim was to understand whether three highly debated practices connected to sustainability reporting are indeed associated with SDG disclosure, not only in terms of the number of goals the company identifies in its activities but also the actions for achieving those goals. The investigated practices are the adherence level to sustainability reporting standard, the methodologies used for external assurance and the adoption of other credibility reinforcement practices.

2.2 Sustainable development goals disclosure and adherence level to sustainability reporting standards

The most widely used sustainability reporting standards worldwide are issued by GRI. Even in the current rapidly changing environment, GRI has benefited from its longevity and reputation and remains the point of reference for sustainability disclosures (KPMG, 2022). The UNGC and GRI have also developed tools that support the inclusion of SDGs in sustainability disclosure, starting in 2015 with the SDG Compass (GRI and UN Global Compact, 2015). More specific guidance links each of the 17 goals to the specific GRI standards that can be used to disclose information, which facilitates SDG integration into sustainability disclosure (GRI and UN Global Compact, 2017; GRI, 2022).

The association between GRI standards and SDGs has received considerable attention in recent studies, especially in connection with the SDG Compass. For instance, García-Sánchez *et al.* (2022b) investigated the influence that institutional investors exert over the adoption of the disclosure strategy established by the SDG compass. Their study demonstrates that ownership by foreign investors, pension funds and other investors has boosted the relevance of the information disclosed in relation to the 2030 Agenda. Avrampou *et al.* (2019) used GRI performance indicators for a comparative assessment of the non-financial performance disclosed in annual sustainability reports, focusing on a small sample of leading European banks. The findings showed an overall low contribution to the SDGs.

Industry-specific studies have also investigated the suitability of GRI standards to operationalise the SDGs (Ordonez-Ponce and Khare, 2021) or to provide frameworks for the analysis of a GRI–SDG linkage (Perello-Marin *et al.*, 2022). Even if the integration of SDG Compass is limited, the implementation of SDG indicators through using GRI guidelines is quite widespread among large companies (García-Sánchez *et al.*, 2022a).

However, few studies have explored how the adherence level to GRI standards influences the extent of SDG disclosure. There is limited evidence available to support this connection. Hassan *et al.* (2013) provided some evidence of a relationship between GRI application levels and disclosure of specific environmental activities, with mixed findings. Simmons *et al.* (2018) found no substantial influence of the level of adherence to GRI on a company's sustainability performance.

Given the collaborative efforts of the UN and GRI after the UN introduced the SDGs, we anticipated that strong adherence to GRI standards would be linked to a high level of SDG disclosure. Our choice of GRI as the sustainability reporting standard to formulate the initial hypothesis was based on its extensive global utilisation (KPMG, 2022; IFAC and AICPA, 2022), the substantial interest that previous studies have shown in GRI, and its clear delineation of adherence levels:

H1. The positive association between GRI and the extent of SDG disclosure is stronger when higher adherence is opted for.

Prior research has examined the relationship between a company's adoption of the GRI and the inclusion of SDGs in its sustainability report. However, the impact of the adherence level to GRI standards on the number of SDGs disclosed and the actions taken to advance those goals has not been widely explored. Therefore, we developed the following sub-hypotheses to further explicate *H1*:

H1a. The positive association between GRI and SDG disclosure breadth is stronger when higher adherence is opted for.

H1b. The positive association between GRI and SDG disclosure depth is stronger when higher adherence is opted for.

2.3 Sustainable development goals disclosure and external assurance methodologies

External assurance regarding sustainability information involves independent organisations – such as accounting firms, consultants and other service providers – who provide external validation. Accounting firms have witnessed a steady rise in their market share over the years and now dominate the provision of sustainability assurance across jurisdictions (IFAC and AICPA, 2022). The provision of external assurance itself signifies a commitment to sustainability disclosure (Schaltegger and Wagner, 2011); even when obtained voluntarily, it serves as a form of investor protection (Herda *et al.*, 2014). By providing credibility and reducing information asymmetries in sustainability reports (Cuadrado-Ballesteros *et al.*, 2017; Casey and Grenier, 2015), external assurance contributes to investor confidence. As a result, companies can enlist the services of external assurance providers to meet stakeholders' expectations regarding independent verification and to enhance the legitimacy of their sustainability disclosures (Maroun, 2020).

Recent studies focusing on the relationship between external assurance and SDG disclosure have gained traction. Many academics and practitioners have called for further exploration and improvement of SDG disclosure assurance (Krasodomska *et al.*, 2021). Although research in this area is limited, there is some evidence in the literature that supports this association. For example, external assurance has been identified as a determinant of early adoption of SDG disclosure (Rosati and Faria, 2019b).

The demand for sustainability assurance services has grown substantially in the past decade (KPMG, 2022). A recent survey by IFAC and AICPA (2022) across 22 jurisdictions, focusing on the largest companies, revealed that most of them obtained some level of

assurance, with audit firms mainly using the ISAE 3000 (Revised) as the assurance standard. According to Martínez-Ferrero *et al.* (2021), when organisations make substantial investments in reliable sustainability assurance by incorporating professional standards, there is a notable increase in their credibility and legitimacy. External assurance appears to be associated with the integration of SDGs in corporate reports (Elalfy *et al.*, 2021), and this relationship is strengthened when higher quality assurance is provided (Sierra García *et al.*, 2022).

Considering that the literature has identified the type of assurance standard adopted as an element of sustainability assurance quality, with publicly available criteria indicative of higher quality (García-Sánchez *et al.*, 2019; Martínez-Ferrero *et al.*, 2018), we investigated this specific aspect of sustainability assurance concerning the SDG disclosure. Accordingly, we hypothesised that the use of recognised assurance standards, rather than proprietary methodologies, would demonstrate a stronger association with the breadth and depth of SDG disclosure. Thus, our *H2* was formulated as follows:

H2. The positive association between external assurance and the extent of SDG disclosure is stronger when performed with recognised assurance standards rather than with the assurance provider's own proprietary methodology.

In coherence with the previous hypothesis, the *H2* was divided into two sub-hypotheses to explore the association with the number of SDGs reported as well as the number of actions taken to advance the goals:

H2a. The positive association between external assurance and SDG disclosure breadth is stronger when performed with recognised assurance standards rather than with the assurance provider's own proprietary methodology.

H2b. The positive association between external assurance and SDG disclosure depth is stronger when performed with recognised assurance standards rather than with the assurance provider's own proprietary methodology.

