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# Double materiality - from theory to practice, an examination of its early implementation

**Anis Shami**

Université Grenoble Alpes

E-mail: [Anis.shami@univ-grenoble-alpes.fr](mailto:Anis.shami@univ-grenoble-alpes.fr)

## **Abstract**

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The term "Double Materiality" (DM) was first used by the European Commission (EC) in the 2019 "Guidelines on Non-Financial Reporting: Supplement on Reporting Climate-Related Information" (2019/C 209/01). As a development of corporate reporting, it necessitates sharing information on i) how a company's operations affect society and the environment, and ii) how climate-related events affect the company's performance. We look into whether, where, and how businesses used the concept of double materiality in their 2020 corporate reports. To achieve this, we gathered information on a population of 1018 companies, we then traced mentions of Double materiality and examined their choices of reporting frameworks / standards that support their sustainability communication . Next, we investigate how rating agencies evaluate the financial health and sustainability of the companies. We examined possible connections between the disclosure policies of the companies and this external evaluation. Our findings demonstrate that the double materiality concept was still in its infancy in 2020. Similar to double materiality, non-financial reporting frameworks were also poorly addressed by the reporters, yet through significance testing, our results reveal a positive association between adopting these frameworks (by the reporter's/companies) and the reliability of the performance assessment conducted by external assessing entities (sustainability rating agencies).  
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## **keywords**

Double Materiality, Baseline, Corporate reporting, Non-financial reporting, Ratings

## I. Introduction

The [accounting directive 2013/34/EU](#) was updated in 2014 by the Non-Financial Reporting Directive ([NFRD](#) [2014/95 EU](#)), which was published by the European Commission. European businesses with more than 500 employees were required to include a section in their annual reports for their non-financial statement. The subjects covered in this statement include environmental protection, social responsibility, workers' rights, anti-corruption, and diversity on the organization's boards. It contributes to a greater understanding of an organization's performance, position, development, operations, and the effects on the community and environment. In order to move the European Union toward a sustainable global economy, the directive encouraged the use of international standards like the [OECD Guidelines for Multinational Enterprises](#), the [Global Reporting Initiative \(GRI\)](#), the [United Nations Global Compact](#), and [ISO 26000](#). It also emphasized issues like the measurement and monitoring of corporate performance and its effects on society (NFRD 2014/95 EU section 3).

The Commission later published "[Guidelines on non-financial reporting: Supplement on reporting climate-related information \(2019/C 209/01\)](#)" that first defined "Double materiality" as the concept that extends materiality, a concept that emerged in the eighteenth century (Holmes 1972). The "Double Materiality" approach combines i) "financial materiality," also known as the "outside-in impact," which measures how a climate-related event will affect a company's financial position or value, and ii) "social and environmental materiality," also known as the "inside-out impact," which measures how the company's operations will affect society and the environment (Bossut et al. 2021; Ravalec et al. 2022).

The literature on DM is slowly developing . Authors (Adams et al. 2021; Baumüller and Sopp 2021; Alexander 2022) have concentrated on defining double materiality and analyzing how it represents a measurement from two opposite perspectives (the company's interest and that of its surrounding "stakeholders"). Other DM research threads investigate its potential applications (Gourdel et al. 2021; Chiu 2022) by i) offering a dynamic balance sheet assessment of climate transitional and physical risks and ii) extending the metrics by identifying appropriate and suitable measurement techniques, indicators, and units that can accurately reflect the true results/situation. Other researchers look at the connection / relation between corporate communication, ESG metrics, and sustainability. They examine this relation to identify possible impact of double materiality in enhancing sustainability reporting and performance assessment.

Pronobis and Venuti (2021), for instance, linked greater precision and transparency in calculating the overall impact of businesses' activities to the possibility of adopting double materiality. To them, such a strategy offers a prospective foundation for consistent reporting, which improves the disclosure of sustainability-related issues. By highlighting and recognizing the main environmental effects of business activities, Zhongming et al. (2021) also examines how materiality contributes to sustainability. Results from Worthington-Smith and Giamporcaro (2022) show how the use of ESG factors in investment choices has a significant impact on both financial performance and sustainable development.

At date, only one research (De Cristofaro & Gulluscio 2023) has investigated how companies adopted DM as a guideline. The authors surveyed 58 corporates' publications over 3 years to find out that The regulatory landscape for NFRs was fragmented across nations, with the EU

having the most involved. In the NFRs of the sample companies, the study found that DM is being adopted and declared, with European companies being more likely to do so than non-European corporations. The authors' approach combined both a qualitative viewpoint of textual analysis and a quantitative perspective of the measurement of feature occurrences to perform an exploratory investigation through a document analysis of NFRs of firms. Three years after the concept release it has become interesting to survey how the DM has resonated amongst a larger number of reporting entities. The current study aims to participate in filling this gap and create a preliminary state of play.

Also, there are numerous sustainability frameworks that businesses can use to enhance their sustainability reporting and address Double Materiality issues. Yet, few studies have looked at how organizations prefer to embrace frameworks and how their decisions relate to adopting the DM notion (Togni et al. 2020; De Cristofaro and Gulluscio 2023).

Finally, rating agencies who act as external controller, are required to handle both impact materiality and financial materiality through credit rating and ESG rating. The relationship between a company's sustainability communication strategies and its ratings has not yet been investigated, even though studies have lately examined the consistency of rating agencies' results. Therefore, our general research question – ***"Does organizations' adoption of the double materiality concept alongside non-financial reporting standards assist the assessment of their non-financial sustainability performance?"*** – develops in three sub-questions: i) Do listed companies include DM in their annual or sustainability reports? ii) What sustainability frameworks are currently being used by them to address sustainability issues? iii) In what manner do credit and ESG ratings inform about or relate to DM practices in a listed company?

To answer these questions, we gathered the 2020 annual reports (Universal Registration Documents / Annual Reports / sustainability reports) of 1018 listed European companies as well as their credit and ESG scores from several rating agencies. We then applied a keyword analysis to these yearly disclosures and connected the findings to the evaluations we received from the various assessing/rating agencies. Our findings show that reporting entities are not adequately addressing double materiality (6 out of 1018 companies), as well as non-financial reporting standards and frameworks, which are still weakly addressed / explicitly mentioned (GRI with 30.75% of the sample). Finally, through significance testing, our results showed that the companies which announced their compliance to non-financial reporting standards/frameworks have obtained higher and more consistent assessments (ratings) from different sustainability rating agencies (S&P global, CSRhub, Sustainalytics, Refinitiv Eikon, and MSCI).

As a result of the arguments that have already taken place in literature and regulations, the study makes a theoretical contribution by clarifying the idea of twofold double materiality. Our research demonstrates, on a managerial level, that businesses that use sustainability reporting frameworks get superior assessments of their sustainability performance from external controllers. This superior assessment manifests itself in the form of converging

sustainability ratings. On a methodological level, our work combines two complementary parts. First part is theoretical which investigates the double materiality (DM) concept in the context of corporate reporting. In this part, we assess the level of adoption of the DM by a sizable sample of European listed companies. In the second quantitative part we evaluate the external assessments (ESG ratings) and test any impact of adopting double materiality and other non-financial reporting standards on these ratings.

The paper develops as follows. First, we establish the context for our analysis, by recalling the regulatory and theoretical underpinnings of double materiality. The second section exposes our methodology : we gather information on a sizable sample of European businesses in order to i) examine their use of the terms "materiality" and "DM," ii) examine their selection of sustainability indicators in relation to carbon emissions (CO<sub>2</sub>), and iii) compare our data with the evaluation offered by a number of rating agencies. We eventually seek any potential connections between the ratings and the qualities of business communication. Following a discussion of our findings, we draw the conclusion on how businesses disclose their performance has an impact on how external evaluators perceive them. Based on our research, the article advocates for the need for increased consistency in businesses' reporting procedures, particularly for non-financial reporting.

