



Sustainability reporting practices and environmental performance amongst nordic listed firms

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ABSTRACT

Corporate social responsibility (CSR) initiatives have increasingly been adopted for legitimacy purposes. Sustainability reporting practices have also been widely debated. In this study, we investigate whether sustainability reporting practices, such as sustainability reports, Global Reporting Initiative (GRI) Standards, and external assurance, are associated with environmental performance. We study a sample of 210 Nordic-incorporated listed firms from 2002 to 2020 across Denmark, Finland, Norway, and Sweden. The baseline model with ordinary least squares regression shows that issuing sustainability reports and reporting under GRI Standards are positively associated with environmental performance whilst external assurance is insignificant. However, we find that environmentally non-certified and CSR awards non-receiving firms have all considered sustainability reporting practices positively related to environmental performance. Employing the substantive versus symbolic approach to legitimacy, we argue that firms with inadequate environmental commitment or reputation might be under immense pressure to achieve corporate legitimacy and may thus use sustainability reporting practices as a substantive approach to legitimacy. Our findings have important policy relevance in the context of the increasing focus on sustainability reporting standards in Europe and other countries. We suggest that quality-enhancing sustainability reporting practices which may curtail firms' symbolic behaviour should be required under mandatory regimes. Meanwhile, firms' existing practices and initiatives should be considered to provide complementary effects related to environmental performance.

1. Introduction

The importance of social and environmental disclosure in corporate reports can be traced back to the 1970s as a consequence of the debate on the social role of corporations through which firms embraced social audits of their activities. This was further intensified in 1990s when the environmental catastrophes ensued and several national and international sustainability-related initiatives and frameworks were initiated. As a result, Corporate social responsibility (CSR) disclosure grabbed an attention from stakeholders, policymakers, and researchers.

Sustainability reporting has increased significantly in recent years. KPMG's Survey of Sustainability Reporting (2022) shows that 96% of global firms now report on sustainability and that the use of Global Reporting Initiatives (GRI) reporting standards and third-party assurance is a major business practice worldwide (KPMG, 2022).¹ In recent times, European and Scandinavian firms have maintained their lead over those in the United States and other countries. To achieve the objective of enhanced business transparency and accountability on social and environmental issues in Europe, the European Union (EU) adopted the Non-Financial Reporting Directive (NFRD) 2014/95/EU on

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¹ Sustainability reporting percentage of global firms in 2022 is about a 15% rise as compared to 2020. See, the KPMG survey on sustainability reporting based on 5,800 firms in 58 countries and jurisdictions, <https://home.kpmg/ff/home/Pinnalla/2022/10/big-shifts-small-steps.html> and <https://assets.kpmg/content/dam/kpmg/xx/pdf/2020/12/the-time-has-come-executive-summary.pdf>.

the disclosure of non-financial information by large public interest firms (NFRD, 2014).² Meanwhile, Anglo-Saxon countries have been actively reporting on greenhouse gas emissions and environmental issues since the 2000s. Although sustainability reporting is not mandatory, the U.S. Securities and Exchange Commission (SEC) 's disclosure rule for public firms requires firms to disclose certain environmental, social, and governance (ESG)- and risk-related information in Regulation S-K (SEC, 2013). In 2018, more than 80% of S&P 500 firms issued sustainability reports.³

In this study, we focus on the Nordic region which is well recognised for its unique Nordic model of CSR because it is closely connected with the social-democratic, institutional-cultural, and political-economic institutions of countries (Gjølborg, 2013; Strand et al., 2015). Thus, Nordic CSR and sustainability are topics of interest amongst policy-makers and researchers. However, Nordic sustainability reporting has received little attention in the literature.

The KPMG Survey of Sustainability Reporting (2022) shows that Nordic countries have relatively high levels of sustainability reporting. The national sustainability reporting rates in Finland, Iceland, Norway, and Sweden (Denmark was not included in the study) were 94%, 91%, 91%, and 98%, respectively (KPMG, 2022). However, Nordic countries have varying levels of sustainability (biodiversity, climate, social, and governance) risk disclosure. The disclosure of climate risks is the most widely reported in almost all countries whilst biodiversity is the least reported risk category. Thus, in the context of EU taxonomy and increasing regulatory actions against greenwashing in the Nordic region, Nordic countries must continue to ensure a high level of reporting on sustainability risks.⁴ Rigorous and comprehensive sustainability reporting is the key to mitigating 'greenwashing' and preventing firms from overlooking the impact of climate change on their bottom line.⁵ Therefore, the study of sustainability reporting practices is crucial for improving sustainability reporting quality. Practices that could improve the quality of sustainability reporting include sustainability reports, reporting based on specific frameworks, and assuring sustainability reports. However, firms may only use sustainability reporting practices for legitimacy purposes. In other words, firms may use these tools as impression management strategies to highlight the positive aspects of their sustainability performance and obfuscate negative outcomes (Diouf and Boiral, 2017).