2.4 Sustainable development goals disclosure and other credibility enhancement practices

Along with external assurance, organisations may rely on additional external verification practices for their SDG disclosures, such as the review of information by a panel of independent experts or representatives of key stakeholders (Adams *et al.*, 2020). Because this study uses the lens of legitimacy theory, we consider these approaches to be stakeholder initiatives to enhance the credibility of SDG-related information. The joint provision of sustainability assurance and other credibility enhancement practices undertaken by company stakeholders has been the object of attention in theory and practice. Prinsloo and Maroun (2021) considered these aspects to be external assurance components in a combined assurance model. Combined assurance is defined as a function of the responsibility of the board of directors to ensure accurate, complete and reliable disclosure together with the characteristics of various internal and external sources of assurance. This combination is also considered in professional standards. For instance, when ISAE 3000 is applied to sustainability disclosure, additional forms of external assessment can be contemplated. These additional materials, among others, can be provided by company stakeholders to support the assuror in carrying out their assignment (IFAC, 2021).

Sustainable development requires a multi-stakeholder approach (Adams and Mueller, 2022). To achieve that, stakeholder engagement practices – which should involve a process of consultation, communication, dialogue and exchange – need to be established by a

company (Greenwood, 2007; López-Concepción *et al.*, 2022). Stakeholder engagement plays a key role in determining material issues, defining the report's content, disseminating information and planning future actions (AccountAbility, 2015; Bellucci *et al.*, 2019; Kaur and Lodhia, 2018; Manetti, 2011). Even if the importance of stakeholder engagement practices is widely recognised, the relevant practices adopted by companies are under-explored and, in some cases, subject to perplexity. For instance, a study on Fortune 500 companies found a low level of stakeholder engagement in disclosures and scant evidence that sustainability reports were based on stakeholder engagement practices (Ardiana, 2021). Therefore, investigating stakeholder engagement initiatives linked to the review of SDG-related information can provide novel insights on the subject. Multi-stakeholder engagement is an advised approach towards sustainable development (Nonet *et al.*, 2022) and this practice is one of the determinants of narrative elements of the disclosure – such as forward-looking and sustainability-specific content (Al-Shaer *et al.*, 2022). Coherently, we expected the review of information by multiple stakeholders to have a stronger impact on the extent of SDG disclosure compared to when the review was conducted by a panel of peers. The *H3* was formulated accordingly:

H3. The positive association between other credibility enhancement practices and the extent of SDG disclosure is stronger when information is reviewed by multiple stakeholders rather than by a panel of peers:

As for the other hypotheses, in this case, the analysis was developed around the number of SDGs reported and the actions disclosed towards their achievement:

H3a. The positive association between other credibility enhancement practices and SDG disclosure breadth is stronger when information is reviewed by multiple stakeholders rather than by a panel of peers.

H3b. The positive association between other credibility enhancement practices and SDG disclosure depth is stronger when information is reviewed by multiple stakeholders rather than by a panel of peers.

Figure 1 provides a comprehensive visual representation of all the hypotheses formulated in our study.

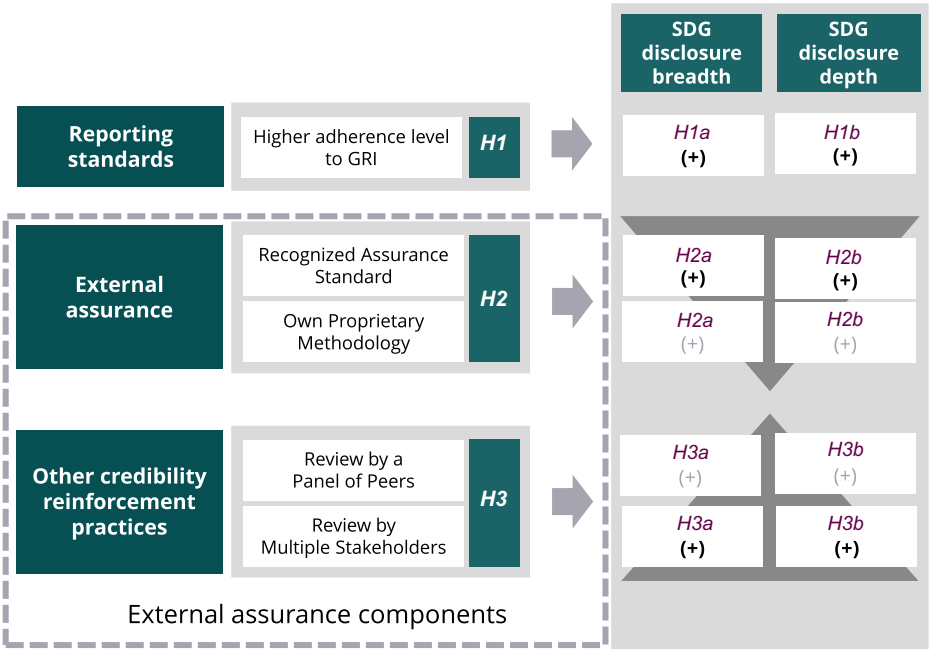
3. Research design

3.1 Sample

For inclusion in our study sample, a company must meet two preliminary criteria: participation in the GC programme, and issuance of a CoP report along with completion of the corresponding questionnaire.

From the list of companies participating in the UNGC, we selected only those also included in Forbes Global 2,000 annual lists of the top 2,000 companies worldwide (Martínez-Ferrero *et al.*, 2018; Van der Waal and Thijssens, 2020). The reason was that larger companies would disclose a greater extent of sustainability information (Jennifer Ho and Taylor, 2007; Pizzi *et al.*, 2021).

Accordingly, of the initial sample of 2,000 potential companies, we identified 845 as participants in the GC programme. We then removed companies lacking SDG and assurance information (subtracting 546 companies) and matched the data with financial and governance-related information from the Refinitiv Eikon database. Our final sample consisted of 1,015 firm-year observations from 299 companies, covering the period from 2017 to 2021. Our decision to commence the analysis from 2017 was informed by the



Source: Authors' own work

Figure 1. Representation of all the hypotheses

recognition that many companies were in the process of aligning their reporting systems with the newly introduced SDGs in the preceding year of 2016. Additionally, we designated 2021 as the final year of our study period due to data availability constraints for subsequent years.

In evaluating the potential influence of the COVID-19 pandemic on our model variables, with the exception of financial control variables, we found minimal discernible disparities in values observed pre- and post-2020. Consequently, we opted to incorporate both the years 2020 and 2021 in our analysis.

Within Table 1, the sequential process leading to sample selection and the consequent removal of missing observations is delineated.

Table 1. Sampling selection procedure

Data restrictions	Total
Initial population of Forbes 2,000 companies	2,000
Less: non-participant companies	(1,155)
Less: companies that do not provide SDGs or assurance information in their CoPs	(546)
Final sample of companies available for tests of hypotheses	299
Total observations for tests of hypotheses for the period 2017–2021	1,015

Source: Authors' own work

Table 2 presents a detailed outline of the sample composition in this study, examining the sample by year, country and industry.

Panel A delineates the distribution of observations per year, spanning from 2017 to 2021. The temporal distribution exhibits a relatively balanced pattern, with observations varying from 17.04% to 22.46% across the respective years. Panel B illustrates the distribution of observations per country. The sample somewhat over-represents France as this was the most prominently represented country in the data set.

