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Article

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DOUBLE MATERIALITY IN SUSTAINABILITY REPORTING: REVEALING ESG-SDGs CONNECTIONS FOR BUSINESSES' AWARENESS

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Abstract

The aim of this research is to investigate the concept of double materiality embedded in sustainability reporting requirements that address both business and society perspectives. In light of stakeholder, legitimacy, and institutional theories, this document explores how environmental, social, and governance (ESG) policies and practices (financial materiality) included in a business strategy may be related to incentives for companies to prioritise Sustainable Development Goals (SDGs) (impact materiality). The data are collected from the Refinitiv Eikon database for nonfinancial international companies, over the 2015-2024 period. Parametric and nonparametric tests for differences in means, correlation analysis, and fixed effects robust regressions are employed to validate three research hypotheses. The results illustrate significant differences on financial and impact perspectives of materiality in European Union (EU) companies, as compared to non-EU companies. Strong associations between ESG scores and SDGs are identified and discussed using the double materiality approach. SDGs prioritisation in general, but also mapped for environmental, social, and governance, is found to have mixed impacts on ESG policies and practices. The findings support the hypothesis that prioritisation of the SDGs may ensure a balance among divergent interests of managers, investors, and other stakeholders. The study has academic and practical contributions to management decisions that integrate sustainable development goals to expand businesses' awareness of sustainability reporting requirements.

Keywords: double materiality, sustainability reporting, Environmental, Social, and Governance (ESG) policies and practices, Sustainable Development Goals (SDGs) prioritisation.

JEL Classification: M41, Q01, Q56

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Introduction

An exponential increase, especially in the context of “multifaceted landscape of different international reporting standards” (Fiandrino, Tonelli, and Devalle, 2022, p.684), is highlighted by recently published research on materiality discussed from a sustainability perspective (Adams and Abhayawansa, 2022; Correa-Mejia, Correa-Garcia, and Garcia-Benau, 2024; Lungu, Caraiani, and Bojan, 2024). The growing interest of policymakers, researchers, and investors in sustainable businesses (Monteiro et al., 2024; Hoang, Pham and Nguen, 2023) is reified in a notable growth of environmental, social, and governance (ESG) disclosure. By opening businesses to their stakeholders, companies can address global issues and help create a more sustainable and equitable future (Monteiro et al., 2024). To meet the needs of stakeholders, ESG policies and practices can be related to the 17 Sustainable Development Goals (SDGs), included in the United Nations (UN) 2030 Agenda (UN, 2015), that address the most pressing sustainability issues in the world (Pizzi, Rosati, and Venturelli, 2021; Delgado-Ceballos et al., 2023; Tyan, Liu and Fu, 2023; Nicolo et al., 2024).

Developed from the millennium sustainability goals established in 2000, the SDGs included in the 2030 Agenda for Sustainable Development are the result of long-standing efforts by the UN to advance global sustainability (Delgado-Ceballos et al., 2023). Furthermore, the gradual changes in the focus of the shareholders model towards an integrated stakeholders model to adjust the business strategy are mirrored in the activity of standard makers. The Climate Disclosure Project (CDP), the Climate Disclosure Standards Board (CDSB), the Global Reporting Initiative (GRI), the International Integrated Reporting Council (IIRC) and the Sustainability Accounting Standards Board (SASB) worked together to establish the basis for guidelines for comprehensive corporate reporting (CDP, CDSB, GRI, IIRC, and SASB, 2020). They decided to join the efforts of the European Commission (EC) and the International Financial Reporting Standards (IFRS) Foundation in developing a general setting for sustainability reporting (Krivogorsky, 2024).

From an institutional perspective, standard makers focus on shareholders and other stakeholders as the main users of sustainability-related information, exposing two materiality concepts. First, the materiality of the information disclosed is related to economic decision-making orientated toward institutional providers of financial capital and to the creation of enterprise value. Second, sustainability reporting should include information that is material in terms of the significant impacts of the organisation on the economy, environment, and people, and their importance to its stakeholders (CDP, CDSB, GRI, IIRC, and SASB, 2020). Recently, the Corporate Sustainability Reporting Directive (CSRD) has been adopted in the EU (EC, 2022), establishing the double materiality principle. This requires companies to report how sustainability matters affect them (financial materiality) as well as their external impacts, on society and the environment (impact materiality).

Pizzi, Rosati, and Venturelli (2021) highlight the limited contributions of accounting scholars to the current academic debate on the SDGs. In addition, Delgado-Ceballos et al. (2023), or Correa-Mejia, Correa-Garcia, and Garcia-Benau (2024) underscore the need for future research conducted on environmental, social, and governance dimensions of corporate sustainability policies and practices in relation with sustainable development goals.

The aim of this research is to highlight whether prioritisation of the SDGs along with ESG policies and practices may help companies to better respond to the needs of their stakeholders

and shareholders. The double materiality concept is approached under the light of stakeholders, legitimacy, and institutional theories in order to contribute to a balance among divergent interests of managers, investors, and other stakeholders. ESG policies and practices, considered the foundation of a sustainable business, are used to conceptualise the financial materiality. SDGs references included in corporate reporting are used to measure the level of prioritisations of the UN 2030 Agenda goals, as a proxy for impact materiality. Significant differences between companies, based on institutional characteristics, may point to the selection of priorities and critical gaps for engaging with globally addressed sustainability goals. To address the aim of this research, the objectives are formulated in order to investigate the differences between EU and non-EU companies, but also to relate the two perspectives of materiality (financial and impact).