Therefore, we empirically examine *whether sustainability reporting practices are associated with the environmental performance of Nordic firms*. We assume that firms with a substantive approach to legitimacy are less likely than others to have an incentive to engage in sustainability reporting practices for mere legitimacy; therefore, such practices should be associated with high environmental performance. By contrast, firms with a symbolic approach to legitimacy are likely to exercise quality-enhancing reporting practices without any association with

environmental performance. Accordingly, we employ 210 Nordic listed firms during the period of 2002–2020 accessed from the Thomson Reuters (Refinitiv) ASSET4 database and examine the relationship between sustainability reporting practices (sustainability reports, GRI Standards, and external assurance) and environmental performance. The study suggests that sustainability reports and GRI Standards practices are positively associated with environmental performance whilst external assurance is insignificant, indicating that the former two practices seem to be substantive approaches to legitimacy and that the latter appears to be a symbolic approach. Our results are consistent with treatment effects investigation for first-time users, and several other robustness tests such as, matched samples, Heckman selection model, and alternative proxies. However, additional analysis shows that the results are consistent only with the subsample of firms either certified by the International Organization for Standardization- Environmental Management Systems (ISO-EMS) or received any CSR awards, suggesting that firms with existing environment-related commitment and reputation seem to use external assurance as a symbolic approach to legitimacy. We interpret this finding as a substitution effect between external assurance and existing legitimacy because firms with environmental certifications and awards are already benefiting from corporate legitimacy and credibility in their cleaner practices. Thus, they are not likely to assure sustainability reporting for the substantive management of their legitimacy. Meanwhile, firms without existing environmental commitments or reputation are more likely to consider the sustainability reporting practices including external assurance as a substantive approach.

The remainder of this paper is organised as follows: Section 2 presents the Nordic sustainability reporting context. Section 3 describes our conceptual framework. Section 4 covers our research methodology. Section 5 details our empirical analysis. Section 6 presents our discussion of the results. Section 7 summarises our conclusions.

2. Sustainability reporting and the nordic region

Nordic firms seem to have been front-runners in sustainability reporting since sustainability reporting gained attention in the 1990s. The Norwegian company Hydro (previously Norsk Hydro) was the first company in the world to report its environmental performance in its environmental report in 1989 (Laine et al., 2021). However, sustainability reporting has remained a voluntary CSR activity until the last decade. For example, the Finnish Accounting Act of 1997 required certain firms to include non-financial issues in their annual reports. Accordingly, the Finnish Accounting Board issued general guidelines for accounting and disclosing environmental issues in the board of directors' report in 2006. Further, the 2014 National Action Plan for the Implementation of the United Nations (UN) Guiding Principles related to Organization for Economic Cooperation and Development (OECD) guidelines encourages firms to publish non-financial data on social and environmental issues (Carrots and Sticks, 2013). In Sweden, the amendment to the Annual Accounts Act in 2006 required certain firms to include a brief disclosure of CSR information in their annual reports. Similarly, the GRI complied with sustainability reporting requirements for state-owned firms in 2007 and corporate reporting on sustainability and diversity policy in 2014 whilst the national CSR policy 2015 required or encouraged large firms to report on sustainability issues (Arvidsson and Dumay, 2022). In Denmark, sustainability policies were first introduced in 1993. The Danish Parliament amended the Danish Financial Statements Act in 2008. The new Act, which includes a soft law on corporate sustainability disclosure, became effective in 2009 on a comply or explain basis, essentially requiring 1,100 large Danish firms to release reports or socially responsible investment policies (Lueg and Pesheva, 2021; Yang et al., 2021). Similarly, the 2013 amendment and the Danish National Action Plan 2014 added the disclosure of climate impact, human rights, responsible investment, and so on as required or expected by the UN Principles of Responsible Investment (UNPRI),

² The directive came into effect in 2017 by which EU firms required to incorporate the Directive into national law and disclose information such as environmental issues, social and employee matters, human rights, anticorruption, diversity, etc. The EU is towards the adoption of Corporate Sustainability Reporting Directive (CSRD) which would amend the existing NFRD, extending the scope to all large firms, requiring the assurance of reported information, detailed reporting according to mandatory EU sustainability reporting standards, digitalizing the reported information, and so on. See, https://ec.europa.eu/info/business-economy-euro/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en.

³ See, Corporate sustainability reporting: Past, present and future, 2018 by the US Chamber of Commerce Foundation, <https://www.uschamberfoundation.org/sites/default/files/Corporate%20Sustainability%20Reporting%20Past%20Present%20Future.pdf>.

⁴ See, <https://home.kpmg/no/nb/home/nyheter-og-innsikt/2022/11/how-do-the-nordic-and-baltic-countries-report-esg-risks0.html>.

⁵ See, <https://www.reuters.com/business/sustainable-business/urgent-progress-needed-company-climate-disclosures-g20-task-force-says-2022-10-13/>.

OECD, UN Global Compact, and GRI guidelines (Knudsen and Moon, 2017). In Norway, the Norwegian Accounting Act of 1998 requires issuers and public firms to demonstrate their principles and practices of corporate governance in their annual reports. In 2013, the Norwegian Accounting Act introduced social reporting requirements (Reggeringen, 2013). In Iceland, the National Regulation on Green Accounting 2002 requires polluting firms to report environmental issues. To achieve a greener economy at the government level, all institutions of the respective industries and state-owned firms were required to publish annual reports using the GRI guidelines in 2011 (Carrots and Sticks, 2013).

In addition to the initiatives discussed above, the European 2014 NFRD requirements and guidelines have greatly influenced the mandatory sustainability reporting in Nordic countries. Similarly, stock exchanges provide recommendations related to sustainability reporting. For example, the ESG reporting guide 2017 for NASDAQ issuers in Denmark, Finland, Iceland, and Sweden and the Oslo Børs guidance 2018 in Norway consider ESG reporting as beneficial not only for individual firms but also for investors incorporating various ESG metrics to listed firms' disclosure (Nasdaq, 2017; EURONEXT, 2022).