In Panel C, the distribution of observations per industry is portrayed. Within this categorisation, the basic materials industry stands out; it accounted for the largest proportion of companies disclosing SDG information (15.17%). Conversely, the health care and real-estate industries exhibited the smallest proportion of companies, at 6.21% and 1.87% of the total, respectively.

3.2 Dependent variables

Consistent with prior accounting research (Erin *et al.*, 2022; Nicolò *et al.*, 2022; Pizzi *et al.*, 2022; Zampone *et al.*, 2022), we used a content analysis approach to assess the extent of SDG disclosure among companies. Specifically, we identify two distinct variables pertaining to SDG disclosure: *SDGDB* and *SDGDD*.

SDGDB encompasses the quantitative aspect of SDG disclosure, quantifying the number of SDGs addressed in a company's CoP report. Ranging from 0 to 17, this scale signifies the company's disclosure on any SDG or all 17 of them. Higher values of SDGDB indicate a greater extent of SDG disclosure.

The qualitative dimension of SDG disclosure is encapsulated by *SDGDD*, which indicates the level of detail in which companies explain their efforts to advance the SDGs within their CoP report. This evaluation was based on six specific questions originating from the guidelines outlined by the UNGC, to which companies were required to respond (by checking the corresponding boxes) in their CoP questionnaire:

(1) Opportunities and responsibilities that one or more SDGs represent to our business.
(2) Where the company's priorities lie with respect to one or more SDGs.
(3) Goals and indicators set by our company with respect to one or more SDGs.
(4) How one or more SDGs are integrated into the company's business model.
(5) The (expected) outcomes and impact of your company's activities related to the SDGs.
(6) If the company's activities related to the SDGs are undertaken in collaboration with other stakeholders.

The resulting *SDGDD* variable ranges from 0 to 6. A score of 0 indicates the absence of actions taken to advance the SDGs, while a score of six denotes comprehensive coverage of all previously mentioned aspects within the company's disclosure.

3.3 Independent variables

Based on our examination of prior research and the information available in the CoP questionnaire, we chose six independent variables, representing a set of specific practices.

Regarding reporting standards, we investigated adherence level to GRI as it is the most extensively adopted reporting standard (KPMG, 2022). We assessed GRI adherence through a variable *GRI*, which took the following values: 0 if the company had not adopted GRI standards; 1 if the company had adopted GRI standards using the "Referenced" option; 2 if

Table 2. Final sample breakdown by year, country and industry

Observations distribution	*N*	%
(Panel A: Years)		
2017	173	17.04
2018	193	19.01
2019	208	20.49
2020	213	20.99
2021	228	22.46
Total	1,015	100.00
(Panel B: Countries)		
Argentina	3	0.30
Australia	14	1.38
Austria	4	0.39
Belgium	6	0.59
Brazil	23	2.27
Canada	24	2.36
Chile	2	0.20
China	30	2.96
Colombia	6	0.59
Cyprus	3	0.30
Denmark	23	2.27
Finland	14	1.38
France	134	13.20
Germany	55	5.42
Hong Kong	3	0.30
Hungary	5	0.49
India	14	1.38
Ireland	15	1.48
Israel	4	0.39
Italy	51	5.02
Japan	99	9.75
Kenya	4	0.39
Korea (South Korea)	28	2.76
Luxembourg	4	0.39
Mexico	15	1.48
The Netherlands	15	1.48
Norway	19	1.87
Poland	3	0.30
Portugal	6	0.59
Russia	15	1.48
Saudi Arabia	5	0.49
Singapore	12	1.18
South Africa	12	1.18
Spain	73	7.19
Sweden	36	3.55
Switzerland	31	3.05
Taiwan	10	0.99
Thailand	27	2.66
Turkey	7	0.69
United Arab Emirates	2	0.20
UK	62	6.11
USA	97	9.56
Total	1,015	100.00

(*continued*)

Table 2. Continued

Observations distribution	*N*	%
(*Panel C: Industries*)		
Basic materials	154	15.17
Consumer cyclicals	81	7.98
Consumer non-cyclicals	129	12.71
Energy	74	7.29
Financials	153	15.07
Health care	63	6.21
Industrials	121	11.92
Real estate	19	1.87
Technology	140	13.79
Utilities	81	7.98
Total	1,015	100.00

Source: Authors' own work

the company had adopted GRI standards using the "Core" option; and 3 if the company had adopted GRI standards using the "Comprehensive" option.

Concerning assurance practices, we defined two binary variables. The primary variable, *EA_RAS*, indicated whether the information had been verified by independent assurors against recognised assurance standards (e.g. ISAE 3000). The variable took 1 in such cases and 0 otherwise. The secondary variable, *EA_OPM*, took a value of 1 if the information had been assured by independent assurors using their own proprietary methodology and 0 otherwise.

Finally, we considered other practices aimed at enhancing credibility by including two binary variables based on the responses provided by companies in their CoP questionnaire. The first variable, *PP*, took the value of 1 if the information had been reviewed by a panel of peers (such as members of the same industry, competitors, benchmarked leaders and others organised via Global Compact Local Network) and 0 otherwise. The second variable, *MS*, was included when the information had been reviewed by multiple stakeholders, taking a value of 1 in such cases and 0 otherwise.

3.4 Control variables

To mitigate omitted variable bias, we incorporated controls for various factors that are likely to influence both the breadth and depth of SDG disclosure. Prior research has suggested that the size of a company may potentially explain variations in the level of sustainability disclosure (Pizzi *et al.*, 2021; Rosati and Faria, 2019a; Zampone *et al.*, 2022; Zampone *et al.*, 2023). Hence, we included *Size* as the natural logarithm of the total assets of the company. We also included *Performance*, which was computed as the ratio of net income to total assets. Companies with strong financial performance are likely to have the resources to undertake sustainable activities and report their outcomes through sustainability reports (Pizzi *et al.*, 2021; Rosati and Faria, 2019a; Zampone *et al.*, 2022; Zampone *et al.*, 2023).

Moreover, because the monitoring demand for information increases as company debt increases, voluntary disclosure of information is expected to be associated with leverage (Martínez-Ferrero *et al.*, 2023; Pizzi *et al.*, 2021; Zampone *et al.*, 2022; Zampone *et al.*, 2023). Thus, we included the *Leverage* variable, computed as the ratio of total debt to total assets.

Given the importance of corporate governance factors in shaping a company's sustainability disclosure practices, we sought to account for the influence of board characteristics on these behaviours. We drew on previous research (Pizzi *et al.*, 2021; Rosati and Faria, 2019a; Zampone *et al.*, 2022; Zampone *et al.*, 2023) and included several control variables in our panel Tobit regression analysis. Specifically, we examined the impact of board size (*BS*), which is often a reflection of various attributes within the board. A larger board size is commonly associated with a higher likelihood of greater diversity and, consequently, a greater potential for enriched discussions infused with fresh perspectives. We also considered the board CEO duality (*BCD*), which captures the potential conflict of interest that may arise if the CEO also serves as the board chairman. Additionally, we assessed the role of board independence (*BI*). This is a measure of the degree to which the board is composed of outside directors who are unaffiliated with the company's management.