## **II. From Materiality to Double Materiality a conceptual framework for standard setting**

### **A. Materiality, the cornerstone of double materiality**

#### **1. Academic definition of Materiality**

Both academic and professional literature have covered a lot of ground on the idea of single materiality. Two extant literature reviews provide a timeline of the development of the concept (Holmes, 1972; Chong, 2015). The first one (Holmes, 1972) focuses on early mentions of materiality. According to him, the concept appears in the work of the Company Law Amendment Committee, chaired by Lord Davey, proposing amendments of the British Companies Act 1862<sup>1</sup>, and remain present in the currently enforced Companies Act 1985<sup>2</sup>. The latter defines materiality as *“Every contract or fact is material which would influence the judgment of a prudent investor in determining whether he would subscribe for the shares or debentures offered by the prospectus”*. The second and more recent literature review (Chong 2015) focuses on later developments occurring in the second half of the 20th century. In that period, accounting bodies, academics and governments proposed their own definitions of the concept (Appendix 1). All the provided definitions displayed by the author addressed materiality as i) focusing on what matters, i.e., what is significantly important in the context of a financial statement ii) a remedy to the attempt of hiding information or providing misleading ones in financial statements.

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<sup>1</sup> Companies Act 1862 (Hansard). (n.d.). Retrieved March 22, 2022, from <https://api.parliament.uk/historic-hansard/acts/companies-act-1862>

<sup>2</sup> Companies Act 1985. (n.d.). Queen's Printer of Acts of Parliament. Retrieved March 22, 2022, from <https://www.legislation.gov.uk/ukpga/1985/6/contents/enacted>

The idea of materiality serves as a filter to identify issues that actually matter (Hicks 1964). Bernstein (1967) commented that materialism is a component of "wisdom of life" that encourages avoiding what is unimportant, irrelevant, or insignificant.

Materiality, according to Iskandar (1996) and Jones et al. (2016), was initially linked to financial judgments, particularly in accounting and auditing processes. The possibility of a change in a company's financial status is an example of a materiality matter. A firm with a capital of 500 000 euros may consider a loss of 100 000 euros (caused by a specific incident) to be significant / material as it represents one fifth of the company's worth. For a corporation with a capital of 500 million euros, this would not be the case as the lost money is inconsequential and relatively insignificant.

## 2. Regulatory definition of Materiality

The Security Exchange Commission (SEC) Securities Act of 1933 (section 17(a)(2)) codified the concept of materiality, which was first introduced in the British Companies Act 1862 amendments as: *"to obtain money or property by means of any untrue statement of a material fact or any omission to state a material fact necessary in order to make the statements made, in light of the circumstances under which they were made, not misleading"* (Cornell Law School; 15 U.S. Code § 77q).

The Securities Exchange Act of 1934 also addressed the issue of materiality when it came to regulating security exchanges (section 3 page 24), using the term "material fact," which was defined as "important and significant information." Financial Accounting Standards Board FASB's Accounting Research Bulletin N°43 discussed materiality as a property of information that is intrinsically tied to the term significant in 1953 (item material and significant).

The [security exchange commission \(SEC\)](#) in 1999 has defined the concept of materiality in a Staff [Accounting Bulletin: No. 99 – Materiality](#) as the potential of an item to be significant and relevant to a user of a reporter's financial statement. According to the bulletin, a matter is material if a *"reasonable person"*, in this case the user of a financial statement, believes is crucial to be reported.

Materiality represents a concept in accounting and auditing that reflects a test of significance of a certain event of matter within a financial statement. It is used as a reference to what should be introduced in a financial statement based on how essential it might be to the user of this statement (e.g. investors). The [Auditing Standards Board \(ASB\)](#) in a statement of auditing standards [No. 138](#) in 2019 amended the concept of materiality and provided a [new description](#) that explains it as *"Misstatements, including omissions, are considered to be material if there is a substantial likelihood that, individually or in the aggregate, they would influence the judgment made by a reasonable user based on the financial statements."*

The [International Financial Reporting Standard \(IFRS\)](#) also provided an [amended definition](#) of materiality as the situation when the decisions of the users *"primary users"* of financial statements would change as a result of mistating, omitting, or obscuring a piece of information. In this case the information overlooked is deemed material.

### B. Materiality in sustainability reporting

We give a brief summary of the topic in the following text and a comprehensive table of the various literary threads that have addressed it in **Appendix 2**. The concept of materiality was

integrated into the sustainability and corporate social responsibility (CSR) reporting process, according to Jones et al. (2016). According to Calabrese et al. (2017), the goal of materiality in sustainability reporting is to find information that is both i) crucial and important for the enterprise reporting its performance and (ii) relevant to the stakeholders (Ngu and Amran 2021). Adopting it can help an enterprise save time, money, and effort when reporting its operations.

According to Ngu and Amran (2021), sustainability reporting is a medium via which businesses can share important non-financial information. In fact, the sustainability-related disclosures made by corporations are chosen based on their materiality, or how important they are to the stakeholders. With the goal of materiality being to increase the decision-usefulness of the reporting process and its influence over stakeholders, establishing its connection between the reporting entities' economic, environmental, and social performances, leads to the new definition of double materiality. According to Torelli et al. (2020), the growing interest in sustainability has prompted various standardization organizations to develop numerous frameworks and principles to streamline the reporting process and include materiality as one of the most crucial and difficult concepts promoting sustainability.

### **C. Unveiling the Flaws in Materiality**

Earlier literature has previously addressed many of the difficulties that have surfaced as a result of the growing interest in materiality adoption for sustainability reporting. Iskandar (1996) has addressed one issue related to the materiality threshold/scale<sup>3</sup>. This scale was described by the author as a tool for determining what is material. This threshold might reflect a predefined monetary amount of losses that a company deems material and thus discloses as it in its financial statement as a result. This threshold/scale concept was taken into account by several entities concerned with standardization, auditing, and accounting. The author claims that an assessing body can unintentionally set this criterion (too high/low), in which case all evaluations of materiality would be incorrect making all materiality judgements inaccurate.

According to Juma'h (2009), defining the materiality of a quantitative matter occasionally may fail to account for the true risk that it may pose. For instance, it would be difficult to estimate the exact amount of losses that would result from a flood in a car warehouse. The experienced harms could take some time to appear as a type of transitional risk (e.g. cars rusting) rather than immediately emerging as physical damages. It would be challenging in this case to accurately quantify and estimate the materiality.

From another perspective, it can be challenging to evaluate and quantify the materiality of a qualitative matter (such as intangibles) and can occasionally be surrounded by a great deal of complexity (Hicks, 1964; Juma'h, 2009). A business that experiences a cybersecurity attack would find it difficult to assess the effects of the incident. It is due to the complexity that surrounds the calculation the losses suffered. The challenge lies in financially valuating the losses in data which is related to its sensitivity and that based on that translates/specifies the monetary losses sustained.

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<sup>3</sup> Materiality threshold/scale: the dividing line between material and immaterial information. It helps recognize what is recorded and what is not recorded in the accounts. (Iselin and Iskandar, 2000)

According to Edgley et al. (2015), there may always be some mistakes in the process of deciding whether an item or issue is material or not. Materiality is a subjective concept due to the variety of interested parties and their varied materiality judgements (Murray 2021). According to the author, the problem is extended further due to the difference in the characteristics of the reporting entities (companies). What might be material to a company working within a specific industry might not be the same for another with different specifications.

## **D. Double Materiality; a two folded enhanced version of materiality**

### **1. Academic definition of Double Materiality**

Adams et al. 2021 claim that double materiality materiality has two folds. This implies that two measurements are made simultaneously, but from two distinct angles. The authors specified these two sides as the i) financial materiality and the ii) impact materiality.

According to Zhou (2011), Jebe (2019), Baumüller and Sopp (2021), Katz and McIntosh (2021), Madison and Schiehl (2021), Milieu and Mendel (2021), and Lee (2021), the first the (financial materiality), measures the effect of the climate (environment) on the business. A company's potential asset losses as a result of a storm are an illustration of financial materiality.