3. Conceptual framework

3.1. Environmental performance

In Europe, early experiments (in 1960s and 1970s) in social reporting seemed to include the appearance of legal requirements in France and the Netherlands which paved the way for the emergence of environmental reports in Germany, Austria, Denmark, and Switzerland.⁶ In the early 1990s, several environmental catastrophes, such as the Bhopal disaster, Sandez Rhine spill, and Exxon Valdez, intensified the critical scrutiny of firms' economic activities. As a result, firms started to disclose detailed quantitative and qualitative sustainability information in their corporate environmental reports (Owen and Dwyer, 2008). This was further driven by the sustainability-related initiatives and frameworks by the UN Environment Programme, Coalition for the Environmentally Responsible Economies, SustainaAbility, GRI, UN Global Compact, UNPRI, OECD, etc. In the 1990s and early 2000s.

Schultze and Trommer (2012), in their review of environmental performance, outlined mainly three categories of environmental performance measures such as operational, strategic, and combined measures. The operational indicators consist of input (e.g., energy consumption), process (e.g., green technology), output (e.g., emissions), and outcome (e.g., impact on stakeholders) oriented measures. Strategic measure involves environmental attitudes and objectives for the strategic management of environment and firm performance. The combined measures include environmental ratings, self-calculated scores, perceived performance, etc. In the current study, we consider the combined measure, environmental rating, due to its coverage of several environmental indicators. The main themes under three categories (carbon emission, energy use, and environmental innovation) of environmental performance score include both operational and strategic indicators such as emission policy and targets, waste generation, biodiversity policy, environmental management systems, water use, renewable energy use, environmental supply chain initiatives, green revenue, environmental expenditure, and so on.

Evidence shows a relationship between sustainability disclosure and environmental performance (Al-Shaer and Hussainey, 2022; Clarkson et al., 2011; Mahoney et al., 2013; Nazari et al., 2017). For example, Al-Shaer and Hussainey (2022) analysed the sustainability reports of UK firms in 2014–2018 and found that sustainability reports that communicate the sustainable production and consumption practices of firms are

likely to exert a positive effect on sustainability performance as measured by ESG scores. The study also used the environmental score to measure environmental performance and found consistent results.

3.2. Substantive vs symbolic approach to legitimacy

Legitimacy theory explains why firms respond to society by reporting their environmental performance (Aluchna et al., 2023). For example, Patten (1992) investigated the effects of the Exxon Valdez oil spill in 1989 on the environmental disclosures of 21 petroleum firms and found a significant increase in such disclosures, with firms exerting great effort into showing their environmental concerns. Exxon was even found to have increased the pages in its annual report devoted to accident and non-accident-related environmental disclosures following the oil spill incident. The legitimacy theory argues that it is a social contract through which firms consent to meet stakeholders' expectations. Gaining and maintaining legitimacy through CSR is thus a key concern for firms which includes social and ecological aspects, including complying with legal rules and moral norms that govern firms' relationship with society and adhering to socially and environmentally responsible practices as expected by stakeholders (Kölbl and Busch, 2021). The first sustainability reports were also published mainly to address external pressures (Brun and Thornam, 2013) caused by corporate environmental misconduct (Patten, 1992). These reports not only increased societal needs and desires for corporate transparency but also raised concerns about firms' legitimacy if they failed to present such reports. Therefore, in our study, we adopt a legitimacy perspective to examine the relationship between sustainability reporting practices and environmental performance. However, voluntary sustainability reporting provides free choices on the part of the firms to disclose information that the management considers beneficial to the firm (Deegan and Gordon, 1996). Furthermore, such reporting is prone to 'greenwashing', where firms attempt to manipulate their environmental performance to appear as good 'corporate citizens' (Balluchi et al., 2020; Nazari et al., 2017). Consequently, stakeholder interest in and concerns about corporate environmental disclosure and its quality have increased in recent decades. Furthermore, different regulatory frameworks have been initiated or mandated to curb firms' tendencies to engage in 'greenwashing'.

In our study, we refer to substantive and symbolic management, two general approaches that firms use to seek legitimacy (Ashforth and Gibbs, 1990; Hahn and Lülfs, 2014; Michelon et al., 2015). According to Ashforth and Gibbs (1990), 'substantive approach involves a real, material change in organizational goals, structures, and processes or socially institutionalized practices while symbolic approach involves an organization simply portraying them to appear consistent with social values and expectations'. The literature shows that symbolic management has a weaker effect on corporate legitimacy and performance than substantive management (Kim et al., 2007).

Several studies on substantive and symbolic views have shown that sustainability disclosure or disclosure practices are symbolic and not substantive. For example, Michelon et al. (2015), with a sample of 112 UK listed firms for the years 2005–2007, studied the effect of three sustainability reporting practices: the use of standalone reports, reporting guidance, and assurance of disclosure quality. They found that sustainability reporting practices do not provide high-quality information, showing evidence of the symbolic use of these practices. During the study period of 2017–2019, Manes-Rossi and Nicolo' (2022) examined 15 energy firms from different European countries that followed GRI Standards. The study found that in most cases, the disclosure of Sustainable Development Goals (SDGs) was symbolic and did not consider a business case for integrating SDGs into firm strategies and operations. Khan et al. (2021) studied the banking sector and found that the use of reporting frameworks, such as GRI Standards, initially evolved symbolically but appears to be substantive over time to improve the quality of sustainability reporting. Moneva et al. (2006) found that some organisations claiming to be GRI reporters fail to transmit corporate

⁶ See, Carrots and Sticks-Promoting transparency and sustainability, <https://www.carrotsandsticks.net/media/zqthaim/carrots-sticks-2010.pdf>.

performance and corporate impacts from the guidelines. Such a gap can be considered as the symbolic management of sustainable development, which simply provides basic information about the dimensions of sustainability.