3.5 Empirical model

We tested our hypotheses using a general model that we adapted to incorporate the specific variables of interest based on our hypothesis. The model is as follows:

$$SDGD_{i,t} = \alpha_0 + \alpha_1 Practices_{i,t-1} + \alpha_2 Size_{i,t-1} + \alpha_3 Performance_{i,t-1} + \alpha_4 Leverage_{i,t-1} + \alpha_5 BS_{i,t-1} + \alpha_6 BCD_{i,t-1} + \alpha_7 BI_{i,t-1} + \alpha_8 Year\_FE_{i,t-1} + \alpha_9 Country\_FE_{i,t-1} + \alpha_{10} Industry\_FE_{i,t-1} + \mu_{i,t} + \eta_i$$

where;

- *SDGD* = breadth (SDGDB) and depth (SDGDD) of information disclosed by companies about their SDG efforts, calculated from items in the CoP questionnaire;
- *Practices* = disclosure practices adopted by companies; these include disclosure (*GRI*), external assurance against recognised assurance standards (*EA_RAS*) or using a proprietary methodology (*EA_OPM*) and other credibility enhancement practices such as review by a panel of peers (*PP*) or multiple stakeholders (*MS*);
- *Size* = natural logarithm of total assets;
- *Performance* = ratio between net income and total assets;
- *Leverage* = ratio between total debt and total assets;
- *BS* = number of board members;
- *BCD* = board CEO duality; and
- *BI* = percentage of independent directors out of the total number of board members.

The panel Tobit regression analysis we used is consistent with prior accounting literature (Frias-Aceituno *et al.*, 2013; García-Sánchez *et al.*, 2021; García-Sánchez and Martínez-Ferrero, 2017; Zampone *et al.*, 2023). It is a statistical technique for analysing data with dependent variables that contain upper or lower limits (Tobin, 1958). As SDGD and SDGDD were restricted to values between 0 and either 17 or 6, respectively, the panel Tobit regression analysis was an appropriate approach that would yield accurate parameter estimates.

To address potential concerns regarding endogeneity arising from reverse causality, we used a lagged approach. We introduced a one-year lag for the independent and control

variables that are subject to annual variations. Additionally, our analysis included categorical variables that captured time, country and industry fixed effects.

4. Results

4.1 Summary statistics for the variables

Table 3 presents summary statistics for the dependent, independent and control variables.

Panel A presents the main summary statistics for the dependent variables [1]. The table reveals that companies, on average, report 11 SDGs in their CoP, with a standard deviation of ±4.43. This finding indicates an intermediate level of *SDGDB* among companies participating in the UNGC. Additionally, the average *SDGDD* was approximately 4.5 out of a maximum score of 6, with a standard deviation of ±1.76. These results suggest that the information disseminated by companies regarding SDGs exhibited a substantial level of depth.

Panel B provides statistics related to the main independent variables. The vast majority of companies (92.51%) had adopted the GRI framework. Among these, 19.80% of companies adopted the GRI Standards with the "Referenced" option, while 44.24% and 28.47% prepared their reports with the "Core" or "Comprehensive" options, respectively. Regarding the other independent variables, Panel B reveals that a substantial majority of the sample (74.88%) adopted recognised assurance standards. A smaller proportion of companies (29.16%) used their own proprietary methodology to assure the CoP report. Furthermore,

Table 3. Summary statistics for dependent, independent and control variables

Variables	*N*	Mean	S.D.	Min	Max	Skewness	Kurtosis
(Panel A: Dependent variables)							
SDGDB	1,015	11.072	4.427	0	17	−0.312	2.323
SDGDD	1,015	4.501	1.757	0	6	−0.975	2.823
(Panel B: Main independent variables)							
	N	0	0 (%)	1	1 (%)		
GRI	1,015	76	7.49 (%)	201	19.80 (%)		
		2	2 (%)	3	3 (%)	Skewness	Kurtosis
		449	44.24 (%)	289	28.47 (%)	−0.531	2.592
	N	0	0 (%)	1	1 (%)	Skewness	Kurtosis
IA_RAS	1,015	255	(25.12)	760	74.88	−1.147	2.316
IA_OPM	1,015	719	(70.84)	296	29.16	0.917	1.841
PP	1,015	876	(86.31)	139	13.69	2.112	5.461
MS	1,015	700	(68.97)	315	31.03	0.820	1.672
(Panel C: Control variables)							
	N	Mean	S.D.	Min	Max	Skewness	Kurtosis
Size	1,015	25.781	2.175	21.74	33.024	0.823	3.427
Performance	1,015	4.438	5.861	−41.777	38.882	1.070	13.490
Leverage	1,015	25.618	14.226	0	66.488	0.382	2.619
BS	1,015	12.603	3.258	4	28	0.739	3.760
BI	1,015	60.615	23.343	0	100	−0.289	2.237
	N	0	0 (%)	1	1 (%)	Skewness	Kurtosis
BCD	1,015	686	67.59 (%)	329	32.41 (%)	0.751	1.565

Source: Authors' own work

approximately 13.69% of the sampled companies had their information reviewed by a panel of peers. A third of the sample (31.03%) brought the information to the attention of multiple stakeholders to enhance the disclosure credibility.

Finally, Panel C presents summary statistics for the control variables. The table provides an overview of the variations among companies regarding their financial and corporate governance factors.

The table above also reveals that not all variables exhibit a normal distribution. As a common practice, it is recommended that the standard skewness of the data falls within the range of ±1.96, while the standard kurtosis ideally falls within the range of ±3 (Gujarati *et al.*, 2020). Although nearly all variables fall within this range, exceptions are observed for *PP*, *Size*, *Performance* and *BS*.

4.2 Correlation analysis

Table 4 reports the correlation matrix between the dependent variables and several independent variables.

Of the five primary independent variables, three exhibited significant correlations with *SDGDB* and all five demonstrated significant associations with *SDGDD*. Importantly, there was no indication of multicollinearity, as the largest correlation coefficient between independent variables – *PP* and *MS* (0.296) – was well below the threshold of 0.8 (Gujarati *et al.*, 2020). To bolster the robustness of our findings, we conducted a variance inflation factor (VIF) test within the ordinary least squares (OLS) model to detect possible multicollinearity issues. The results revealed an average VIF value of 1.25, well below the cut off value of 10 (Wooldridge, 2020, p. 92). Together, these results indicate the absence of multicollinearity concerns.

4.3 Multivariate analyses

Table 5 presents the findings of the panel Tobit regression analyses examining the relationship between the independent variables and the disclosure of SDGs.