The impact a firm has on society and the environment is discussed in the second measuring approach, also known as social and environmental materiality (Zhou, 2011; Zhou and Lamberton, 2011; Baumüller and Sopp, 2021). One example of such materiality appears in the lawsuit case against DuPont chemical company which has been polluting the drinking water of the Ohio River exposing almost 70,000 people to poisoned water (Rich, 2016). While the shareholders and investors are the main audience of the first branch "financial materiality", those of the second branch "social and environmental materiality" are consumers, employees, partners, communities, responsible investors and anyone who is concerned with sustainability (Baumüller and Sopp, 2021; Ngu and Amran, 2021; Pronobis and Venuti, 2021).

The double materiality is anticipated to produce a system that is relevant and clearly represents the organization and how stakeholders are actually impacted by its existence (Commission communication 2019). The European Commission (EC) must recognize two aspects in order to implement this new strategy. The first brings together potential circumstances and events that could have an effect on how businesses operate and function. The second contains all the necessary measurements and instruments to track, record, assess, and communicate the effects of business operations (European Commission 2019 p. 5 - 12).

### **2. Regulatory definition of Double materiality**

In their report "PROPOSALS FOR A RELEVANT AND DYNAMIC EU SUSTAINABILITY REPORTING STANDARD SETTING," the European Financial Reporting Advisory Group (EFRAG 2021) defined double materiality (DM) as the process of combining two types of materialities (financial materiality and the impact materiality) in the assessment and reporting activities (p.8). The group views DM as a crucial idea that supports the development of sustainability standards in the European Union (p.8). The company's financial performance, progress, and



position in the eyes of investors are all displayed by the concept of "double materiality," which also looks out for the interests of the stakeholders (social and environmental status) (UNCTAD 2020).

The social and environmental aspects addressed by DM also referenced as "Impact materiality" is measured by the severity (scale, scope, and, remediability<sup>4</sup>) of negative impact of companies' activities and the probability of occurrence. It also may oppositely represent the potential positive impacts that people or the environment gain due to such activities (EFRAG 2021). An explanation of such measurement includes answering the following questions: i) who is impacted by the company's activity? ii) how much are they impacted? iii) what is the polarity of the impact (positive/negative)? iv) what is the possibility of reducing the damage and rectifying the effects of the activity (returning to the initial state)? , and v) what is the probability of the damage taking place?. An example of such activities would be conducting a business operation that significantly contributes to the emission of hazardous gasses, a low efficient water consumption, or high waste and pollution generation (EU sustainability disclosures for financial institutions 2022).

The disclosure and communication of corporations' non-financial performance has been the subject of numerous regulatory facility and organization initiatives at various levels. The European Commission sought to increase the transparency of social and environmental information in the directive 2014/95/EU (p. 1 section 1) and to establish a minimum standard of legal requirements with regard to what non-financial information needs to be disclosed by the reporting entities (p. 2 section 5). This improves the accessibility of non-financial information to investors and report readers (p. 3 section 12), which makes it easier to compare issues pertaining to social, environmental, employee-related, human rights, anti-corruption, and bribery (p. 2 sec 6). The regulation also urges the European Commission to create and establish non-financial standards, benchmarks, and key performance indicators (KPIs) for general and sectoral entities' evaluation procedures (p. 3 section 17).

The Commission updated the 2014/95/EU directive's provisions later in 2019 in a report titled "Guidelines on non-financial reporting: Supplement on reporting climate-related information." The new strategy for conveying non-financial information, double materiality, was addressed in this addition (section 2.2 Materiality, p. 5). The paper recommends that businesses use double materiality since it combines the perspectives of the financial, social, and environmental spheres. This aids them in the process of recognizing business opportunities and hazards. Many additional regulatory bodies and international organizations have addressed double materiality and the implementation process, which has increased the validity and creditability of the idea.

Double materiality was discussed by the United Nations Conference on Trade and Development (UNCTAD 2020, p. 6), who also used the term included in the directive and non-financial reporting requirements issued by the European Commission. It then made sure that one of the most important trends in the Sustainable Development Goals is the consideration of double materiality together with climate-related financial disclosures (SDGs) *"Broader consideration of materiality is one of the most important trends in Sustainable Development Goal reporting, including climate related financial disclosures. It is important to*

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<sup>4</sup> Remediability: the ability to rectify, correct, or resolve.

*note that the European Commission, in its consultation document on the update of the nonbinding guidelines on non-financial reporting, 27 refers to a double materiality perspective: (a) financial materiality, ...”.*

Without explicitly mentioning double materiality, the European Regulation (EU) 2019/2088 on Sustainability Disclosures in the Financial Services Sector (SFDR<sup>5</sup>) Regulation requested financial market participants to continuously assess and disclose their financial and sustainability risks (financial materiality), and encouraged (not obligatory) the reporting entities to promote sustainable investments that have a positive impact on society and the environment (sustainably material).

According to the European Financial Reporting Advisory Group (EFRAG), double materiality (based on the CSRD directive) is "a concept which provides criteria for judging whether a sustainability topic or information has to be included in the undertaking's sustainability report" (European Sustainability Reporting Guidelines 1 Double Materiality conceptual guidelines for standard-setting, p. 4). The report also considered DM as the union of impact materiality (inside-out) and financial materiality (outside-in), rather than just their intersection. The relationship between the two aspects (inside-out and outside-in influences) and how they interact and coexist to create double materiality are as well discussed in the report. According to this definition, large companies and SMEs that have their securities listed on EU regulated markets have to disclose information that is material from both sides; i) financial and ii) social and environmental as well as the information that is material from one of those two sides only.

#### **E. Reality of Double materiality; the status of information disclosed and potential greenwashing**

Research has increasingly used ESG data that has been disclosed by reporting businesses or that has been acquired from outside assessment bodies. The objective is to comprehend how operations of businesses will affect their potential social and environmental performance (Fiaschi et al. 2020). Due of its growing significance, the Double Materiality idea, like other sustainability issues, may be employed by businesses (reporting entities) just for marketing purposes. This could push stakeholders in the wrong direction toward businesses that say what they do not do. In contrast to reality, it gives stakeholders the impression that a company is sustainable and ecologically beneficial. Many companies have used the holes/deficiencies in the ESG-related policies/standards as an opportunity to submit incomplete, inaccurate, or deceptive information, which enhances their reputation and finally results in greater financial rewards (In and Schumacher 2021). This act is also known as greenwashing.

From another perspective external assessing entities also struggle to provide consistent performance evaluations or ratings due to the lack of sustainability reporting standards (In and Schumacher 2021). More problems that face providing reliable scores/evaluations include the i) results that are unvalidated by external entities, ii) their lack of homogeneity, iii) the inaccuracy of the raw data provided by the assessed entities “in the disclosures” and

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<sup>5</sup> Sustainable finance disclosure regulation (SFDR): A European regulation that aims to improve the transparency in the market for sustainable investment products and increase the transparency of sustainability claims made by financial market participants. (Eurosif)

finally iv) the subjectivity in the adopted methodologies and weightings of analyzed matters by the different rating agencies (Fiaschi et al. 2020). According to In and Schumacher 2021, this gap in the frameworks/standards alongside the concern of stakeholders, in regard to the potential ESG greenwashing, has pushed major regulators to put forward more efforts to establish more robust sustainability frameworks. In this particularity, there should be some unified, robust, and well-structured disclosure requirements that accompany the development of the double materiality assessment. This might help escape any potential greenwashing attempt (e.g. mentioning the adoption of double materiality in the annual reports without actually implementing it).

**F. Escaping reporters’ potential greenwashing**

**1. Adopting EFRAG’s ESRS exposures (CSRD later)**

In April 2022, The European Financial Reporting Advisory Group (EFRAG) published multiple Exposure Drafts for European Sustainability Reporting Standards (ESRS). These drafts represent an essential constituent of [Corporate Sustainability Reporting Directive \(CSRD\)](#) which has been adopted by the European Union Council on the 28th of November 2022.

The drafts contain 13 chapters (figure 1) covering different sustainability matters grouped in five sections i) the general disclosure principles ii) general strategy, governance, and materiality assessments iii) environmental subjects like “climate change / resources / etc.” iv) Social subjects “workforce / communities / etc.” and v) governance subjects “risk management / business conduct / etc.”.