We argue that owing to increasing stakeholders' interest in non-financial information, firms try to meet stakeholders' required levels of disclosure and transparency in sustainability reporting by using one or more sustainability reporting practices, such as sustainability reports, GRI Standards, and external assurance. However, the empirical question is whether these sustainability reporting practices used by firms are symbolic or substantive relative to environmental performance. This study seeks to answer this question by employing sample firms from the stakeholder-oriented Nordic region.

4. Research method

4.1. Sample selection and data

The Nordic region includes Denmark, Iceland, Finland, Norway, and Sweden. However, as in previous studies (Branco et al., 2018; Yang et al., 2021), we considered countries other than Iceland because of data availability issues. Following existing studies, we accessed environmental performance and reporting-related data from ASSET4 Universe at Thomson Reuters (Refinitiv). ASSET4 Universe includes the list of firms with substantial ESG performance that is collected by Refinitiv analysts reviewing corporate reports, annual reports, sustainability reports, digital disclosure, and other public disclosures. The Universe includes 281 firms from Nordic countries. However, the regression analysis accounted for only 210 firms (firms incorporated outside Nordic countries and with missing data for the variables used in the model were excluded from the study), and the study covered the period 2002–2020. In sum, the study comprised 1,904 firm-year observations.

4.2. Measurement

4.2.1. Dependent variable: environmental performance

To measure environmental performance, we used the environmental pillar score available in Refinitiv's ASSET4 database. This score has been used in several studies (Al-Jaifi, 2020; García Martín and Herrero, 2019; Orazalin, 2020) because of its extensiveness and transparency. The score measures a firm's environmental performance, commitment, and effectiveness, and it ranges from 0 to 100, with a higher score indicating better environmental performance. Specifically, the score is the aggregated scores of three categories: emission reduction, environmental resource use, and environmental innovation.⁷ As defined by Refinitiv, the emission reduction score measures a firm's performance towards reducing environmental emissions in its production and operational processes. The environmental resource use score reflects a firm's performance and capacity to reduce the use of materials, energy, or water and to find eco-efficient solutions. The environmental innovation score represents a firm's performance in employing environmental technologies and processes.

4.2.2. Independent variables: sustainability reporting practices

We used the following three measures of sustainability reporting practices in line with the works of Michelon et al. (2015) and Ottenstein et al. (2022): sustainability reports, GRI Standards, and external assurance. Sustainability reports in the data refer to the binary variable indicating 1 if a firm published a sustainability or CSR report as a standalone report or integrated report and 0 otherwise. We also considered the sustainability information included in other sections of annual reports or a substantial page dedicated to sustainability

disclosure, including public or digital disclosure. CSR reports are the main channels of corporate communication related to CSR and sustainability performance. Thus, we considered CSR reports as a measure of a firm's reporting practices. GRI Standards in the data refers to the binary variable indicating 1 if a firm followed GRI-based Standards in their sustainability reporting/disclosure and 0 otherwise. We considered the GRI Standards amongst others for two reasons. First, the GRI Standards are the leading standards followed by firms since the early 2000s. Second, the GRI Standards dominate the framework for sustainability reporting worldwide. Estimates show that approximately 70% of firms follow GRI Standards in their sustainability reporting.⁸ External assurance in the data refers to the binary variable indicating 1 if a firm assured its sustainability reporting/disclosure through external auditing or accounting authorities and 0 otherwise.⁹ We included this indicator because existing studies have shown that external assurance can enhance the credibility and reliability of reported information (Moroney et al., 2012).

4.3. Study model

Below we present our baseline multivariate regression equation to examine the association between sustainability reporting practices and environmental performance.

$$\text{Environmental performance} = \alpha + \beta_1 * \text{SReports} + \beta_2 * \text{GRIStandards} + \beta_3 * \text{SRAssurance} + \beta_4 * \sum \text{controls} + \varepsilon$$

In the model, environmental performance is the dependent variable proxied by the environmental pillar score whilst sustainability reports (SReports), GRI Standards, and sustainability report assurance (SRAssurance) are our independent binary variables equal to 1 if firms adopted them in their reporting practices and 0 otherwise. Following the literature (Al-Shaar and Hussainey, 2022; Belkhir et al., 2017; Michelon et al., 2015; Moneva et al., 2006), we used the following firm characteristics as control variables: governance score, firm size, leverage, firm growth, profitability, tangibility, capital expenditure, and institutional ownership. Please refer to Table 1 for variable explanations. Furthermore, we consider multiple fixed effects model that takes into account year, industry (ICB-4digits), country, industry-year, and country-year effects to partial out respective time-invariant and time-variant effects on the environmental performance. We also cluster the data at the firm level to mitigate possible serial correlation within a firm across years.

5. Empirical analysis

5.1. Descriptive results

Table 2 summarises the sample firms' data from 2002 to 2020. The environmental scores of the sample firms ranged from 0 to 97.36, with the average score being 48.56. Approximately 75% of Nordic firms had sustainability reports, with 54% of them following the GRI reporting guidelines and with 40% assuring their sustainability reports. The

⁸ See, KPMG survey of corporate responsibility reporting 2017, <https://home.kpmg/pt/en/home/insights/2017/10/executive-summary-the-kpmg-survey-of-corporate-responsibility-reporting-2017.html>.