Company-year data collected from the Refinitiv Eikon database for the 2015-2024 period are examined using parametric and nonparametric tests for differences in means, correlation, and regression analyses. Endogeneity and multicollinearity are addressed using fixed effects of year, industry, and country included in robust regressions to provide a better fit to the data, while alternative measures are used to validate the results.

This empirical approach contributes to the academic and practical understanding of an evolving business model that incorporates the decision to engage in current sustainability frameworks and policies. First, this paper extends the research and knowledge about the relationship between ESG policies and practices and SDGs prioritisation at the corporate level, adding to previous studies of Delgado-Ceballos et al. (2023), Hoang, Pham, and Nguen (2023), Soni (2023), Nicolo et al. (2024). or Tyan, Liu, and Fu (2024). Consequently, the research contributes to a deeper understanding of how sustainability reporting aligns with global sustainable development goals. Second, it advances the double materiality research field through an original contribution by offering comprehensive and extensive empirical evidence on ESG policies and practices and SDGs prioritisation for companies with headquarters in EU countries, as well as in non-EU countries. Thereby, it facilitates a comparative analysis within different institutional settings, emphasising the integration of mandatory requirements regarding double materiality into the most recent European regulations. Third, the practical implications of the participation of companies in the SDGs are highlighted and discussed, differentiated according to the three distinct dimensions of corporate sustainability: environmental, social, and governance.

The structure of the remainder of the paper is as follows. In Section 1, the relevant literature, the underlying theories, and the research hypotheses are outlined. Section 2 describes the research methodology, including data and sample, variables, statistical tests, and econometric models. Section 3 discusses the results and additional robustness tests. Conclusions summarise the main findings and present the final remarks, as well as limitations and future research proposals.

1. Literature review - Double materiality, theories, and research hypotheses

1.1. The concept of double materiality

Today, there is an increased awareness of finding responsible ways to design sustainable businesses that integrate the non-accomplished objectives in areas of critical importance for humanity and planet (people, planet, prosperity, peace, and partnership) in order to achieve

global sustainability (Delgado-Ceballos et al., 2023). Research on the participation of companies in addressing the 17 SDGs included in the 2030 Agenda of the UN has gained increased attention in the literature (Hummel and Szekeley, 2021; Khaled, Ali, and Mohamed, 2021; Pizzi, Rosati, and Venturelli, 2021; Delgado-Ceballos et al., 2023; Whittingham et al., 2023). Furthermore, the multidisciplinary characteristic of the topic of the SDGs is highlighted by relating it to various areas such as accounting or corporate sustainability performance, further related to ESG policies and practices (Khaled, Ali and Mohamed, 2021; Hoang, Pham and Nguen, 2023; Monteiro et al., 2024).

ESG policies and practices incorporated in sustainable business and publicly communicated respond to shareholder pressure and underlie the accountability of companies and their legitimacy to operate. They illustrate the financial perspective of the materiality pursued by companies when establishing the significant information to be disclosed in their corporate reports. Complementary to their societal-orientated goal, the SDGs are also relevant for companies in providing a framework to identify challenges and opportunities and to contribute to long-term advantages (Delgado-Ceballos et al., 2023). This may guide companies in selecting the material information that shows its impact on society and the environment. The institutional perspective may explain how the normative pressure of society's need for sustainability drives changes in businesses (Whittingham et al., 2023).

The concept of materiality was used prior in financial reporting to identify relevant information that can influence users' decisions or change their judgment when omitted or misrepresented. This approach is identified as the economic or financial perspective of materiality (Fiandrino, Tonelli, and Devalle, 2022). However, the evolving definition and implementation of the materiality concept integrates current outward and inward concerns about sustainable businesses, stakeholder engagement, or how sustainability is assessed and reported (Correa-Mejia, Correa-Garcia, and Garcia-Benau, 2024).

The European Commission (EC) was the first to include the concept of double materiality, which encompasses both financial and environmental and social issues. To illuminate the concept of materiality, Raith (2023) analyses corporate responsibility policies in the EU and presents the business perspective and the 'social case' of material issues. The business perspective concentrates on business risks (EC, 2022), responds to shareholders and other investors claims, underscores internal impacts of ESG matters being financially material for a company that is affected outside-in (Aras, Furtuna, and Kazak, 2024). The 'social case' focusses on business impacts on the environment and its stakeholders, and highlights the influence of the company's inside material (Aras, Furtuna, and Kazak, 2024; Correa-Mejia, Correa-Garcia, and Garcia-Benau, 2024). In a company that assumes its social role, stakeholders help identify material social and environmental aspects (Fiandrino, Tonelli and Devalle, 2022) that can be affected by business operations. The concept was extended in the CSRD, requiring companies to disclose information on both the business perspective (financial materiality) and the society perspective (impact materiality) applicable from the 2024 reporting year.

Correa-Mejia, Correa-Garcia, and Garcia-Benau (2024) outline that early commitment to double materiality shows a company's readiness for the time of mandatory implementation of CSRD. Additionally, early adopters may have a competitive advantage over late adopters, which may be reflected in better sustainability performance. Therefore, early adopters play a key role, since they are the first to embrace new sustainability policies and practices and relating them to the incorporation of SDGs into business strategy. Pizzi, Rosati, and

Venturelli (2021) highlight the collaborative effort in applying the UN 2030 Agenda, while Aras, Furtuna, and Kazak (2024) claim for a direct interplay of public and international institutional factors, private businesses, academia, and societies to achieve the SDGs.

The new standards in sustainability reporting, released internationally and across industries, ensure high-quality ESG information (Fiandrino, Tonelli, and Devalle, 2022), along with the financial one. Corporate reporting may be a driver for sustainable businesses, creating premises to connect the ESG policies and practices with the prioritisation of relevant SDGs. The growing interest in achieving corporate sustainability, along with the recognition by stakeholders of the pursuit of sustainable business outcomes, contributes to the development of double materiality (Delgado-Ceballos et al., 2023), linking financial interests with environmental, social, and governance objectives, ensuring global sustainability achievement.