**Figure 2: ESRS Exposure Draft index**

ESRS Exposure Drafts index	
<b>Cross-cutting Exposure Drafts</b>	
ESRS 1	General principles
ESRS 2	General, strategy, governance and materiality assessment
<b>Topical standards - Environment</b>	
ESRS E1	Climate change
ESRS E2	Pollution
ESRS E3	Water and marine resources
ESRS E4	Biodiversity
ESRS E5	Resource use and circular economy
<b>Topical standards - Social</b>	
ESRS S1	Own workforce
ESRS S2	Workers in the value chain
ESRS S3	Affected communities
ESRS S4	Consumers & end-users
<b>Topical standards - Governance</b>	
ESRS G1	Governance, risk management and internal control
ESRS G2	Business conduct

Source: [EFRAG](#)

The ESRS E1 on Climate change Exposure is one of the European Sustainability Reporting Standards issued drafts by EFRAG which was adopted later by the CSRD. It includes the disclosure guidelines for environmental issues. The utility of the reporting outcome is anticipated to increase as a result of these standards, which are in line with the Paris Agreement 2015 and are tailored to the sustainable economic goals of the United Nations. The new standards can improve the clarity, accuracy, and comparability of the companies' annual reports as well as the capacity to track the success of the reporter over the short,

medium, and long terms (EFRAG - ESRS E1). They also make it possible for those who read the publicly available reports to comprehend the polarity (positive or negative) and magnitude of the effects of the companies' operations on the climate (materiality).

The focus in this paper will be limited to indicators related to greenhouse gas and carbon emissions as they are significantly addressed by companies in their universal registration documents, annual reports, integrated reports, or sustainability reports. Carbon Emissions are also given higher priority with a dedicated section in the EFRAG's ESRS E1 draft which shows an increasing interest towards standardizing the way they are reported. The draft has provided general and specific disclosure requirements related to Emissions. From this perspective, the reporting entities or the undertakings as named in the draft, shall provide an explanation about the i) key transition plans towards lower emissions (decarbonizations levels), ii) the change of their products / services and how it impacts in lowering emissions, iii) the financial resources dedicated to support the plans to lower the impact the emissions associated with the reporters' operations, iv) the adoption of policies related to limiting climate change adverse impacts and global warming, v) the climate related targets "e.g. net zero emissions" and the reduction in the emissions of scope 1, 2, 3 and vi) the progress made in the implementation of the transition plans.

The auditing firm KPMG (Vaessen, 2022) has published a report comparing some sustainability reporting proposals put forward by different reporting organizations (ISSB<sup>6</sup>, SEC<sup>7</sup>, EFRAG). **Appendix 3** represents a summary of results of the comparison. The report compared the i) audience targeted by each proposal ii) the principals disclosed iii) their status "mandatory/voluntary" iv) the concerned entities "reporters" v) the materiality lens vi) conditions of disclosure "when & where" vii) the proposal effective dates and the viii) assurance needed for the data disclosed. In general, there are many areas where the three proposals differ and some areas where they align. However, all the three aim to enhance the outcome of the reporting activity by producing more comprehensive reports. This shows an increase in the awareness towards the need to standardize the sustainability reporting activity.

## **2. Utilizing Baseline and other double materiality references; the case of carbon emissions**

Since the Double Materiality aims to involve and affect a larger range of stakeholders, measuring performance using this strategy necessitates the use of references that can guarantee its effective implementation. The idea of baseline is one of the most crucial conditions covered by the EFRAG's "ESRS E1" draft. A baseline serves as a benchmark that establishes the performance standards for businesses' sustainability efforts. This baseline can take one of two forms: a baseline value, such as the amount of CO<sub>2</sub> emissions in metric tons of CO<sub>2</sub>, or a year baseline, such as comparing a certain year's performance to earlier years. The EFRAG concept states that businesses must use one of the two baselines—or both—to define a milestone or particular objective to accomplish in the future. The reporting entities

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<sup>6</sup> ISSB - International Sustainability Standards Board: standard-setting body (under the IFRS foundation) established in 2021/2022 and aims to develop sustainability reporting standards to fulfill the sustainability reporting needs of investors.

<sup>7</sup> SEC: U.S. Securities and Exchange Commission: United States federal agency which aims to enforce laws against market manipulation.

should also monitor and evaluate their strategies for tracking their progress toward achieving this goal. Regarding the emissions, the draft proposes the use of emission value that is absolute or relative (if applicable). The target amount can be separated on the three emission scopes 1, 2 and 3 or combined in one overall amount. For the target year, the undertakings/reporters shall provide the targeted values of emissions for the 2030 and 2050 if applicable.

A baseline is an accurate environmental measurement from the past or the present that may be used to compare a company's future performance (Guerrero-Gatica et al. 2019). Even though a full ecological restoration of the environment is frequently impossible, historical data and the ecological baseline are essential to comprehend the current environmental situation and the potential to restore it through improved environmental and social performance (Uców et al. 2022). There is also a need to monitor and evaluate baselines for other issues, such as ecological risk, natural resource degradation or depletion, and environmental restoration potential (Burger et al. 2007).

According to Olson (2010), addressing emissions in sustainability reporting (methods of measurement and reporting) is more complicated and complex than financial reporting and auditing. To him, reporting an emissions baseline by some enterprises aims to demonstrate their superiority over rivals, sustainability, environmental stewardship, and moral performance. It might also be used to display their improvement and progress of lowering the impact on environment. In doing so, most enterprises highlight their positive/success points while hiding any failure or misconduct. For this reason, the process of evaluating the emissions needs to be traceable and should be linked to the reporter's operations as they represent the sources of these emissions (e.g. electricity, natural gas, petroleum consumption). Using such a method leads to setting an accurate baseline which helps in evaluating the current performance and identifying potential opportunities of improvement. It also promotes higher credibility and transparency.

Companies used to disclose their carbon emissions by comparing them to a pre-established baseline, according to In and Schumacher 2021. This is altering as businesses "become more vocal" about their emissions and the goals they hope to accomplish in the future, such as Net Zero Emissions. The authors claim that because this information is self-reported and unaudited, there may be a concern. Additional references of double materiality are carbon budgets, carbon taxes, and carbon policies. For instance, the idea of a carbon budget quantifies the allowable emission threshold after which the global temperature will reach dangerous levels (Lahn 2020). According to the author, this reference had a significant influence on the climate-related disclosures and policies over the years. To Friedlingstein et al. 2021, carbon budget helps in the accurate assessment of the carbon emissions to the atmosphere, ocean, etc. which leads to a better understanding of the emissions situation and eventually, the development of climate related policies.

In the second section of this paper, we provide an analysis in which we empirically investigate three main themes related to companies non-financial reporting and the double materiality concept. We explore the adoption status of double materiality through i) its constituents "materiality, financial materiality, sustainability materiality, etc." ii) the double materiality references "baseline, benchmark, carbon budget, etc." and iii) the non-financial

reporting frameworks/organizations “GRI<sup>8</sup>, TCFD<sup>9</sup>, NFRD<sup>10</sup>, etc.” After that, we assess the potential impacts of adopting them by analyzing the response of external assessing entities “rating agencies” through their ratings.

### III. Empirical analysis

#### A. Research Question & Data sample

We seek to comprehend the entire position of the non-financial reporting activity carried out by various European listed firms in our empirical investigation. We have a primary research question: *“Does organizations’ adoption of the double materiality concept alongside non-financial reporting standards assist the assessment of their non-financial sustainability performance?”* alongside several sub-research questions that we are attempting to answer including **Q1**: What is the overall status of double materiality in corporate reporting? **Q2**: Do businesses’ reporting of their sustainability performance change as a result of the adoption of the double materiality concept? **Q3**: Do external evaluators, specifically rating agencies, take into consideration any disparities in the reporting technique or process?