Regarding *H1*, the results indicated a positive association between *GRI* and *SDGDB* (coefficient = 0.450, p-value < 0.05). This result implies that companies with a higher adherence level to GRI standards are more likely to disclose their commitment to SDGs in their CoP report. This follows the joint efforts by the UN and GRI in providing SDG reporting tools. The finding supports *H1a*. However, there is insufficient empirical evidence to substantiate *H1b*, as the statistical analysis revealed a non-significant relationship between *GRI* and *SDGDD*.

Regarding *H2*, the results demonstrated a positive association between *EA_RAS* and both *SDGDB* and *SDGDD* (coefficients = 1.071 and 0.467, respectively, both $p < 0.01$). There was also a positive correlation between *EA_OPM* and both *SDGDB* and *SDGDD* (coefficients = 0.630 and 0.217, p-value < 0.1, respectively). The findings indicate that companies are more likely to report SDG information, both in terms of breadth and depth, when their sustainability reports are assured. Therefore, the results provide support for both *H2a* and *H2b*.

Finally, regarding other credibility enhancement practices, the results for *H3* indicate that *SDGDD* is positively influenced by *PP* and *MS* variables (coefficients = 0.341 and 0.471, $p <$ 0.1, respectively). Thus, stakeholder engagement practices involving consultation with a panel of peers or heterogeneous groups of stakeholders positively affect the depth of SDG disclosure. This finding supports *H3b*. However, the adoption of other credibility enhancement practices did not affect levels of *SDGDB*.

Regarding the control variables, a positive and significant relationship was evident between company size (*Size*) and the number of SDGs reported in the CoP (*SDGDB*). This

Table 4. Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) SDGDB	1.000												
(2) SDGDD	0.317***	1.000											
(3) GRI	0.134***	0.100***	1.000										
(4) EA_RAS	0.058*	0.101***	0.126***	1.000									
(5) EA_OPM	0.073**	0.067**	0.093***	−0.258***	1.000								
(6) PP	0.028	0.126***	0.048	0.046	0.243***	1.000							
(7) MS	0.049	0.203***	0.116***	−0.068**	0.249***	0.296***	1.000						
(8) Size	0.166***	−0.012	−0.004	−0.029	0.070**	−0.001	0.064**	1.000					
(9) Performance	−0.084***	−0.019	−0.080**	−0.056*	0.043	0.012	0.014	−0.179***	1.000				
(10) Leverage	0.059*	0.097***	0.180***	−0.020	0.056*	0.014	0.061*	−0.171***	−0.198***	1.000			
(11) BS	0.032	−0.069**	0.040	0.149***	−0.059*	0.045	−0.037	0.037	−0.196***	0.098***	1.000		
(12) BCD	0.055*	0.008	0.018	−0.007	0.056*	0.030	0.104***	−0.096***	−0.033	0.029	0.146***	1.000	
(13) BI	−0.117***	0.048	0.106***	0.055*	−0.015	−0.022	0.000	−0.285***	−0.007	0.099***	−0.087***	−0.003	1.000

Notes: ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
Source: Authors' own work

Table 5. Panel for Tobit regression results

		(1) Reporting practices		(2) Assurance practices		(3) Other credibility enhancement practices	
		(1)	(2)	(3)	(4)	(5)	(6)
Variables		SDGDB	SDGDD	SDGDB	SDGDD	SDGDB	SDGDD
Reporting practices							
GRI	*H1*	0.450** (0.219)	0.0591 (0.0746)				
External assurance practices							
EA_RAS	*H2*			1.071*** (0.406)	0.467*** (0.139)		
EA_OPM	*H2*			0.630* (0.377)	0.217* (0.130)		
Other credibility enhancement practices							
PP	*H3*					0.711 (0.529)	0.341* (0.180)
MS	*H3*					−0.0456 (0.389)	0.471*** (0.134)
Size		0.415*** (0.123)	−0.00218 (0.0386)	0.416*** (0.123)	−0.00371 (0.0382)	0.425*** (0.124)	−0.00822 (0.0374)
Performance		−0.0210 (0.0345)	−0.00275 (0.0117)	−0.0244 (0.0346)	−0.00350 (0.0116)	−0.0219 (0.0347)	−0.00422 (0.0114)
Leverage		0.0102 (0.0168)	0.00265 (0.00551)	0.0129 (0.0169)	0.00328 (0.00545)	0.0136 (0.0170)	0.00243 (0.00535)
BS		0.0158 (0.0684)	−0.00653 (0.0227)	0.00766 (0.0689)	−0.0129 (0.0226)	0.0176 (0.0689)	−0.00654 (0.0222)
BCD		0.447 (0.475)	0.0867 (0.155)	0.414 (0.476)	0.0771 (0.153)	0.440 (0.480)	0.0236 (0.152)
BI		−0.0110 (0.0105)	0.00140 (0.00339)	−0.0125 (0.0105)	0.000672 (0.00336)	−0.0103 (0.0105)	0.00158 (0.00330)
Year_FE		Included	Included	Included	Included	Included	Included
Country_FE		Included	Included	Included	Included	Included	Included
Sector_FE		Included	Included	Included	Included	Included	Included
Constant		0.188 (3.665)	3.437*** (1.167)	0.177 (3.679)	3.297*** (1.154)	0.484 (3.700)	3.551*** (1.131)
Sigma_u		3.742*** (0.223)	1.122*** (0.0701)	3.767*** (0.222)	1.103*** (0.0692)	3.802*** (0.224)	1.069*** (0.0689)
Sigma_e		3.582*** (0.107)	1.342*** (0.0362)	3.572*** (0.107)	1.338*** (0.0360)	3.574*** (0.107)	1.341*** (0.0361)
Rho		0.531	0.411	0.527	0.405	0.531	0.388
Log likelihood		−2,556.437	−1,902.009	−2,553.525	−1,896.538	−2,556.437	−1,891.934
Wald chi-square		60.87	69.18	66.87	80.73	60.87	90.49
P		0.000	0.000	0.0000	0.0000	0.0000	0.0000
Observations		1,015	1,015	1,015	1,015	1,015	1,015
Number of ID		299	299	299	299	299	299

Notes: Standard errors in parentheses. ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
Source: Authors' own work