⁹ GRI and assurance data with missing observations are replaced with zero assuming that firms choose to disclose these data for reputation and legitimacy reasons if they have GRI standards and assurance for their sustainability reports. In addition, we believe that replacing zero gives our data a closer look to prior survey results. For example, KPMG survey of sustainability reporting 2020 indicated that about two third of firms worldwide followed GRI Standards for sustainability reporting while about half of them assured their sustainability reporting in 2020. This survey result is in line with our replaced data, on average. https://assets.kpmg/content/dam/kpmg/be/pdf/2020/12/The_Time_Has_Come_KPMG_Survey_of_Sustainability_Reporting_2020.pdf.

⁷ To know more about how the score is designed or measured, see <https://www.refinitiv.com/en/sustainable-finance/esg-scores#methodology>.

Table 1
Description of variables.

Variables	Description
<i>Dependent variable:</i>	
Environmental performance	Refinitiv's score based on a firm's performance, commitment, and effectiveness in emission reduction, resource use and environmental innovation activities. The score ranges between 0 and 100.
<i>Independent variables:</i>	
SReports	Binary variable indicating one if firms have sustainability reporting, and zero otherwise.
GRIStandards	Binary variable indicating one if firms report following GRI guidelines, and zero otherwise.
SRAssurance	Binary variable indicating one if firms assure sustainability reporting, and zero otherwise.
<i>Control variables:</i>	
Governance score	Refinitiv's score based on a firm's performance, commitment, and effectiveness in management practices, CSR strategy, and shareholder welfare. The score ranges between 0 and 100.
lnTA	Natural logarithm of total assets.
Leverage	Ratio of total debt to total assets.
TQ	Sum of the market value and total debt, all divided by total assets.
ROA	Ratio of operating income to total assets.
Capex	Ratio of capital expenditure to total assets.
Tangibility	Ratio of fixed assets to total assets.
Institutionalholdings	Ratio of total shares owned by institutional shareholders.

Table 2
Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
Environmental performance	1904	48.562	26.847	0	97.36
SReports	1904	.767	.423	0	1
GRIStandards	1904	.545	.498	0	1
SRAssurance	1904	.402	.49	0	1
governancescore	1904	51.522	22.063	2.281	97.474
lnTA	1904	23.246	1.68	18.805	27.313
Leverage	1904	.182	.136	0	.801
TQ	1904	2.81	3.356	.458	41.663
ROA	1904	.08	.126	-1.471	.736
Capex	1904	.051	.053	-.001	.477
Tangibility	1904	.247	.212	0	.996
Institutional holdings	1904	.388	.187	.033	.942

Table 2 reports summary statistics of variables used in the study models. The continuous accounting variables are winsorized at 1% and 99% quartiles to exclude the outlier effect. Refer to Table 1 for an explanation of the variables.

summary statistics do not seem promising if we consider the entire study period (2002–2020) possibly because only after the EU adopted the NFRD in 2014 did firms begin to focus on sustainability disclosures. Therefore, we note a substantial improvement in sustainability reporting practices over the last decade, particularly since the NFRD came into force in 2017. Our untabulated data for 2020 show that 95% of the firms had sustainability reports, 67% followed the GRI Standards, and 61% assured their sustainability reporting. This result is in line with the KPMG survey for 2022 which showed that the national rates of sustainability reporting in Finland, Iceland, Norway, and Sweden (Denmark is not included in the study) were 94%, 91%, 91%, and 98%, respectively.

Table 3 reports the correlation coefficients between study variables. The correlation coefficients show that Sustainability reports, GRI Standards, and external assurance have correlation of 0.579, 0.610, and 0.487, respectively with environmental performance. The positive and significant (at a 1% level) correlation provides us with a preliminary understanding of the direction and degree of relationship between our variables of interest. The maximum correlation coefficient is below 0.62, indicating no possible issue of multicollinearity. Furthermore, the variance inflation factor is below 2, indicating that multicollinearity between our variables is not an issue.

5.2. Multivariate results

Table 4 reports the results of the multivariate regression analysis on the relationship between sustainability reporting practices and environmental performance in the sample of Nordic firms. The dependent variable environmental performance is positively and significantly

associated with the presence of sustainability reports ($\beta = 17.6739, \rho < 0.01$) and GRI Standards ($\beta = 8.3150, \rho < 0.01$) but not with external assurance. This indicates that Firms with sustainability reports and GRI Standards adoption, on average, have about 18 and 8 points higher environmental score than firms without sustainability reports and GRI Standards, respectively. We argue that firms are likely to use sustainability reports and GRI Standards for the substantive management of CSR and that the use of external assurance is questionable. If the external assurance of sustainability disclosure is not associated with environmental performance, firms are likely to use it as an approach to the symbolic management of corporate legitimacy. The control variables such as firm size, firm growth, tangibility, and capital expenditure are also significantly associated with environmental performance.

5.3. Treatment effects: First-time sustainability reports, GRI standards, and external assurance

To investigate the association of sustainability reporting/sustainability reporting practices with environmental performance, we perform an additional analysis employing sample firms that issued sustainability reports, followed GRI Standards, and externally assured their sustainability reports for the first time.¹⁰ We find 102, 105, and 100 observations for the issue of sustainability reports, adoption of GRI Standards, and use of external assurance for the first time, respectively.¹¹ We then calculate the average treatment effect on the treated group by using the nearest neighbour matching estimator. We employ 1:1 matching with the baseline covariates. Table 6 presents the results of the effect of the first-time presence of sustainability reports/GRI Standards/external assurance on environmental performance. The results are consistent with previous ones, indicating the positive association of sustainability reports ($\beta = 9.8860, \rho < 0.01$) and GRI Standards ($\beta = 6.5094, \rho < 0.01$) with environmental performance. Firms issuing sustainability reports

¹⁰ We consider only the first time (year) during the study period when firms have sustainability reports, GRI Standards and external assurance of sustainability reports; and we compare this year's sustainability performance with previous year when they had no sustainability reports, GRI Standards, and external assurance. For this we create dummy variables: *SRfirsttime*, *GRIfirsttime*, and *SRAfirsttime*, indicating one if there is any presence of these qualities, and zero otherwise. Note that we do not consider other times for the same firm when it dropped and adopted these qualities again. We assume that firms might have other motivations in such cases.