In the following sections we use a quantitative analysis and adopt an explorative approach that researches the new, understudied concept “double materiality” in the context of corporate reporting. The sample that was utilized, the data gathered, and the sort of test run are all described in the section below.

#### B. Data sample (Method for sampling)

For our empirical quantitative analysis, we chose a sample of 1018 European listed companies. This sample combines companies that belong to more than 50 industries (Number per industry and percentage is displayed in Table 1).

**Table 1: The distribution of the sample with respect to industry**

Industry	Nb	%	Industry	Nb	%
Aerospace & Defense	25	2.50%	Integrated Hardware & Software	1	0.10%
Automobiles & Auto Parts	20	2.00%	Investment Banking & Investment Services	22	2.20%
Banking Services	17	1.70%	Leisure Products	24	2.40%
Beverages	21	2.10%	Machinery, Equipment & Components	30	2.90%
Biotechnology & Medical Research	19	1.90%	Media & Publishing	30	2.90%
Chemicals	23	2.30%	Metals & Mining	22	2.20%
Collective Investments	13	1.30%	Multiline Utilities	14	1.40%
Communications & Networking	22	2.20%	Natural Gas Utilities	8	0.80%
Computers, Phones & Household Electronics	16	1.60%	Office Equipment	7	0.70%
Construction & Engineering	33	3.20%	Oil & Gas	19	1.90%
Construction Materials	17	1.70%	Oil & Gas Related Equipment and Services	21	2.10%
Consumer Goods Conglomerates	4	0.40%	Paper & Forest Products	20	2.00%
Containers & Packaging	16	1.60%	Passenger Transportation Services	15	1.50%
Diversified Industrial Goods Wholesale	2	0.20%	Personal & Household Products & Services	5	0.50%
Diversified Retail	16	1.60%	Pharmaceuticals	15	1.50%

<sup>8</sup> GRI: Global Reporting Initiative

<sup>9</sup> TCFD: Task Force on Climate-Related Financial Disclosures

<sup>10</sup> NFRD: Non-financial Reporting Directive

Electrical Utilities & IPPs	23	2.30%	Professional & Commercial Services	30	2.90%
Electronic Equipment & Parts	22	2.20%	Real Estate Operations	23	2.30%
Financial Technology (Fintech) & Infrastructure	15	1.50%	Renewable Energy	19	1.90%
Food & Drug Retailing	20	2.00%	Residential & Commercial REIT	23	2.30%
Food & Tobacco	26	2.60%	Semiconductors & Semiconductor Equipment	20	2.00%
Freight & Logistics Services	17	1.70%	Software & IT Services	29	2.80%
Healthcare Equipment & Supplies	20	2.00%	Specialty Retailers	25	2.50%
Healthcare Providers & Services	19	1.90%	Telecommunications Services	22	2.20%
Holding Companies	21	2.10%	Textiles & Apparel	21	2.10%
Homebuilding & Construction Supplies	22	2.20%	Transport Infrastructure	12	1.20%
Hotels & Entertainment Services	20	2.00%	Uranium	1	0.10%
Household Goods	16	1.60%	Water Utilities	1	0.10%
Insurance	21	2.10%	x	x	x

Regarding the sample selection, we randomly choose European companies from different countries to have a sample that represents, to a big extent, the European market. In Table 2, we provide the distribution of the companies with respect to the country in which they reside (headquarters).

**Table 2: The nationality of the companies in the sample**

Country	Nb	%	Country	Nb	%	Country	Nb	%
Austria	23	2.30%	Greece	9	0.90%	Norway	45	4.40%
Belgium	37	3.60%	Hungary	3	0.30%	Poland	11	1.10%
Czech Republic	1	0.10%	Iceland	2	0.20%	Portugal	7	0.70%
Denmark	13	1.30%	Ireland	13	1.30%	Romania	2	0.20%
Estonia	1	0.10%	Italy	60	5.90%	Russian Federation	5	0.50%
Finland	32	3.10%	Luxembourg	14	1.40%	Spain	34	3.30%
France	196	19.30%	Malta	6	0.60%	Sweden	104	10.20%
Germany	109	10.70%	Monaco	1	0.10%	Switzerland	42	4.10%
Gibraltar	1	0.20%	Netherlands	38	3.70%	United Kingdom	209	20.50%

In the collection process, from the firms' official websites, we manually retrieved the annual publications for the 2020 fiscal year. The reports we initially sought out were the Universal Registration Documents (URD) of the corporations, but only 13.9% of our sample had provided these documents. For the remainder of the sample, we gathered their main annual disclosure documents including annual reports (60%) and annual reports & accounts (14.8%), as well as other types like integrated reports, yearly reports, sustainability reports, etc., and grouped them into a category called other (11.3%). It should be noted that in the case when a company had two separated documents one related to financial disclosure & balance sheets and one related to sustainability (non-financial) disclosure, we chose the sustainability reports to download and use (5 out of 1018). We did so as we primarily seek to evaluate the non-financial reporting of these companies. Table 3 represents a percentage breakdown per industry of the types of files obtained from the companies' websites (the Annual Reports / Annual Reports and accounts / Universal registration Documents, and other types).

**Table 3: The annual reports / annual reports and accounts / universal registration documents & other per industry**

Industry	File Type				Total
	Annual Report	Annual Report and Accounts	Universal Registration Document	Other	
Oil & Gas	15	3	3	1	22
Beverages	14	3	5	1	23
Construction & Engineering	14	3	5	6	28
Chemicals	18	1	1	4	24
Construction Materials	12	3	1	3	19
Investment Banking & Investment Services	16	5	2	2	25
Machinery, Equipment & Components	25	1	4	2	32
Freight & Logistics Services	1	0	0	0	1
Water Utilities	2	0	1	0	3
Banking Services	14	1	5	1	21
Specialty Retailers	13	4	4	4	25
Passenger Transportation Services	14	4	1	1	20
Electronic Equipment & Parts	18	4	0	0	22
Healthcare Equipment & Supplies	16	2	1	0	19
Real Estate Operations	0	0	1	0	1
Semiconductors & Semiconductor Equipment	15	4	1	1	21
Education	2	1	0	0	3
Diversified Retail	9	2	1	3	15
Financial Technology (Fintech) & Infrastructure	10	2	1	1	14
Professional & Commercial Services	15	2	9	4	30
Textiles & Apparel	16	2	2	3	23
Collective Investments	9	4	0	0	13
Diversified Industrial Goods Wholesale	3	1	0	0	4
Holding Companies	15	1	1	0	17
Residential & Commercial REIT	10	7	7	2	26
Aerospace & Defense	11	4	4	5	24
Automobiles & Auto Parts	10	0	5	2	17
Biotechnology & Medical Research	14	1	3	0	18
Coal	1	0	0	0	1
Communications & Networking	17	3	0	0	20
Computers, Phones & Household Electronics	13	2	1	2	18
Consumer Goods Conglomerates	1	1	2	0	4
Containers & Packaging	12	1	1	2	16
Electrical Utilities & IPPs	14	1	3	4	22
Food & Drug Retailing	13	0	3	3	19
Food & Tobacco	19	3	2	0	24
Freight & Logistics Services	15	1	0	0	16
Healthcare Providers & Services	13	3	2	0	18
Homebuilding & Construction Supplies	15	4	2	1	22
Hotels & Entertainment Services	12	2	5	1	20
Household Goods	9	5	1	1	16
Insurance	13	1	3	5	22
Leisure Products	12	2	3	4	21
Media & Publishing	12	4	10	2	28
Metals & Mining	16	2	3	0	21



Multiline Utilities	7	3	4	0	14
Natural Gas Utilities	4	2	0	1	7
Office Equipment	7	0	0	0	7
Oil & Gas Related Equipment and Services	15	2	3	1	21
Paper & Forest Products	14	0	0	4	18
Personal & Household Products & Services	3	1	1	0	5
Pharmaceuticals	11	0	3	2	16
Real Estate Operations	12	1	5	2	20
Renewable Energy	16	1	0	2	19
Research Organization	1	0	0	0	1
Software & IT Services	16	3	12	4	35
Telecommunications Services	9	1	4	6	20
Transport Infrastructure	10	1	1	4	16
Uranium	1	0	0	0	1
<b>Total</b>	<b>664</b>	<b>115</b>	<b>142</b>	<b>97</b>	<b>1018</b>

After collecting the reports, we specified terms related to non-financial reporting frameworks, standards, standardization organizations (GRI, TCFD, NFRD, etc.) see Appendix 6, concepts related to double materiality (Financial Materiality, Sustainability Materiality, Impact Materiality, Materiality Matrix, etc.) and terms that reference double materiality measurements “case of Emissions” (Baseline, Benchmark, Carbon Budget, Carbon Tax, etc.).