Table 6. Panel for ordered probit regression results

Variables	(1) SDGDB	(2) SDGDD	(3) SDGDB	(4) SDGDD	(5) SDGDB	(6) SDGDD
Reporting practices						
GRI	0.133** (0.0618)	0.0313 (0.0668)				
External assurance practices						
IA_RAS			0.291** (0.115)	0.449*** (0.124)		
IA_OPM			0.170 0.107)	0.221* 0.117)		
Other credibility enhancement practices						
Panel of peers					0.184 0.150)	0.358** (0.166)
Multiple stakeholders					−0.0105 (0.110)	0.423*** (0.121)
Size	0.115*** (0.0350)	0.0176 (0.0365)	0.116*** (0.0353)	0.0160 (0.0360)	0.118*** (0.0355)	0.0129 (0.0351)
Performance	−0.00513 (0.00977)	−0.000737 (0.0106)	−0.00607 (0.00983)	−0.00144 (0.0106)	−0.00536 (0.00985)	−0.00199 (0.0104)
Leverage	0.00340 (0.00479)	0.00383 (0.00520)	0.00420 (0.00481)	0.00426 (0.00514)	0.00440 (0.00483)	0.00362 (0.00503)
BS	0.00515 (0.0194)	−0.00548 (0.0205)	0.00308 (0.0196)	−0.0125 (0.0204)	0.00574 (0.0196)	−0.00620 (0.0200)
BCD	0.127 (0.135)	0.125 (0.145)	0.118 (0.136)	0.113 (0.144)	0.125 (0.137)	0.0752 (0.141)
BI	−0.00306 (0.00297)	0.000704 (0.00315)	−0.00347 (0.00300)	−9.24e-05 (0.00313)	−0.00287 (0.00300)	0.000879 (0.00305)
Year_FE	Included	Included	Included	Included	Included	Included
Country_FE	Included	Included	Included	Included	Included	Included
Sector_FE	Included	Included	Included	Included	Included	Included
Sigma2_u	1.149*** (0.157)	1.199*** (0.188)	1.174*** (0.159)	1.151*** (0.181)	1.194*** (0.161)	1.071*** (0.172)
Observations	1,015	1,015	1,015	1,015	1,015	1,015
Number of ID	299	299	299	299	299	299

Notes: Standard errors in parentheses ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
Source: Authors' own work

result is consistent with previous literature findings (Pizzi *et al.*, 2022; Zampone *et al.*, 2022; Zampone *et al.*, 2023).

4.4 Further analyses

In a further analysis, we substituted the variables SDGDB and SDGDD, which had the upper bounds of 17 and 6, respectively, with two novel variables, namely, *A_SDGDB* and *A_SDGDD*. These new variables were derived by rescaling the previous variables, dividing them by 17 (*SDGDB*) and 6 (*SDGDD*), respectively, representing their maximum possible values. This allowed us to generate two new values between 0 and 100. Notably, most of the results exhibited qualitative similarity even after the substitution.

In addition, we substituted the independent variable *GRI*, which falls under the category of disclosure practices, with *IR*, which indicates the degree to which sample companies had adopted Integrated Reporting. The rationale for this decision was that, after GRI, integrated reporting is the second most commonly used sustainability reporting standard among corporations (KPMG, 2022). Despite this substitution, there was still no evidence of a significant relationship between *IR* and *SDGDB* (unlike *GRI* variable). Moreover, consistent with our results regarding the GRI variable, we observed no statistically significant relationship between *IR* and *SDGDD*. Finally, as an additional robustness test, we ran an ordered probit regression. The results of this regression are presented in Table 6 and are qualitatively similar to those of the original model [2].

5. Discussion

Results offer insights into the dynamics of sustainability reporting and its impact on SDG disclosure. Firstly, adherence to reporting standards such as GRI is crucial for ensuring the breadth of SDG disclosures, but there is a need for more detailed guidelines to enhance the depth of these disclosures. Secondly, external assurance significantly enhances both the breadth and depth of SDG disclosures, highlighting its importance in building credible and reliable sustainability reports. Thirdly, stakeholder engagement is vital for producing high-quality and comprehensive SDG disclosures, reflecting diverse perspectives and fostering greater transparency.

One of the key findings is the positive relationship between adherence to GRI standards and the breadth of SDG disclosure. Firms adhering to GRI guidelines tend to report on a wider range of SDGs. GRI standards encourage firms to cover multiple SDGs in their sustainability reports, promoting a more comprehensive approach to sustainability reporting. This aligns with Rosati and Faria (2019a), who found that institutional factors significantly influence the early adoption of SDG reporting among companies. However, the lack of a significant relationship between GRI adherence and the depth of SDG disclosure indicates that while GRI standards promote the inclusion of various goals, they may not provide sufficient guidance for detailed and substantive information about these efforts. This gap highlights the need for more detailed guidelines within the GRI framework to improve the depth of disclosures, as noted by KPMG (2022) and García-Sánchez *et al.* (2022a). Hahn and Kühnen (2013) also emphasised the necessity for comprehensive reporting standards to ensure high-quality sustainability disclosures.

Another significant finding is the strong positive association between external assurance, particularly when conducted using recognised standards such as ISAE 3000, and both the breadth and depth of SDG disclosure. High-quality assurance enhances the credibility and comprehensiveness of sustainability reports by providing a critical layer of validation. This reduces information asymmetry and increases stakeholder confidence in the reported information, as highlighted by Martínez-Ferrero *et al.* (2021). This finding aligns with

previous research emphasising the role of assurance in improving the reliability of sustainability disclosures (Cuadrado-Ballesteros *et al.*, 2017; Hahn and Kühnen, 2013).

Stakeholder engagement also emerges as a crucial factor in improving the depth of SDG disclosure. Firms that involve multiple stakeholders in reviewing their sustainability information tend to provide more detailed and comprehensive disclosures. This supports the notion that stakeholder engagement is essential for ensuring that sustainability reports reflect a wide range of perspectives and concerns, thereby enhancing the quality of the disclosures (Al-Shaer *et al.*, 2022; Hummel and Szekely, 2022). It also suggests that stakeholder engagement practices can enhance legitimacy by demonstrating a firm's commitment to addressing stakeholder expectations and contributing to sustainable development. This is corroborated by Adams and Mueller (2022), who argued that engaging diverse stakeholders is critical for creating sustainability reports that are meaningful and reflective of actual practices.

Translating into real-world context, the positive coefficient for adherence to GRI standards on SDGDB suggests that an increase in GRI adherence is associated with a proportional increase in the number of SDGs disclosed by the firm. This implies that firms adhering more closely to GRI guidelines are likely to report on a broader array of SDGs, reflecting a more comprehensive approach to sustainability reporting. Similarly, the positive coefficient for external assurance on both the breadth and depth of SDG disclosure indicates that firms obtaining high-quality external assurance are likely to disclose a greater number of SDGs and provide more detailed information about their sustainability practices. This enhanced disclosure can be attributed to the increased credibility and reliability conferred by external assurance, which encourages firms to be more transparent and detailed in their reporting (Martínez-Ferrero *et al.*, 2021).

The positive relationship between stakeholder engagement and SDGDD suggests that firms actively involving stakeholders in their sustainability reporting processes tend to provide more comprehensive and detailed disclosures. This reflects the diverse perspectives and insights brought in by stakeholders, which enrich the content and quality of the reports (Al-Shaer *et al.*, 2022). Hummel and Szekely (2022) further corroborate this by emphasising that effective stakeholder engagement leads to higher quality and more detailed sustainability disclosures, essential for building trust and credibility with various stakeholders.