¹¹ We had few observations for opposite direction, i.e., firms dropping sustainability reports, GRI Standards, and external assurance of sustainability reports. However, due to limited observations (approx. 25) we did not consider opposite case.

Table 3
Correlation analysis.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(1) Environmental performance	1.000											
(2) SReports	0.579*	1.000										
(3) GRIStandards	0.610*	0.612*	1.000									
(4) SRAssurance	0.487*	0.453*	0.540*	1.000								
(5) Governance score	0.337*	0.251*	0.248*	0.293*	1.000							
(6) lnTA	0.338*	0.151*	0.248*	0.189*	0.204*	1.000						
(7) Leverage	0.036	-0.018	0.000	0.003	0.148*	0.073*	1.000					
(8) TQ	-0.167*	-0.071*	-0.181*	-0.102*	0.035	-0.392*	-0.059*	1.000				
(9) ROA	0.052	0.026	0.008	0.035	-0.086*	0.047	-0.133*	0.211*	1.000			
(10) Capex	-0.094*	-0.061*	-0.074*	-0.034	0.070*	-0.286*	0.062*	0.400*	0.156*	1.000		
(11) Tangibility	0.159*	0.046	0.079*	0.129*	0.099*	-0.169*	0.196*	0.134*	0.014	0.490*	1.000	
(12) Institutional holdings	0.106*	0.179*	0.085*	0.092*	0.128*	0.034	0.046	-0.022	-0.016	-0.105*	-0.203*	1.000

Table 3 reports pearson’s correlation results. Refer to Table 1 for an explanation of the variables. *p < 0.01.

Table 4
Baseline regression model.

VARIABLES	OLS
	Environmental performance
SReports	17.6739*** (2.4670)
GRIStandards	8.3150*** (2.2244)
SRAssurance	3.1919 (2.3529)
Governance score	0.1263*** (0.0394)
lnTA	5.8850*** (1.0340)
Leverage	-1.7082 (8.0540)
TQ	0.8293** (0.4186)
ROA	-0.3250 (4.5579)
Capex	-34.2787* (18.0170)
Tangibility	26.3330*** (6.7987)
Institutional holdings	6.5957 (4.7763)
Constant	-184.6140*** (26.5738)
Year effect	Yes
Industry effect	Yes
Country effect	Yes
Industry and year effect	Yes
Country and year effect	Yes
Observations	1,904
R-squared	0.712

Table 4 reports the baseline multivariate regression result showing the relationship between sustainability reporting practices measures (SReports, GRIStandards, SRAssurance) and environmental performance (EnvironmentalScore). The model also includes control variables and multiple fixed effects. Cluster robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

and following GRI Standards for the first time during our study period, have about 10 and 7 points higher environmental score, respectively, in the treatment year compared to the previous year. Meanwhile, the effect of external assurance is not significant.

5.4. Robustness analyses

For the robustness of our results, we perform several tests, however, results are unreported for brevity. First, to eliminate firm-level heterogeneity, we match firm-year observations on the indicator variables sustainability reports, GRI Standards, and external assurance using the

Table 5
Treatment effects.

VARIABLES	model1	model2	model3
	Environmental performance	Environmental performance	Environmental performance
SRfirsttime	9.8860*** (1.9514)		
GRIfirsttime		6.5094*** (1.6806)	
SRAfirsttime			2.1157 (2.0053)
Observations	175	184	169

Table 5 reports the treatment effects results. Models 1, 2, and 3 show the relationship between the first-time exercise of sustainability reporting practices (SReports, GRIStandards, SRAssurance) and environmental performance (EnvironmentalScore), respectively. Robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

propensity score matching method. We use probit regression using covariates such as governance score, total assets, leverage, Tobin’s Q, ROA, and employees to estimate the probability that firms adopt these sustainability reporting practices. In the second stage, we run a baseline model for the matched firm–year observations and find result consistent with prior results. Second, we employ Heckman selection model using original data for our independent variables (without replacing missing observations). The first stage used baseline variables and one additional variable (firm age) to predict firms’ likelihood of reporting sustainability reporting practices data. The second stage, which accounts inverse mills ratio predicted from the first stage, shows consistent results even after accounting sample selection issues. Third, we use alternative measures for our variables. Our results are similar if we use three categories (emission, resource use, and environmental innovation scores) of environmental performance score separately as our dependent variables. Moreover, main results are consistent when we replace external assurance with BIG4 and Non-BIG4 dummies. Fourth, we test the robustness using lagged right-hand side variables and find similar results. Fifth, results still hold if we exclude the period after 2016 when mandatory non-financial reporting in the EU was implemented. Sixth, we cluster the standard errors at the industry (ICB-4digits) and country level, however, our main results remain unchanged.