2.2. Theoretical channels of double materiality in sustainability reporting

A sustainable business changes corporate reporting toward sustainability, strengthened by the impact of environmental and social policies on company activities, the focus on company stakeholders, or the newest societal worldwide arrangements claiming for double material information (Adams and Abhayawansa, 2022). Fiandrino, Tonelli, and Devalle (2022) identify a growing body of literature grounded in stakeholder theory, which advocates for double materiality assessment, based on stakeholder engagement strategies, but also aimed at both society and the environment. Furthermore, the awareness of stakeholders about the relationship between financial materiality and impact materiality improves the visibility, legitimacy, and reputation of companies, and therefore the performance through value creation. Considering the complexity of the concept of double materiality, a single-sided conceptual approach is insufficient to capture the heterogeneous character of practices adopted in sustainability reporting (Sepulveda-Alzate, Garcia-Benau, and Gomez-Villegas, 2021; Fiandrino, Tonelli, and Devalle, 2022). Accordingly, stakeholder, legitimacy, and institutional theories should be considered complementary, rather than competing, when trying to explain the relationship between an organisation and the society within which it operates (Fiandrino, Tonelli, and Devalle, 2022).

The selection of these theories is aligned with the research objective of presenting two perspectives on the concept of double materiality (financial and impact) supported by the idea that the existence and function of companies depend on the interests of both stakeholders, whose legitimacy is ensured by a legislative framework and a system of social norms and principles (Beske, Haustein, and Lorson, 2020; Chouaibi and Zouari, 2021; Hoang, Pham, and Nguyen, 2023).

According to stakeholder theory, *companies must consider* the interests of their stakeholders when making decisions and setting performance and reporting objectives. Therefore, one of their main goals is to demonstrate their social involvement to satisfy the needs of its different stakeholders (Khaled, Ali, and Mohamed, 2021). In a normative context, stakeholder theory explains how relationships between companies and stakeholders create long-term value, suggesting the impact materiality perspective. Companies should consider the expectations of various key stakeholders, including investors and employees, in order to respond to their interests on sustainability-related practices (Khaled, Ali, and Mohamed, 2021; Fiandrino, Tonelli, and Devalle, 2022; Sepulveda-Alzate, Garcia-Benau, and Gomez-Villegas, 2022; Hoang, Pham and Nguyen, 2023). In addition, companies can focus on addressing the

specific needs of stakeholders, including the involvement of the government in the implementation of the SDGs.

Legitimacy theory establishes the interconnectivity between organisations and society, promoting the survival of businesses by recommending whether sustainable actions of the company are appropriate and consistent with their integrated set of values and norms (Nicolo et al., 2024). The pressure of social and political expectations acts as a trigger for sustainability disclosure and explains the changes in the general strategy of companies to ensure its legitimacy. Stakeholders from countries focused on ESG policies and practices have a clear understanding of SDG prioritisation, contributing to general efforts to achieve environmental, social, and governance targets (Dimes and Molinari, 2024). Hence, legitimacy theory anticipates that voluntary reporting will reach a wider audience rather than just a few chosen social groups, aspect that could be associated with a strategic behaviour orientated towards enhancing legitimacy (Hoang, Pham, and Nguyen, 2023). Consequently, gains in legitimacy make company actions desirable and motivate sustainable businesses to proactively embrace double materiality (Correa-Mejia, Garcia-Benau, and Correa-Garcia, 2024), supporting their mandatory inclusion in the European legislation. Hummel and Szekely (2021) draw attention to voluntary disclosure of corporate social responsibility, considering the landscape of stakeholder and legitimacy theories. The authors highlight that in order to actively affect their legitimacy, companies disclose nonfinancial information to both capital market actors and other nonfinancial stakeholders.

Institutional theory examines organisations from the homogeneous characteristics certified by belonging to the same institutional area, sharing the political, financial, educational, cultural, and economic systems. The baseline idea of the institutional theory states that the operating system of the company affects its overall activity (Hoang, Pham, and Nguyen, 2023). Therefore, companies are considered to be expected to comply with the requirements of the institutional environment, integrating aspects of sustainability reporting (Khaled, Ali and Mohamed, 2021; Fiandrino, Tonelli, and Devalle, 2022). For example, companies internalise ESG policies and practices driven by institutional pressures, such as sustainability reporting requirements shaped in line with the engagement of the SDGs. Long-term value creation and organisational legitimacy are met when entities adjust to these constraints, being able to meet social expectations and improve their standing (Monteiro et al., 2024). Thus, the institutional perspective may explain how the normative pressure drives changes in corporate strategy (Whittingham et al., 2023) towards sustainable businesses.

These theories orientated toward an economic environment, but also a social and political environment, are used to highlight the external pressure posited by different types of stakeholders on sustainable practices of companies, highlighting the means by which businesses operate within a complex and dynamic socioeconomic context (Beske, Haustein, and Lorson, 2020).

2.3. Research hypotheses

Increased evidence of meaningful normative pressure reflected in more transparent disclosure of ESG policies and practices and a higher level of prioritising the SDGs invite researchers to respond to the wide recognised gap of narrow-focused studies related to SDGs or ESG policies and practices (Correa-Mejia, Garcia-Benau, and Correa-Garcia, 2024; Whittingham et al., 2023).