We then used an acrobat reader “[Foxit Phantom Reader](#)” to automatically conduct a keyword search “lexicometry” with the pre-specified terms and then generated reports with the results. The results include information of whether the term was mentioned, how many times it was mentioned, how many documents mentioned it, and in what context. Examples of these reports are available in **Appendix 4**.

We also manually collected both the credit (Fitch, Moody’s, S&P global) and CSR ratings (Refinitiv eikon, S&P Global, MSCI, CSRhub, Sustainalytics) from online open source databases provided by these agencies (e.g. [MSCI ESG Ratings & Climate Search Tool](#), [Sustainalytics ESG ratings](#), etc.). We used these sources because they belong to reputable and large rating agencies in both Credit and CSR fields and because they are freely available to the public. These sources and ratings have been used and examined by previous research like Berg et al. (2019). For each company of our sample provided by multiple rating agencies in the year 2020. Our aim is to compare the ratings set by different rating agencies, for both credit and corporate social responsibility (csr), and investigate their consistency and correlation. We conduct the search for these ratings using online

We manually searched the ratings of each company of our sample across all the ratings database and it should be noted that not all companies of our sample were rated by all the rating agencies. **Table 4** contains the number of ratings obtained from each agency for both CSR and Credit.

**Table 4: number of ratings per rating agency and the intersections**

Rating agency	CSR					Credit			Intersection results		
	Refinitiv eikon	SP Global (CSR)	MSCI	CSRhub	Sustainalytics	Moody's	SP global (Credit)	Fitch Rating	CSR ratings	Credit ratings	All ratings intersected
<b>Observations</b>	464	169	159	438	309	312	259	170	<b>142</b>	<b>94</b>	<b>48</b>

The results of the search for the ratings showed that different sets of companies were assessed by the different rating agencies. Out of the 1018 companies there was a minimum number of ratings obtained from Fitch rating agency (170), and a maximum of 464 ratings obtained from Eikon database. The ratings combined different sets of companies from the 1018 sample, for this reason, we intersected all CSR ratings and all Credit ratings as well the two types together. The results of the intersection showed a total of 94 observations / companies have their credit ratings available in all the three credit rating agencies, 142 companies have their CSR ratings available in all agencies, and only 48 companies are rated by all the seven agencies. After we completed the intersections, we adjusted the rating scales set and used by the different agencies in order to make it possible to compare them.

A scale adjustment is the process of unifying the unit types used by the different rating agencies. For example, Moody’s uses a scale that ranges from Aaa (best) to Caa (worst) and 20 steps. S&P global in contrast uses a scale from AAA (best) to D (worst) with 23 steps. For this reason, we transform these scales into a unified percentage (100%) scale that takes the different number of steps into account. We provide the table we used for the adjustment in **Appendix 5**.

**C. Results**  
**1. Stage 1: Analysis of companies integrated annual reports**  
**a) Double materiality**

We searched the annual reports, URDs, and sustainability reports for the term "double materiality" in order to measure the level of awareness that corporations have regarding double materiality. The outcomes revealed that this phrase appeared in 6 documents out of the 1018 that were examined, with a relatively low rate of 0.59%. The six businesses that made a significant reference to the notion in their annual reports and universal registration forms are included in the table below.

**Table 5: Companies mentioning double materiality 2020**

2020						
NB	Company name	Country	Industry	Founded	Revenue 2020 billion EUR	File Type
1	Assicurazioni Generali	Italy	Financial Services	1831	85.24	Annual Integrated Report
2	BNP Paribas	France	Retail banking	1822	44.27	Universal Registration Documents
3	Fluidra	Spain	Pool and wellness	1969	1.525	Annual Report
4	Euopris	Norway	Retail Services	1992	0.799	Annual Report
5	Atos	France	Information technology	1997	11.18	Universal Registration Documents
6	Telia Company	Sweden	Telecommunications	2002	8.463	Annual & Sustainability Report

In **Table 6** we provide a detailed description of the occurrence of double materiality in the reports of the six companies including the number of mentions, the page where it was mentioned, under which section (section title), the context of the mention, the size compared to the report size, and any supplementary information provided.

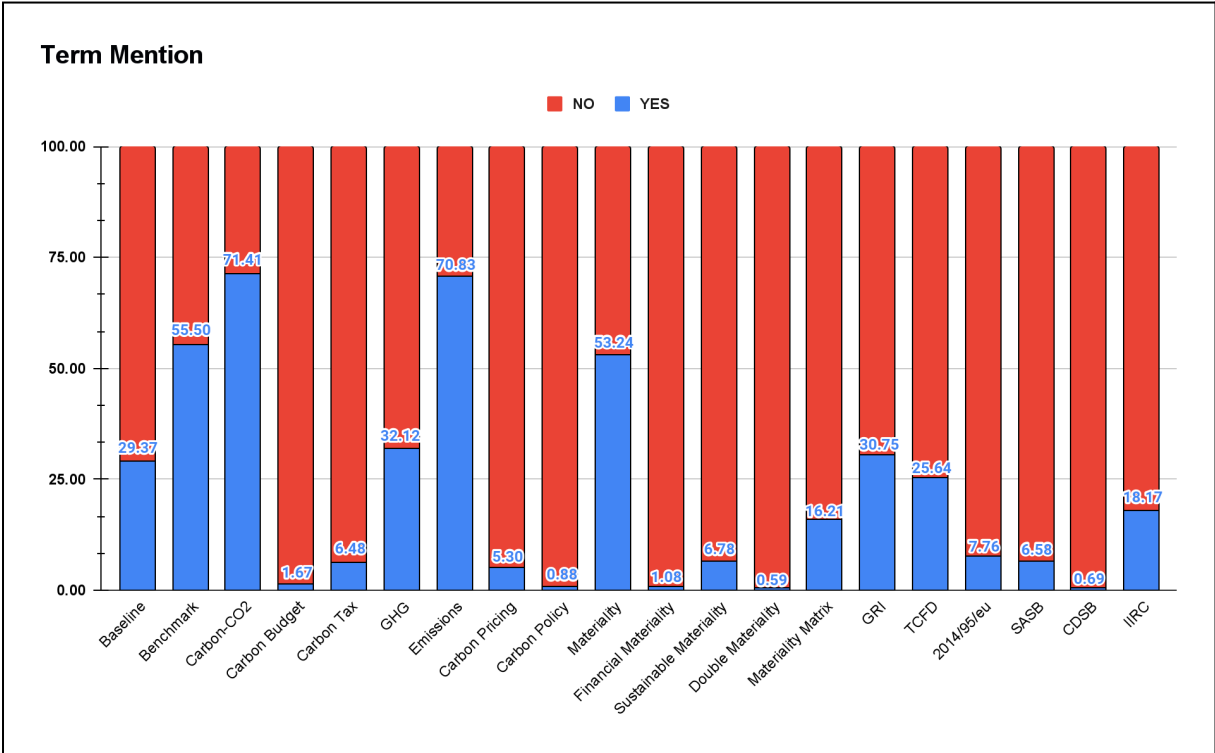
**Table 6: A detailed description of the DM mentions by the 6 companies**