5.5. Additional analysis

Our baseline models examine the association between sustainability reporting practices and environmental performance from the perspectives of substantive versus symbolic management of corporate environmental performance. In doing so, we question the suspicious role of external assurance in enhancing environmental performance in line with the works of Boiral and Heras-Saizarbitoria (2020) and O’Dwyer and

Table 6
The role of existing environmental commitment/reputation.

VARIABLES	ISO-EMS certification		CSR awards	
	(Yes)	(No)	(Yes)	(No)
	model1	model2	model3	model4
	Environmental performance	Environmental performance	Environmental performance	Environmental performance
SReports	13.6234*** (3.4453)	15.3066*** (3.9256)	17.8274** (7.2263)	18.0824*** (2.9463)
GRIStandards	8.1267*** (2.8811)	9.0487** (4.1149)	11.3115** (4.7563)	6.8866*** (2.5345)
SRAssurance	0.2438 (2.7301)	9.3792** (4.4579)	-2.9119 (3.2045)	5.4260** (2.5879)
Governance score	0.1016** (0.0514)	0.1437** (0.0642)	0.0895 (0.0709)	0.1075** (0.0460)
lnTA	5.3738*** (1.3783)	4.3343*** (1.2340)	6.7005*** (1.2737)	5.3787*** (1.1187)
Leverage	-15.4082 (10.2375)	-12.7513 (10.6385)	-11.9208 (15.8564)	1.3002 (9.2103)
TQ	1.2913** (0.5857)	0.4373 (0.4549)	0.3672 (0.9861)	0.7532 (0.5076)
ROA	-13.3558 (8.8746)	10.4832* (5.5209)	-7.8290 (18.0669)	0.4272 (4.5343)
Capex	-9.3841 (28.1011)	-22.2551 (28.1176)	19.7714 (46.3087)	-31.0175 (23.1817)
Tangibility	25.8542** (10.0859)	21.8921*** (7.9046)	33.5288*** (11.5949)	24.7722*** (8.0037)
Institutional holdings	15.7051** (6.3694)	-4.5174 (6.2386)	2.5796 (10.9376)	7.8096 (5.3177)
Constant	-186.7713*** (31.0937)	-121.5226*** (27.7230)	-184.1344*** (29.7900)	-132.7276*** (29.8449)
Year effect	Yes	Yes	Yes	Yes
Industry effect	Yes	Yes	Yes	Yes
Country effect	Yes	Yes	Yes	Yes
Industry and year effect	Yes	Yes	Yes	Yes
Country and year effect	Yes	Yes	Yes	Yes
Observations	1,241	663	564	1,340
R-squared	0.688	0.856	0.836	0.707

Table 6 reports the baseline multivariate regression results for ISO-EMS and CSR-awards-based subsamples analyses. All Models show the relationship between sustainability reporting practices measures (SReports, GRIStandards, SRAssurance) and environmental performance (EnvironmentalScore). Models 1 and 2 split sample based on ISO-EMS certifications while Models 3 and 4 split sample based on CSR-awards. All models include control variables and multiple fixed effects. Cluster robust standard errors in parentheses, ***p < 0.01, **p < 0.05, *p < 0.1.

Owen (2005). However, the question remains as to whether contingencies lead firms to adopt external assurance as a symbolic management strategy. We test the contingency role of firms' existing environmental commitment or reputation using two proxies: (1) ISO-EMS certification, and (2) CSR awards. ISO-EMS standards provide solutions to global challenges such as environmental issues. ISO 14000 family is a set of practical tools to manage firms' environmental responsibilities. Similarly, EMS intends to comply with environmental obligations, achieve environmental objectives, and improve environmental performance.¹² Firms certified with such standards are likely to adopt proactive environmental strategies and contribute to efficient and cleaner production (Oliveira et al., 2016). Our second proxy measuring environmental commitment or reputation is the CSR awards. As the CSR awarding requires a full ESG commitment, it can be used as a measure for environmental commitment related social reputation (Uyar et al., 2022). For empirical test, we split sample based on two proxies/criteria such as ISO-EMS certified vs non-certified groups and CSR award receiving vs non-receiving groups. Table 6 shows consistent baseline results for ISO-EMS certified and CSR award receiving groups of firms. However, we find that ISO-EMS non-certified and CSR award non-receiving firms also have external assurance of sustainability reporting associated with environmental performance. The results

indicate that ISO-EMS non-certified and CSR award non-receiving firms have about 9 and 5 points higher environmental score, respectively, if they assure their sustainability reports. This suggests that assured sustainability reporting of the sampled firms is likely to have a positive relationship with environmental performance when their existing commitment or reputation related to the environmental performance is inadequate. Specifically, firms' ISO-EMS certification and CSR awards seem to be a substantive approach to legitimacy which likely makes the role of external assurance insignificant.

6. Discussion

The empirical results show that sustainability reports and GRI Standards are generally associated with the environmental performance of Nordic firms. This finding is consistent with that of Mahoney et al. (2013) who studied US listed firms and found a relatively high CSR performance score associated with firms that voluntarily issue stand-alone CSR reports; this finding suggests that firms use voluntary CSR reports to publicise their social and environmental performance to all stakeholders. The same result was also validated by Papoutsis and Sodhi (2020), who studied 331 firms in the United States, Canada, and Europe. They concluded that disclosures in sustainability reports appear to coincide with actual sustainability performance. Al-Shaer and Hussainey (2022) investigated UK firms and found that sustainability reports are likely to have a positive effect on sustainability performance. However, sustainability communication needs to have a strong sustainability

¹² For more information about ISO-EMS, <https://www.iso.org/standard/60857.html>.

approach that goes beyond business-centred and compliance-based approaches. Similarly, the positive association of GRI Standards with sustainability performance is consistent with the results of [Yadava and Sinha \(2016\)](#) who showed that GRI-based reporting results in a considerable difference in Indian firms' environmental and social reporting. By contrast, [Belkhir et al. \(2017\)](#) who studied firms headquartered in different countries, found no correlation between GRI reporting and sustainability performance, as measured by CO₂ performance. One can argue that the GRI Standards are universal, whereas the standards of the US-based Sustainability Accounting Standards Board are industry focused. Hence, GRI reporting may not necessarily improve CO₂-related performance but rather overall sustainability performance.