A limited number of studies conduct research on double materiality perspectives included in nonfinancial corporate reports, offering a limited perspective for ESG policies and practices or SDGs prioritisation, including only specific industries and countries, or using cross-industry samples. Furthermore, previous research reflects divergent approaches on the concept of double materiality, emphasising the complexity of its integration in sustainability reporting. Therefore, Delgado-Ceballos et al. (2023) present the relationship between SDG prioritisation and ESG policies and practices in the context of double materiality, through a descriptive approach, with limited empirical evidence on the link between financial materiality and impact materiality. Furthermore, Aras, Furtuna, and Kazak (2024) present empirical evidence on the association of SDGs with ESG policies and practices in the context of double materiality, but only for a sample of financial institutions, an aspect that limits the relevance of the results for other industries. Correa-Mejia, Garcia-Benau and Correa-Garcia (2024) and Sepulveda-Alzate, Garcia-Benau, and Gomez-Villegas (2021) analyse the impact of corporate governance and financial performance on SDGs prioritisation for a sample that includes Latin-American companies. However, implications of double materiality in the context of ESG-SDGs connection are not discussed, while the results are limited to specific geographical regions. Through a qualitative research based on content analysis of sustainability reports for European companies, Correa-Mejia, Correa-Garcia, and Garcia-Benau (2024) identify differences between the form and the substance of the concept of double materiality in business practice. The sample limitation to a relatively low number of companies from a specific region could affect the robustness of the results and a possible extrapolation. In addition, the estimation of the level of implementation of the double materiality concept is influenced by the subjectivism that characterises the grouping and interpretation of data collected through content analysis. Monteiro et al. (2024) limit their research to investigating the relationship between SDG5 and ESG reporting practices for UE companies, while Nicolo et al. (2024) analyse the impact of ESG performance on SDG score for a sample of international companies, limited to only 2, 402 observations for 635 companies from 45 countries, regionally differentiated. Fiandrino, Tonelli and Devalle (2022) point out a variety of research methods regarding the double materiality concept, underscored by diverse theoretical approach.

These contrasts with respect to the methodological and contextual differences could highlight a potential lack of convergence at the level of applicability of double materiality in the context of sustainability reporting. Prior literature (Monteiro et al., 2024; Tyan, Liu, and Fu, 2024) emphasises that to better understand double materiality phenomena, more in-depth analyses of SDG disclosure across companies, countries, and longer reporting horizons should be analysed as associated with ESG policies and practices. The growth of incorporating ESG aspects into the sustainable business and decision making process can be motivated more by its impact on corporate value (financial materiality) than by ethical concerns related to the impact of the company on society and the environment (impact materiality). The two sides of materiality embedded in corporate sustainability data reported by companies around the world following the launch of the Sustainable Development Goals in 2015 are addressed, with the aim of filling the gap identified in previous studies.

In light of these considerations, there is a noticeable need to initiate research that explores the relationship between ESG policies and practices (as financial materiality) and prioritisation of SDGs (as impact materiality) for a holistic understanding of business strategy. This research aims to provide significant contributions to existing research gaps regarding the concept of double materiality and is designed to respond to future research

directions identified in the existing literature. Hence, three main research hypotheses are formulated:

RH1. There is a significant difference in the double materiality perspectives for EU and non-EU companies.

RH2. Financial materiality is strongly associated with impact materiality.

RH3. An increase in impact materiality has a significant positive influence on financial materiality.

2. Research methodology

This research aims to investigate various aspects of sustainability reporting framed within the double materiality approach required by European and international regulations and standards. The study reveals the importance of the concept of double materiality (financial materiality and impact materiality) in addressing the sustainability nexus by connecting the requirements of the 17 SDGs with the ESG policies and practices reported by companies.

2.1. Data and research variables

The initial sample considered for this empirical study consists of a total of 58,985 company-year observations (not tabulated in this paper, but available upon request), collected from Refinitiv Eikon database, for international companies activating in non-financial industries, over the period 2015-2024. The Refinitiv Eikon platform has been selected due to the comprehensive coverage of both ESG scores and SDGs included in corporate reporting, as well as financial indicators. The complex methodology used (LSEG, 2023), with a history dating back to 2002, and covering more than 90% of global market capitalisation for more than 15,500 global public and private companies, ensures the validity of the data used in this study. The use of international listed companies (also studied by Khaled, Ali and Mohamed, 2021 and Nicolo et al., 2024) captures the increased regulations placed on corporate sustainability requirements over the last years, around the world. The 2015-2024 time frame was chosen to explore the evolution of ESG policies and practices reporting along with SDG prioritisation starting immediately after the release of the UN 2030 Agenda, until the current period.

Observations with missing data for ESG, SDG scores, and control variables were eliminated, generating an intermediate sample of 43,424 observations. Based on the descriptive statistics related to skewness and kurtosis subsequently analysed, high values have been detected for the variables: Return on assets (ROA), Free cash flow (FCF), and Financial leverage (LEV). Using the drop function from STATA v.18, the extreme values computed for the three variables based on the 1% and 99% percentiles were excluded, resulting in a final sample of 40,867 observations for 10,075 companies from 91 countries around the world, activating in 10 different industries. Additionally, the overall sample was split into two sub-samples: one of 6,316 observations with companies having the headquarters in the EU countries and one of 34,551 observations with companies not established in EU countries. Thus, adding to previous research, this study extends both the analysed period, and the number of sampled companies, taking into consideration the institutional context for the two sub-samples (EU companies and non-EU companies). It directly explains the prevailing specific approaches at

the level of EU legislation regarding integration of the double materiality concept in sustainability reporting.

To respond to the research objective and the three research hypotheses, a set of variables is described in Table no. 1 is used.