NB	Company	Number of Mentions	Pages NB	Section title	Context of the mention	Size of the mentions	Supplementary Information
1	Assicurazioni Generali (Italian Financial services company)	2	7 & 142	About the annual integrated report	<ol style="list-style-type: none"> <li>1. Confirmation of following a double materiality analysis process and tries to engage internal and external stakeholders.</li> <li>2. Addressed the Social, Environmental, and Governance issues by calling them “mega trends”</li> </ol>	Introduced twice in two small sections of two pages out of a total of 362 pages.	Defined double materiality by discussing the potential impact of the company’s activities on society and environment as well as the climate impact on specific business functions.
2	BNP Paribas (French international banking group)	1	611	Climate-related risks and opportunities in short, medium, and long term	1. Confirmation of adopting the double materiality concept & considering both transitional and physical risks that were identified by the European Commission communication 2019.	Addressed at the end of page 611 in a small section out of a total of 672 pages.	x
3	Fluidra (Spanish Machinery industry company)		66	Climate and Methodology risks	<ol style="list-style-type: none"> <li>1. Announces its adoption of double materiality</li> <li>2. Discusses its integration of a risk assessment in its report by incorporating both the physical and transitional risks that are associated with climate change and how they might impact its operations and business.</li> </ol>	One paragraph in page 66 out of a total of 136 pages.	x
4	Europris (Norwegian Retail Services company)		34	Focus on the most material sustainability aspects	1. Discusses defining its material sustainable topics by adopting a double materiality approach in assessing the ESG impacts throughout the company’s value chain.	One page (34) out of a total of 124 pages	x
5	Atos (French Information technology company)		166	Requests regarding climate change disclosures	<ol style="list-style-type: none"> <li>1. announces favoring the double materiality approach in its assessment and reporting</li> <li>2. It considers both the two perspectives identified by this approach “climate change impact on the company” and “impact of the company on the climate”.</li> </ol>	Two paragraphs in page (166) out of 420 pages	Identifies the main environmental risks and opportunities using the help of internal and external experts. Atos uses a materiality risk assessment through engaging stakeholders.
6	Telia Company (Swedish Telecommunications company)		228	Stakeholders engagement and materiality determination	<ol style="list-style-type: none"> <li>1. addressed its adoption of a stakeholder-based approach in appraising sustainability.</li> <li>2. Specifies that its reporting process is based on the double materiality principle.</li> </ol>	DM is addressed in a small paragraph only once at the end of the report of 259 total pages.	x

As an additional step, we analyzed the annual disclosures of the six companies at the year the concept was introduced 2019. Only **Assicurazioni Generali** out of the rest has mentioned the term. This proved that double materiality is junior and still needs time to be embraced by more companies.

In figure 2 we provide the percentage results of the keyword analysis related to terms that represent constituents or references to double materiality and non-financial reporting standards and frameworks.

**Figure 2: Keyword search results**



**b) References of double materiality**

The term “materiality” was addressed by more than half of the companies (53.24%). This concludes that the companies do prioritize the risks and impacts caused by the climate towards their companies’ financial status “the outside-in impact”. This result was expected as “materiality” is a term that has always been used in the assessment, accounting, and financial reporting.

Regarding the second pillar of double materiality “Impact/Sustainability Materiality - inside-out impact”, of the 1018 companies 69 (6.78%) mentioned the term “Sustainable Materiality”. The majority of the documents defined this term as the impact of a company's activities/operations on society and environment. Companies that addressed sustainability materiality did, in fact, mention both the Materiality (Financial Materiality) and sustainability materialities. This indicates that those companies did consider the double materiality concept in their assessment without explicitly mentioning it. This could be due to their unawareness of this new concept introduced by the European Commission. One example of these companies is **RIO Tinto plc** a mining company Headquarterd in the United kingdom. The company describes its materiality assessment using the combination of “Sustainability Materiality” and “Financial Materiality” concepts together through engaging the

stakeholders in the assessment without mentioning the term Double Materiality. The following is the section from the company's annual report that describes its materiality analysis: *"We complete a sustainability materiality assessment every year to ensure we are publicly reporting on topics that matter most to our stakeholders and to our business. In simple terms, a sustainability materiality assessment records the threshold at which an issue or topic becomes important enough to be reported on externally. This considers the impact and level of perceived importance to stakeholders. This differs from financial materiality, which may use financial metrics or other quantitative analyses to determine what would be considered a significant, or material, impact. Not all sustainability-related topics have the same risk profile, which the assessment reflects."*

In this paper, for testing double materiality references terms we focused on a group of terms related to carbon emissions as it represents one of the most developed themes in sustainability reporting with respect to the indicators, measurements, and metrics. Beginning with terms related to carbon emissions and that reference double materiality, "Baseline" and "Benchmark" terms have been addressed at a moderate level with percentages ranging between 29.37% and 55.5%. Carbon Policy, Carbon Budget, Carbon Pricing, and Carbon Tax were hardly introduced. They had very weak percentages of 0.88%, 1.67%, 5.3%, and 6.48% respectively. It is only for the terms with general themes related to gas emissions like "Emissions", "Carbon", "CO2", "GHG" that had a significantly high to moderate number of mentions ranging between 32.12% and 71.51%.

### **c) Terms of sustainability reporting standards**

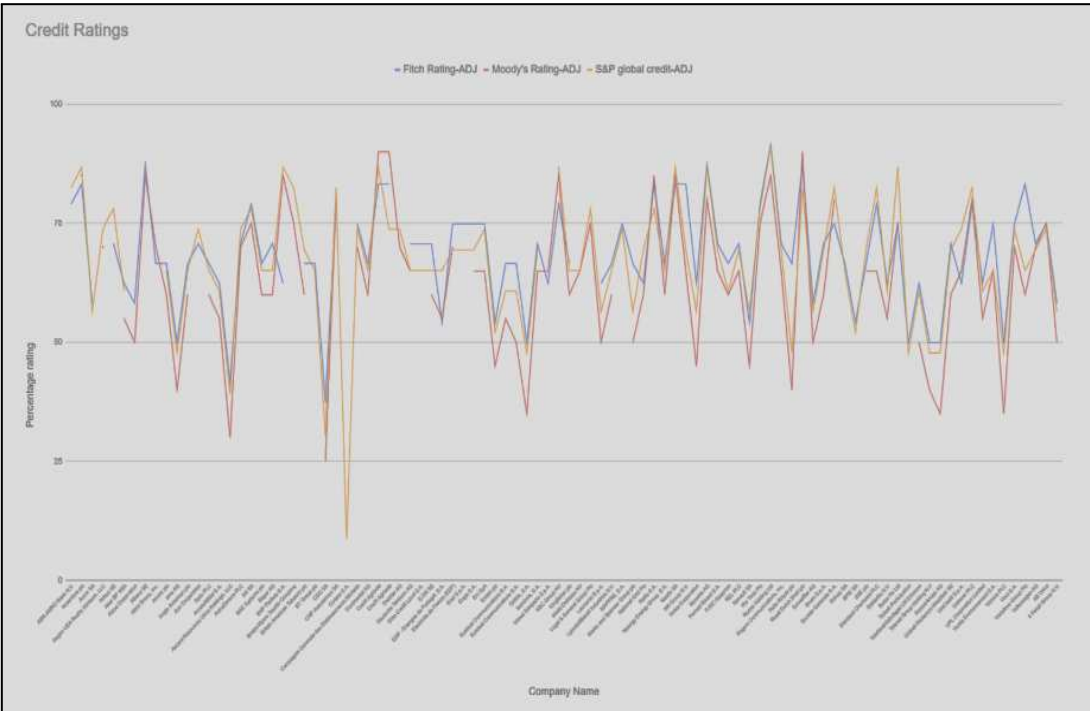
The search for the terms related to non-financial sustainability standardization boards reveals a generally weak level of awareness or consideration from companies. For example, the European Commission directive 2014/95/eu (NFRD) was only addressed by 7.76% of the companies, the Global Reporting Initiative (GRI) appeared in 30.75% of the documents, the Task Force on Climate Related Financial Disclosures (TCFD) in 25.64%, the International Integrated Reporting Council (IIRC) in 18.17%, the Sustainability Accounting Standards Board (SASB) was addressed by 6.58% and the Climate Disclosure Standards Board (CDSB) mentioned by only 0.69% of the reports. Regarding the context of these mentions, the companies either promoted following these initiatives in the process of reporting their non-financial results, or their awareness of such standards/frameworks/boards and the willingness to adopt them.