Our findings can be attributed to the well-documented institutional context of Nordic countries ([Strand et al., 2015](#)). The environmental concerns in these countries are genuine. Moreover, the results are coherent with stakeholder and legitimacy theories, as firms seem to be conscious of disclosing sustainability issues and aligning with the GRI Standards to be perceived as serious and meet the expectations regarding CSR in Nordic societies. Although interpreted with caution, this approach seems more substantive rather than symbolic as a half-hearted strategy would easily be discovered and lead to low legitimacy, which may negatively affect reputation and business.

Meanwhile, we find an insignificant association between external assurance of sustainability reporting and environmental performance. This finding is in line with that of [Boiral and Heras-Saizarbitoria \(2020\)](#) who analysed the contents of 337 assured sustainability reports from the mining and energy sectors and reported that assurance does not provide material and substantial effects related to critical sustainability issues and stakeholder concerns; rather, it appears as a symbolic practice. Contrary to our study, the works of [Braam and Peeters \(2018\)](#), [Alon and Vidovic \(2015\)](#), and [Moroney et al. \(2012\)](#) revealed a significantly positive relationship between sustainability performance and third-party assurance of sustainability reports. The baseline result highlighting an insignificant association between external assurance and environmental performance in the Nordic region indicates that external assurance in Nordic firms may act as a substitute for other initiatives. As the Nordic governance model has a high reputation for social welfare and sustainability ([Gjølberg, 2013](#); [Strand et al., 2015](#)), external assurance, which is generally used by firms for credibility and reputation-enhancing purposes elsewhere ([Simnett et al., 2009](#)), does not seem to result in enhanced credibility as perceived by Nordic firms ([Park and Brorson, 2005](#)). Hence, further testing is required. We test this hypothesis empirically using the role of sample firms' existing environmental commitment (proxied by ISO-EMS certifications and CSR awards) and find that the ISO-certified and CSR award receiving firms had a symbolic approach to external assurance. This finding indicates that firms' existing environmental reputation or commitments are likely to improve environmental performance ([Anas et al., 2015](#); [Bravi et al., 2020](#); [Comoglio and Botta, 2012](#)) and result in corporate legitimacy ([Nishitani et al., 2021](#)) making the role of external assurance insignificant. Meanwhile, competitors without existing environmental commitment or reputation seem to improve their environmental performance ([Li et al., 2018](#)) for the substantive management of legitimacy when they adopt such adopting sustainability reporting practices. This relationship probably explains why Nordic firms are somewhat indifferent to assuring their sustainability reports and why assurance mostly takes the form of symbolic management of CSR under a voluntary framework. However, from another perspective, external assurance does not appear to have adverse effects on the environmental performance of Nordic firms, hence the need to focus on proactive or generally accepted assurance methods ([Park and Brorson, 2005](#)) under the mandatory approach.

7. Conclusion

This study examined the relationship between sustainability reporting practices (sustainability reports, GRI Standards, and external

assurance) and environmental performance from the legitimacy perspective. The results suggest that Nordic firms use such reporting practices either as a symbolic or substantive approach to legitimacy. We reveal the conditioning role of existing legitimacy which might affect firms' motivation for symbolic or substantive management of CSR. Specifically, we suggest that firms with limited existing legitimacy are likely to practice sustainability reporting from the substantive approach whilst it can be symbolic approach if firms enjoy existing legitimacy.

This study makes several important contributions to the existing literature. Firstly, we contribute to the broad sustainability and CSR performance literature by extending it to the study of sustainability reporting practices in a stakeholder-oriented context. Secondly, we demonstrate the substitutionary effect of existing environmental initiatives on sustainability reporting assurance which has important policy implications. We argue that the legitimacy acquired from existing environmental commitments might have a substitutionary effect on external assurance practices, making the relationship between assured sustainability reporting and environmental performance insignificant.

Given our findings, we agree that enhanced sustainability reporting practices should be made mandatory to curtail firms' symbolic CSR behaviours. Thus, an interesting topic is whether the recently adopted Corporate Sustainability Reporting Directive (CSRD) in the EU, which includes mandatory requirements for sustainability reports, standardization, and external assurance, improves firms' accountability towards the substantive management of legitimacy in general. Future researchers could investigate the important empirical question of whether the mandatory regime shows results that are consistent with those of the current study. Future studies should explore other conditions under which sustainability reporting practices play an instrumental role in the substantive management of legitimacy. The findings of this study apply to legitimacy in relation to environmental performance. Future studies should examine whether such practices have a consistent relationship with the legitimacy of environmental disclosure. Our data are from a modest number of listed firms in Nordic countries; thus, our sample is somewhat limited. Hence, the findings are only partially generalisable outside the Nordic region.

Author contributions

Ishwar Khatri: Conceptualization; Data curation; Formal analysis; Methodology; Roles/Writing - original draft; Writing - review & editing.
Frode Kjærland: Supervision; Writing - review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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