Table no. 1 Variables of the study

Variable name	Code	Description and measurement
<i>Dependent variables</i> [values between 0 and 100]		
ESG score	ESG	The Financial Perspective of double materiality
Environmental pillar	ENV	Emission, Innovation, and Resource use categories
Social pillar	SOC	Community, Human rights, Product responsibility, and Workforce categories
Governance pillar	GOV	CSR strategy, Management, and Shareholders categories
<i>Independent variables</i> $[(\sum \text{SDGi} * 100) / n]$		
SDGs prioritisation score	SDG	The impact perspective of double materiality considering the 17 SDGs
Environmental SDGs	SDG_ENV	Includes SDG 6, SDG12, SDG13, SDG14, and SDG 15
Social SDGs	SDG_SOC	Includes SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, and SDG 16
Governance SDGs	SDG_GOV	Includes SDG 7, SDG 8, SDG9, SDG 10, SDG 11, and SDG 17
<i>Control variables</i>		
CSR Sustainability Committee	CSR_SC	Dummy variable (1- if companies have a CSR committee of independent directors with previous experience in socially responsible actions, 0 - otherwise)
Global Compact Signatory	GCS	Dummy variable (1- if companies are aligned to 5Ps strategies and advance SDGs, 0 - otherwise)
Stakeholder Engagement	SE	Dummy variable (1- if companies consult and communicate with stakeholders and report material issues resulting from this engagement, 0 - otherwise)
Return on assets	ROA	Company's operating performance ratio $[(\text{Net income} / \text{Total assets}) * 100]$
Free cash flow	FCF	Company's financial health $[\text{Free cash flow} / \text{Total assets}]$
Financial leverage	LEV	Company's financing structure $[\text{Total liabilities} / \text{Total equity}]$
Total assets	Size	The natural logarithm of the company's total assets
IFRS adoption	IFRSdummy	1 if companies adopted IFRS, 0 otherwise
EU dummy	EUdummy	1 if companies activate in EU countries, 0 otherwise

ESG scores are quantified based on more than 630 annual material ESG metrics collected for each company from publicly available information sources (company websites, annual reports and sustainability reports, stock exchange fillings, or news sources). The most relevant 186 comparable measures grouped within 10 categories further define three pillars: environmental, social, and governance, integrated into the ESG score (LSEG, 2024).

Impact materiality is measured by prioritisation of SDGs constructed as an unweighted disclosure score developed to measure the extent of the 17 SDGs reported by companies,

considered individually as dummy variables (1 if the SDG is reported and 0 otherwise). An unweighted score can reduce the potential subjectivity that arises from attributing arbitrary weights to different items (Nicolo et al., 2024). Additionally, the SDG score is decomposed according to the three pillars of sustainability. The SDGs-ESG mapping (Lungu, Caraiani, and Bojan, 2024) is based on the 5 Ps (Planet, People, Prosperity, Peace, and Partnership) (UN, 2015; Correa-Mejia, Garcia-Benau and Correa-Garcia, 2024).

2.2. Statistical and econometric analysis

The final sample of 40,867 company-year observations that met the filters to clean the data is first statistically analysed using descriptive statistics. Statistical assumptions of the normality of the data and homogeneity of variances are checked. Based on histogram analysis, the data may be considered within normal distributions for most of the study variables. Furthermore, the mean and median values are similar, while the results show that the means for all variables are within the 95% confidence interval, supporting the normality of the data. The homogeneity of variance is checked using the Levene test that shows significant values with a probability lower than 5%, except for the ESG and SOC variables. These results underpin the use of both parametric and nonparametric tests to verify the RH2. Parametric (Pearson) correlation coefficients complete the statistical analysis, while models' diagnosis based on Variance Inflation Factor (VIF) is applied to ensure the robustness of the results, as well as to discuss multicollinearity issues, also used by Hummel and Szekely (2021), Hoang, Pham, and Nguyen (2023), Correa-Mejia, Garcia-Benau, and Correa-Garcia (2024), and Nicolo et al. (2024). The sample is further examined by applying univariate analysis for the two sub-samples with EU and non-EU companies. Muchmore, difference tests to estimate on equality of means between the groups are performed using ANOVA parametric t-test. For the robustness of the results, Mann Whitney Wilcoxon non-parametric test is applied.

In addition, two regression models are designed in accordance with the previous literature. It includes a dependent variable measuring the financial perspective of double materiality (ESG), independent variables measuring the impact perspective of double materiality (SDG), considered as an aggregated score (SDGs), but also as a decomposed score (SDG_ENV, SDG_SOC, and SDG_GOV). Control variables, as described in Table no. 1, are also included in line with previous research (Khaled, Ali and Mohamed, 2021; Hoang, Pham and Nguyen, 2023; Tyan, Liu, and Fu, 2024). The generic equations for the regression models are presented as follows:

$$ESG_{it} = \beta_0 + \beta_1 SDG_{it} + \beta_2 ControlVariables_{it} + \mu_{it} + \varepsilon_{it}, \quad (1)$$

$$ESG_{it} = \beta_0 + \beta_1 SDG_ENV_{it} + \beta_2 SDG_SOC_{it} + \beta_3 SDG_GOV_{it} + \beta_4 ControlVariables_{it} + \mu_{it} + \varepsilon_{it}, \quad (2)$$

where all variables are explained in Table no. 1, *i* - the company and *t* - the time period, μ_{it} refers to year, industry, and country fixed-effects, and ε_{it} is the error term.