From an economic perspective, these findings highlight the importance of robust sustainability reporting practices for firm performance. Firms that invest in comprehensive reporting and assurance practices are likely to experience enhanced stakeholder trust and improved reputational capital, translating into tangible economic benefits such as increased investor confidence and access to capital (Bebbington and Unerman, 2018). This aligns with Pizzi *et al.* (2021), who demonstrated that high-quality sustainability reporting positively impacts corporate reputation and can lead to financial advantages.

Adopting a legitimacy theory perspective, strategic legitimacy predicts frequent conflicts between managers and constituents over legitimation activities. The theory distinguishes between symbolic and substantive conflicts (Suchman, 1995). Previous literature provides evidence that sustainability disclosure can face the risk of becoming "smoke and mirrors" (Moerman and Van der Laan, 2005), a camouflaging tool (Michelon *et al.*, 2016) or a greenwashing vehicle (Jiang *et al.*, 2023). Similar concerns have been raised regarding SDG disclosure, highlighting the risk of cherry-picking (Mhlanga *et al.*, 2018) and SDG washing (Heras-Saizarbitoria *et al.*, 2022). A company's adoption of different external assurance components not only supports the company's social licence but also produces substantive results in terms of SDG disclosure, as evidenced by the number of SDGs disclosed and the actions taken to advance them.

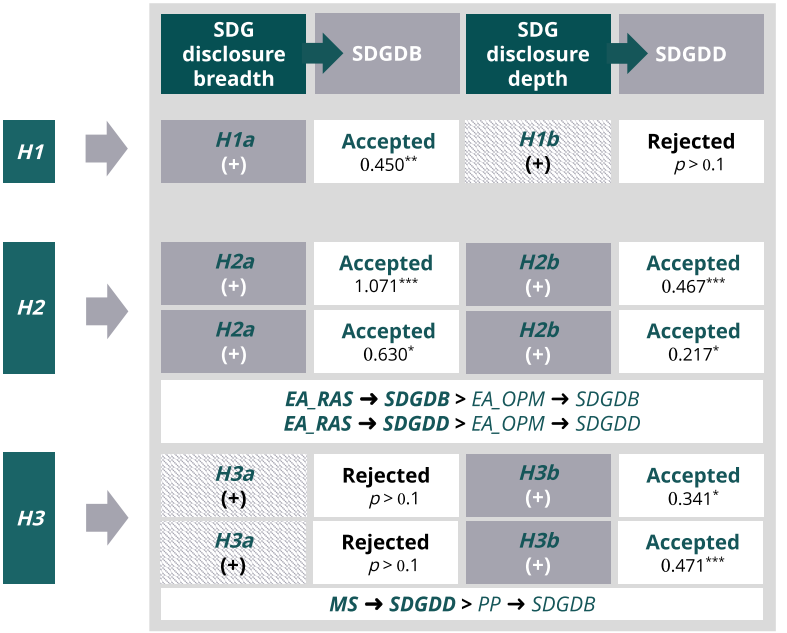
Overall, the company's choices related to external verification of information can substantially affect the company's contribution to the 2030 Agenda. The choice of adhering to

higher levels of GRI seems to facilitate the inclusion of a larger number of SDGs in the report. External verification supports the company in identifying opportunities and responsibilities connected to SDGs, indicators and objectives, priorities in relation to different goals, expected impacts and cooperation addressed with other parties to advance SDGs, as well as in integrating them into the business model. More specifically, opting for external assurance – especially if conducted with recognised public standards – and the review of information by multiple stakeholders can produce substantial benefits for SDG disclosure. Considering these practices as elements of a combined assurance model (Prinsloo and Maroun, 2021), the evidence presented in this study provides insights on how different external assurance components can contribute in terms of SDG disclosure, not only in terms of the goals reported but more importantly the identification and disclosure of the company's actions to achieve those goals.

Figure 2 ideally follows and complements Figure 1, presenting a comprehensive visual depiction of all the findings obtained in our study, along with the associated hypotheses.

6. Conclusion

This study contributes to previous theory providing substantial insights into the dynamics between sustainability reporting, assurance practices and the extent of SDG disclosure among firms. The results clearly illustrate the critical role that these practices play in enhancing the transparency, credibility and comprehensiveness of corporate sustainability communications.



Source: Authors' own work

Figure 2. Summary of findings

One of the key findings is the positive relationship between adherence to GRI standards and the breadth of SDG disclosure. This suggests that firms following GRI guidelines tend to report on a wider range of SDGs. GRI standards appear to play a crucial role in encouraging firms to cover multiple SDGs in their sustainability reports, thus promoting a more comprehensive approach to sustainability reporting. However, the lack of a significant relationship between GRI adherence and the depth of SDG disclosure indicates that while GRI standards promote the inclusion of various goals, they may not provide sufficient guidance for detailed and substantive information about the efforts related to these goals (García-Sánchez *et al.*, 2022a). This points to a need for more detailed guidelines within the GRI framework to improve the depth of disclosures.

Another significant finding is the strong positive association between external assurance, particularly when conducted using recognised standards such as ISAE 3000, and both the breadth and depth of SDG disclosure. This underscores the importance of high-quality assurance in enhancing the credibility and comprehensiveness of sustainability reports. External assurance provides a critical layer of validation, reducing information asymmetry and increasing stakeholder confidence in the reported information (Martínez-Ferrero *et al.*, 2021). This finding aligns with previous research and highlights the value of adopting rigorous assurance standards to enhance the quality of SDG disclosures.

Stakeholder engagement also emerges as a crucial factor in improving the depth of SDG disclosure. Firms that involve multiple stakeholders in reviewing their sustainability information tend to provide more detailed and comprehensive disclosures. This finding supports the notion that stakeholder engagement is essential for ensuring that sustainability reports reflect a wide range of perspectives and concerns, thereby enhancing the quality of the disclosures (Al-Shaer *et al.*, 2022; Hummel and Szekely, 2022). It also suggests that stakeholder engagement practices can serve as a mechanism to enhance legitimacy by demonstrating a firm's commitment to addressing stakeholder expectations and contributing to sustainable development.

These findings align with recent literature on the challenges of SDG disclosure and the risk of SDG-washing when organizations superficially engage with SDGs without making substantive contributions to sustainable development (Heras-Saizarbitoria *et al.*, 2022). These concerns and our findings underscore the need for robust reporting standards and assurance practices, combined with stakeholder engagement, to enhance the effectiveness of SDG disclosures.

The practical implications of this study underscore once again the significance of adopting comprehensive and high-quality sustainability reporting practices. Additionally, the study highlights the value of engaging a diverse range of stakeholders in the reporting process. This engagement can lead to more detailed and reflective disclosures, helping firms to address stakeholder concerns more effectively and demonstrating a genuine commitment to sustainable development. Companies can leverage these detailed disclosures to improve their risk management practices, identify new opportunities for sustainable growth and ensure compliance with increasing regulatory requirements.