To capture the relationship, the study runs fixed effects regression models (FE) for the company-year panel dataset, to tackle endogeneity and to ensure the robustness of findings (Nicolo et al., 2024; Hoang, Pham, and Nguyen, 2023). Because the level of ESG scores may change in time, across industries, and across countries, fixed effects for year, industry, and country, as well as company-clustered robust errors are included in all regressions. Panel regressions are performed by including robust standard errors, controlling for

heteroskedasticity (*robust* option in STATA v.18). The decision to use FE panel regression was made based on the results of the Breusch-Pagan Lagrange Multiplier (LM) test, followed by the Hausman test. Regression models' diagnosis is applied in order to assess their validity, using the modified Wald test for heteroskedasticity in fixed effect regressions and the Breusch-Pagan/Cook-Weisberg test, along with the Ramsey RESET test for omitted variables (results not tabulated, but available upon request).

To further validate and support the robustness of the results, alternative regression analyses are performed by replacing the ESG score with each of the three pillars (environmental, social, and governance), noting any differences compared to the main two estimations displayed in Equations (1) and (2).

3. Results and discussions

3.1. Descriptive statistics and tests of differences

To address *RH1*. *There is a significant difference in the double materiality perspectives for EU and non-EU companies*, descriptive statistics for the full sample, as well as for the two subsamples that include EU companies and non-EU companies are presented (Table no. 2). The mixed results of Levene test on the homogeneity of variances, insignificant for ESG and SOC at a 1% confidence level, support the use of both parametric (ANOVA t-test) and non-parametric (Mann Whitney Wilcoxon z-test) tests. Table no. 2 illustrates the significance of differences in means for the prioritisation of ESG policies and practices and the SDGs between the two groups (Lungu, Caraiani and Bojan, 2024).

Table no. 2. Tests for differences in the double materiality perspectives

Variables	Mean – Overall sample	Mean – EU sample	Mean – non-EU sample	Difference	Std. Error	Levene test	ANOVA t-test	Mann Whitney Wilcoxon z-test
ESG	46.197	53.862	44.796	-9.066	0.278	1.080	-32.65***	-32.038***
ENV	39.679	49.651	37.857	-11.795	0.373	38.464***	-31.60***	-30.928***
SOC	47.541	58.528	45.533	-12.995	0.320	3.301	-40.65***	-39.621***
GOV	49.832	50.715	49.670	-1.045	0.309	9.280***	-3.40***	-3.426***
SDG	26.086	32.060	24.994	-7.066	0.449	212.874***	-15.75***	-21.044***
SDG_ENV	26.277	32.584	25.125	-7.46	0.470	61.578***	-15.85***	-21.086***
SDG_SOV	23.594	28.000	22.788	-5.213	0.446	51.406***	-11.70***	-18.913***
SDG_GOV	28.418	35.682	27.091	-8.591	0.497	41.260***	-17.30***	-21.766***
CSR_SC	0.631	0.674	0.624	-0.051	0.007	301.041***	-7.70***	-7.693***
GCS	0.151	0.317	0.122	-0.195	0.005	4571.778** *	-40.55***	-39.758***
SE	0.586	0.698	0.566	-0.132	0.007	2945.117***	-19.60***	-19.509***

Notes: Variables are defined in Table no. 1. The symbol *** indicates significance at the 1% level.

Number of observations: Full sample: 40,867; EU sample: 6,316; non-EU sample: 34,551.

Source: Data collected from Refinitiv Eikon, processed by the authors using the STATA 18 version.

The results show that during the period 2015-2024, companies report ESG policies and practices with an average score of 46.197, focussing more on governance (49.832) and social (47.541) and less on environmental (39.679) aspects. Similar results obtained by Lungu, Caraiani, and Bojan (2024) highlight a 2018 choice followed by an abrupt decrease in 2019,

but quickly recovered during the next years. Additionally, the SDG scores, in general and decomposed by the three pillars, indicate that, in general, companies prioritise 26.086% of the 17 SDGs, 26.277% of environmental (SDG 6, SDG12, SDG13, SDG14 and SDG 15), 23.594% of social (SDG 1, SDG 2, SDG 3, SDG 4, SDG 5, and SDG 16), and 28.418% of governance goals (SDG 7, SDG 8, SDG9, SDG 10, SDG 11, and SDG 17).

Comparing the means for the two subsamples, EU companies are characterised by a higher level of reporting ESG policies and practices, and prioritising the SDGs more. However, the mean prioritisation of SDGs for EU companies (32.060%) is lower than that observed by Nicolo et al. (2024). Parametric tests, reinforced by results from non-parametric tests, denote significant differences between EU and non-EU companies, validating RH1. These results indicate that EU companies are more interested in incorporating double materiality perspectives in sustainability reporting, while non-EU companies integrate ESG policies and practices and prioritise SDGs at a lower level. The arguments supporting the findings may address the differences in the approach and regulatory requirements for sustainability reporting for EU compared to non-EU countries. Therefore, the compliance of EU companies with a mandatory regulatory framework contributes to improving the quality of sustainability reporting, compared to non-EU countries where sustainability reporting is voluntary (Rezaee et al., 2023). The results are consistent with legitimacy and institutional theories, which state that particularities of the political system at the country level and the specific regulatory framework exert significant influence on sustainability reporting policies and practices (Monteiro et al., 2024). Furthermore, another influential factor consists of different institutional environments for EU companies compared to non-EU, providing regulators with specificity in consistent implementation of sustainability reporting policies (Rezaee et al., 2023).

3.2. The association between financial materiality and impact materiality

To respond to RH2. *Financial materiality is strongly associated with impact materiality*; parametric (Pearson) correlations are analysed (Table no. 3).

Table no. 3. Pearson correlation analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ESG	1.000							
(2) ENV	0.869**	1.000						
(3) SOC	0.900**	0.736**	1.000					
(4) GOV	0.688**	0.415**	0.424**	1.000				
(5) SDG	0.484**	0.511**	0.454**	0.231**	1.000			
(6) SDG_ENV	0.479**	0.513**	0.444**	0.228**	0.945**	1.000		
(7) SDG_SOC	0.436**	0.450**	0.415**	0.210**	0.948**	0.843**	1.000	
(8) SDG_GOV	0.471**	0.499**	0.440**	0.224**	0.963**	0.873**	0.865**	1.000

Notes: Variables are defined in Table no. 1. The symbol ** indicates significance at the 5% level.

The entire sample consists of 40,867 company-year observations.

Source: Data collected from Refinitiv Eikon, processed by authors using STATA 18 version.

ESG scores are strongly associated with all SDG scores, with coefficients greater than 0.400, at a level of significance of 5%. Significant and positive correlations are identified especially between environmental policies and practices (ENV) reported by companies and the three categories of SDGs (SDG_ENV:0.513, SDG_SOC:0.450, and SDG_GOV:0.499). Similarly,

social policies and practices (SOC) are strongly associated with SDG scores (SDG_ENV:0.444, SDG_SOC:0.415, and SDG_GOV:0.440). Although weaker compared to ENV and SOC, GOV policies and practices and prioritisation of SDGs are found to be significantly associated. These findings are comparable with those of Nicolo et al. (2024) and validate RH2, showing that both perspectives of the materiality (financial and impact) are linked to each other by companies, foreshadowing the recent requirements legitimised by sustainability standards.

3.3. The impact of SDGs prioritisation on ESG policies and practices

To discuss the RH3, *An increase in impact materiality has a significant positive influence on financial materiality*, Table no. 4 displays the results of FE robust panel regressions for the influence of prioritisation of the SDGs (impact materiality) on ESG policies and practices (financial materiality) reporting, with an in-depth analysis for each of the three pillars.

Table no. 4. SDGs prioritisation - ESG policies and practices regression analysis

Variables DV: ESG	Overall sample		EU sample		Non-EU sample	
SDG	0.050*** (18.771)		0.028*** (4.407)		0.053*** (17.986)	
SDG_ENV		0.012*** (2.763)		0.007 (0.731)		0.013*** (2.735)
SDG_SOC		0.022*** (4.973)		0.003 (0.297)		0.024*** (4.864)
SDG_GOV		0.016*** (3.671)		0.017* (1.854)		0.016*** (3.121)
CSR_SC	6.637***	6.637***	5.591***	5.585***	6.715***	6.716***
GCS	2.015***	2.019***	2.122***	2.116***	2.042***	2.046***
SE	6.549***	6.545***	5.215***	5.220***	6.688***	6.685***
ROA	-0.395	-0.388	-1.940	-2.022	-0.156	-0.148
FCF	-0.636	-0.644	0.556	0.656	-0.855	-0.861
LEV	-0.057	-0.057	-0.128	-0.130	-0.042	-0.042
Size	2.979***	2.974***	3.694***	3.691***	2.782***	2.776***
IFRSdummy	-2.071**	-2.055*	-1.259	-1.306	-2.671**	-2.644**
EUdummy	2.181***	2.170***				
Constant	-33.063***	-32.915***	-38.322***	-38.236***	-30.526***	-30.380***
Observations	40,867	40,867	6,316	6,316	34,551	34,551
R-squared	0.396	0.396	0.316	0.316	0.408	0.408

*Notes: Variables are defined in Table no. 1. The p values are two-tailed. The symbols ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Year, industry, and country FE are included. Robust t-statistics in parentheses for independent variables.*

Source: Data collected from Refinitiv Eikon, processed by authors using STATA 18 version.

The regression analysis validates RH3 for the general sample (columns 1 and 2). A positive and significant impact of the SDG score on ESG ($\beta=0.050$; $p<1\%$) confirms that companies that prioritise SDGs also tend to increase the level of reported ESG policies and practices. Similarly, Nicolo et al. (2024) demonstrate that SDGs prioritisation may be considered a channel for companies to enhance ESG policies and practices reporting. Detailing the analysis, the regression model is re-run by using decomposed scored of SDGs. Findings also support the RH3 with positive and significant impact for environmental ($\beta=0.012$; $p<1\%$), social ($\beta=0.022$; $p<1\%$), and governance ($\beta=0.016$; $p<1\%$) related SDGs. Comparative

analysis highlights that companies that prioritise more social SDGs tend to have higher ESG scores. The positive influences of the environmental and social SDGs on the environmental and social pillars of the ESG score, respectively, are also found by Nicolo et al. (2024). On the contrary, Soni (2023) emphasises positive and significant causality between the governance pillars of the SDGs and the ESG score and proposes greater attention to social and environmental factors to improve the ESG score.

The existence of a CSR sustainability committee ($\beta=6.637$; $p<1\%$), the enrolment in the UN Global Compact initiative ($\beta=2.015$; $p<1\%$), the stakeholders' engagement ($\beta=6.549$; $p<1\%$), and the value of total assets ($\beta=2.979$; $p<1\%$) contribute to an increase in the ESG policies and practices reporting. On the contrary, the results show that companies using IFRS financial reporting standards tend to engage less in ESG policies and practices.

Furthermore, mixed results were found for EU companies (columns 3 and 4) compared to non-EU companies (columns 5 and 6). Thus, the ESG-SDG relationship is characterised by a trade-off between the two perspectives of double materiality, within the context of stakeholder theory. For the decomposed score, the single significant impact is that of SDG_GOV on the ESG score ($\beta=0.017$; $p<10\%$) for EU companies. Governance-related SDGs are highly prioritised with a significant impact on the increase in the ESG score, suggesting that companies internalise stakeholder theory (Khaled, Ali, and Mohamed, 2021) as related to legitimacy theory (Whittingham et al., 2023). Moreover, for non-EU companies, the impact of SDGs on ESG is similar to the overall sample, indicating positive and significant impacts at a 1% level on ESG score when all SDGs are considered, as well as when they are analysed by the three pillars. Monteiro et al. (2024) report similar insights on a sample of EU companies. Therefore, stakeholders are more likely to support companies with increased commitment to the SDGs, which in turn influences ESG policies and practices.