Although this study aims to provide a substantial contribution to the field, it is important to acknowledge its limitations. One limitation of our study was the partial consideration of the institutional characteristics across different countries where the companies operate. These, coupled with the diverse practices under examination, could further influence the breadth and depth of SDG disclosure. Additionally, our sample selection only included companies listed in Forbes Global 2000, which may not be representative of all companies. Future research should consider a larger sample that includes a more diverse range of companies to ensure the robustness of findings. Another limitation is the source of data for SDG disclosure. While we used CoP questionnaires as the primary source of SDG disclosure, we recognise that companies may also disseminate SDG disclosures through other channels, such as websites and social media. Incorporating these other channels of

SDG disclosure into future research would provide a more comprehensive understanding of SDG disclosure practices. We also acknowledge that our disclosure indexes may not fully capture the depth of SDG-based information disclosed by companies. Further analysis of the content of the information disclosed may be necessary to better evaluate the quality of SDG disclosure practices. Finally, although our research investigates SDG disclosures from two distinct dimensions, it is constrained within the confines of studying SDG disclosure exclusively. Future research could consider the relationship between disclosure and actual SDG performance to provide deeper insights into the effectiveness of corporate sustainability practices. This could involve developing metrics and methodologies that better capture the impact of corporate actions on achieving the SDGs.

The regulatory landscape for sustainability reporting is rapidly evolving, with new frameworks emerging in various jurisdictions. For example, the CSRD in Europe and the rules on climate-related disclosures issued by the Securities and Exchange Commission (SEC) in the USA are set to significantly change reporting requirements for companies. These regulations are likely to increase the rigour and comparability of sustainability disclosures, thereby reducing the risk of greenwashing and enhancing investor confidence. Future research could explore the impact of these regulatory changes on SDG disclosure practices.

Note

1. Appendix 1 offers further detailed statistics concerning the dependent variable.
2. Appendix 2, as further analysis, presents winsorized regression results that are consistent with those in Table 5 and Table 6.

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Further reading

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Appendix 1

Table A1. Summary statistics for dependent variables

Variables		
(*Panel A: Dependent variables by year*)	SDGDB	SDGDD
2017	9.838	3.873
2018	11.098	4.373
2019	11.356	4.490
2020	11.300	4.756
2021	11.513	4.860
(Panel B: Dependent variables by country)		
Argentina	5.667	11.333
Australia	4.500	11.357
Austria	5.750	15.750
Belgium	3.833	9.000
Brazil	4.130	12.913
Canada	5.292	10.833
Chile	3.000	11.000
China	4.800	11.900
Colombia	2.167	10.167
Cyprus	6.000	13.000
Denmark	4.565	7.652
Finland	4.500	11.071
France	4.090	11.582
Germany	4.382	10.691
Hong Kong	4.333	5.000
Hungary	1.800	12.600
India	4.571	13.857
Republic of Ireland	4.533	8.867
Israel	4.000	9.000
Italy	3.804	10.176
Japan	4.475	13.020
Kenya	5.500	9.000
Republic of Korea (S. Korea)	4.571	10.964
Luxembourg	3.750	10.500
Mexico	4.200	13.200
The Netherlands	5.267	6.933
Norway	4.789	8.474
Poland	1.333	10.667
Portugal	3.333	7.333
Russia	4.867	14.467
Saudi Arabia	3.200	8.400
Singapore	5.583	11.583
South Africa	3.833	13.333
Spain	4.959	11.329
Sweden	4.917	10.583
Switzerland	4.677	11.387
Taiwan	4.700	14.200
Thailand	5.148	10.815
Turkey	4.714	12.000
UAE	5.000	7.500

(*continued*)

Table A1. Continued

Variables		
UK	4.274	10.613
USA	4.887	9.670
(Panel C: Dependent variables by industry)		
Basic materials	4.545	11.357
Consumer cyclicals	4.185	12.222
Consumer non-cyclicals	4.744	11.775
Energy	4.081	11.095
Financials	4.549	11.654
Health care	4.032	7.746
Industrials	4.537	10.058
Real estate	4.947	10.000
Technology	4.771	11.121
Utilities	4.383	11.407

Source: Authors' own work

Table A2. Further analyses: winsorized regression results

	(1) Reporting practices		(2) Assurance practices		(3) Other credibility enhancement practices	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	SDGDB	SDGDD	SDGDB	SDGDD	SDGDB	SDGDD
Reporting practices						
GRI	0.452** (0.219)	0.0598 (0.0746)				
External assurance practices						
IA_RAS			1.069*** (0.406)	0.467*** (0.139)		
IA_OPM			0.622* (0.377)	0.214 (0.130)		
Other credibility enhancement practices						
Panel of peers					0.708 (0.529)	0.341* (0.180)
Multiple stakeholders					−0.0470 (0.389)	0.469*** (0.134)
Size	0.419*** (0.125)	0.00188 (0.0393)	0.421*** (0.125)	0.000733 (0.0389)	0.430*** (0.126)	−0.00390 (0.0381)
Performance	−0.00760 (0.0402)	0.00140 (0.0136)	−0.0100 (0.0403)	0.00105 (0.0135)	−0.00766 (0.0404)	−0.000125 (0.0133)
Leverage	0.0118 (0.0169)	0.00295 (0.00554)	0.0146 (0.0170)	0.00364 (0.00547)	0.0153 (0.0171)	0.00276 (0.00538)
BS	0.0227 (0.0703)	−0.00517 (0.0233)	0.0142 (0.0708)	−0.0117 (0.0232)	0.0245 (0.0708)	−0.00548 (0.0227)
BCD	0.451 (0.474)	0.0891 (0.155)	0.419 (0.476)	0.0796 (0.153)	0.445 (0.480)	0.0267 (0.152)
BI	−0.0121 (0.0106)	0.00133 (0.00343)	−0.0135 (0.0106)	0.000622 (0.00340)	−0.0113 (0.0107)	0.00152 (0.00333)
Year_FE	Included	Included	Included	Included	Included	Included
Country_FE	Included	Included	Included	Included	Included	Included
Sector_FE	Included	Included	Included	Included	Included	Included
Sigma_u	3.743*** (0.223)	1.122*** (0.0701)	3.769*** (0.223)	1.103*** (0.0692)	3.804*** (0.224)	1.068*** (0.0688)
Sigma_e	3.582*** (0.107)	1.343*** (0.0362)	3.572*** (0.107)	1.339*** (0.0360)	3.574*** (0.107)	1.341*** (0.0361)
Constant	−0.0617 (3.741)	3.289*** (1.193)	−0.103 (3.757)	3.140*** (1.180)	0.205 (3.778)	3.401*** (1.156)
Observations	1,015	1,015	1,015	1,015	1,015	1,015
Number of ID	299	299	299	299	299	299

Notes: Standard errors in parentheses ***$p < 0.01$; **$p < 0.05$; *$p < 0.1$
Source: Authors' own work