3.4. Robustness checks

The robustness of the results is examined employing alternate measures of dependent variable (ENV, SOC, GOV), in line with the prior literature (Hoang, Pham, and Nguyen, 2023; Nicolo et al., 2024). The regression models used to test RH3 are re-estimated for the overall sample, as well as for the two sub-samples (Table no. 5).

The results provide additional support to the initial findings, highlighting the positive and significant impact of prioritising SDGs on reporting ESG policies and practices for the overall sample, for EU companies, and for non-EU companies. Much further, the re-estimated regressions denote differences in the relationship between SDGs and ESG when companies prioritise environmental, social, or governance SDGs. Moreover, for these complementary models, VIFs are computed and average values are smaller than 4, which demonstrates that there is no multicollinearity between research variables. No significant differences were observed in the control variables' coefficients. On the basis of these results, the research findings are robust and may be validated.

Table no. 5. Robustness checks for regression analysis

Variables	DV: ENV		DV: SOC		DV: GOV	
Overall sample N=40,7867 obs.						
SDG	0.059***		0.064***		0.020***	
SDG_ENV		0.015***		0.011**		0.006
SDG_SOC		0.029***		0.032***		0.007
SDG_GOV		0.016**		0.021***		0.007
EU sample N=6,316 obs.						
SDG	0.035***		0.030***		0.017*	
SDG_ENV		0.022*		-0.009		0.008
SDG_SOC		-0.004		0.013		0.007
SDG_GOV		0.017		0.025**		0.003
Non-EU sample N=34,551 obs.						
SDG	0.063***		0.069***		0.018***	
SDG_ENV		0.014**		0.016**		0.006
SDG_SOC		0.035***		0.032***		0.006
SDG_GOV		0.015**		0.021***		0.006

Notes: Variables are defined in Table no.1. The symbols ***, ** and * indicate significance at the 1%, 5% and 10% levels, respectively. Control variables, year, industry, and country FE and robust t-statistics are included (values not tabulated, available on request).

Source: Data collected from Refinitiv Eikon, processed by authors using STATA 18 version.

Conclusions

This empirical study examines the double materiality perspectives included in sustainability reporting requirements, exploring potential contributions to connecting the SDGs to company-level sustainability to improve ESG policies and practices reporting. Despite the existing research connecting ESG policies and practices to sustainable development goals, most of these studies focus on alignment among various requirements, the connection of the SDGs with corporate performance, or on disclosing the implementation of double materiality requirements. Although extensive conceptual debate has been identified in the literature on double materiality, there remains a lack of empirical research in this emerging field.

In order to add to previous research and to fill the gap regarding dimensions less explored thus far, the original contribution of the present study consists in proposing a shift in the research paradigm, with a focus on the complexity of the double materiality concept. Thus, through empirical research conducted on a relevant sample, this research examines the interconnection of the two perspectives, financial materiality and impact materiality. The enactment of the findings into the practices of companies, along with the necessity of differentiated approach for EU versus non-EU companies, represents contributions grounded in scientifically validated results and supports the advancement of informed management decisions.

The main findings illustrate differences in ESG policies and practices, as well as in SDG prioritisation for EU compared to non-EU companies, that may be generated by different regulatory frameworks and standards for sustainability reporting. The correlation analysis highlights that environmentally related SDGs are more prioritised by companies with stronger environmental ESG policies and practices. Muchmore, socially-oriented companies seem to prioritise more the SDGs, compared to governance-oriented companies. The results

are further validated by regressions with decomposed and alternative measures, showing that the higher the prioritisation of SDGs, the more ESG policies and practices are reported by companies, both overall, but also for each pillar.

The underlying theories are validated by the findings illustrating that reporting of ESG policies and practices may benefit from prioritisation of SDGs. First, stakeholder theory states that companies participate in ESG activities to satisfy the demands and expectations of different stakeholders, creating a long-term relationship between them. Second, in line with the legitimacy theory, in order to ensure a positive impact on society and the environment where they activate, companies became more open towards ESG initiatives. Third, institutional theory provides an understanding of how companies react to institutional frameworks, societal expectations, and external influences.

In conclusion, this research validates the statement that double materiality may raise awareness of businesses to improve corporate sustainability policies and practices, reflected in ESG scores, considering stakeholders' interests, and prioritising SDGs. Thus, investors' interests in sustainability (financial materiality) are reconciled with the external impact of the business on society and the environment (impact materiality).

Although this study sheds new light on the research of double materiality in sustainability reporting, limitations related to the unequal distribution of EU companies compared to non-EU countries, the heterogeneity of the sample, the partial reference to the specific ESG categories or to individual SDGs, as well as management inside perspectives are acknowledged. Furthermore, potential limitations of the data extracted from Refinitiv should be highlighted, as well as the generic endogeneity risk that characterises regression-based research.

Future research may extend the investigation by including an in-depth analysis of each ESG policy and practice and each SDG. In addition, a sectoral analysis can be performed to establish how various industries prioritise the SDGs. To successfully support the goals of the 2030 Agenda, future research may address the priority ranking of SDGs taking into account characteristics at the country and company level. Furthermore, causality analysis may identify further insightful connections between ESG and SDGs.

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