## **2. Stage 2: Investigating rating discrepancies**

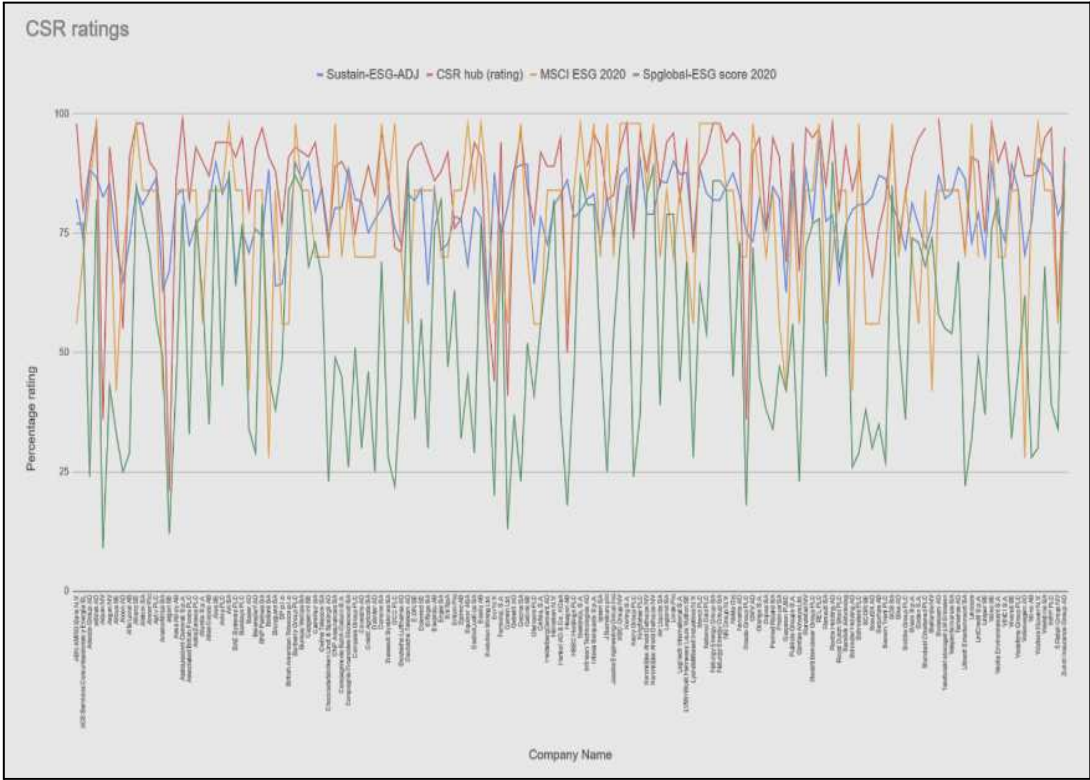
In this section we address the evaluations of both the financial and sustainability performances by different assessment agencies (Credit vs CSR). We follow this approach with the aim to check the reliability of these measures (Berg et al. 2019). These two types of assessments (Credit & CSR) utilize the companies' disclosures as one of the main sources of information in their evaluation process. Previous literature has shown a significant impact of the disclosures on the rating agencies assessments (Bonsall and Miller 2017; Rezaee and Tuo 2017). We think it is interesting to compare the outcomes of these agencies corresponding to the same sample of companies over the same period of time. For this reason, we test the consistency between the ratings provided by different Credit and CSR ratings similar to the work of (Berg et al. 2019; Billio et al. 2021; Zumente and Lāce 2021). We start by plotting the intersections of credit ratings and those of CSR ratings (**Figure 3/4**). The x-axis combines the

names of the rated organizations while the y-axis represents the ratings obtained by the organization from different rating agencies.

**Figure 3: Credit ratings consistency**



**Figure 4: CSR ratings consistency**



When visually comparing the two plots, we observe more consistent credit ratings, that is, companies achieve relatively similar credit ratings compared to CSR ones. The graph of CSR

ratings seems to be more volatile and combines more extreme values. To be sure about our visual observations we test the correlation between the Credit and CSR ratings of our sample from different the rating agencies. Tables 6/7 represent the correlations between the credit ratings vs CSR ratings.

**Table 6: Correlations of Credit ratings**

Correlation	Fitch - ADJ	Moody's - ADJ	S&P global - ADJ
Fitch Rating-ADJ	1	<b>0.87952</b>	<b>0.87303</b>
Moody's - ADJ		1	<b>0.95273</b>
S&P global - ADJ			1

**note: pearson correlation is conducted to 94 companies with available credit ratings**

**Table 7: Correlations of CSR ratings**

Correlations	Sustainalytics ADJ	CSRhub	MSCI	Spglobal-ESG	Refinitiv Eikon
Sustainalytics ADJ	<b>1.0000</b>	0.3028	0.1148	-0.0914	0.2692
CSRhub		<b>1.0000</b>	0.2018	0.0088	0.4823
MSCI			<b>1.0000</b>	0.0730	<b>0.4910</b>
Spglobal-ESG				<b>1.0000</b>	0.3288
Refinitiv Eikon					<b>1.0000</b>

**note: pearson correlation is conducted to 142 companies with available CSR ratings**

The results show high positive correlation between different credit ratings as they range between 0.873 and 0.952 confirming the results of Ratha and Mohapatra, 2011. In contrast, CSR ratings showed insignificant correlations with a maximum correlation of 0.4910 and a minimum of 0.0073. These results propose that credit rating agencies approach the assessments process in a comparable manner which explains the high correlation between their outcomes. On the other hand, CSR rating agencies have provided varying ratings corresponding to the same company sample over the same period.

The results above (CSR ratings plots and correlation) raise the question of the precision of the ESG ratings. Literature like Steffen 2021 and Berg et al. 2019 tried to find out the reason behind their inconsistency and concluded that the reasons behind these differences include i) the subjectivity of the rating agencies models due to the assigned importance of the three assessment factors (Environmental, social, and governance) (Steffen 2021). To Berg et al. (2019), the reason behind the differences in the ratings relates to the way the rating agencies measure the performance, the scope of the topics/attributes/matters measured, and the weighting of the importance of the three factors (ESG).

Another potential reason highlighted by Steffen (2021) is the quality and structure of information / data provided in the reporters' (companies') disclosures which are analyzed by the assessing agencies. According to the author, the reports analyzed combine information from hundreds of indicators related to the three categories. The way these indicators/metrics are reported affects the assessment process. Eventually, the lack of unified reporting standards limits the comparability between the data provided and makes it more complex measurement-wise.

### 3. Stage 3: The ratings in the context of annual reporting

In this part of the analysis, we conduct a statistical test of annual disclosures and their impact (level of consistency of ratings across different agencies) on the ratings obtained by different rating agencies. To do so, we explore the impact of different i) double materiality constituents (matters related to both the financial and impact materiality), ii) double materiality references terms (e.g. baseline / carbon budget / carbon tax / etc.), and iii) non-financial reporting standards/frameworks references on the ratings obtained.

**Table 8** is a heat map table that represents the outcome of Mann–Whitney U test<sup>11</sup> to the keywords and their significant impact on the ratings provided by the different assessing entities. These keywords belong to three groups i) the constituents of double materiality (the verbal references), ii) double materiality conceptual references, and iii) the sustainability related frameworks. In this table the terms level of impact on the ratings of different rating agencies varies from a minimum of 0 (in red) to a maximum of 4 (dark green).

**Table 8: Annual disclosures and the impact on the obtained ratings.**

Double materiality constituents	Double materiality references	Sustainability Frameworks	Number of Significant ratings
Materiality Matrix	Carbon-CO2	TCFD	4
		GRI	3
	Baseline	2014/95/eu	2
	Carbon Tax		1
	Carbon Pricing		0
Double Materiality	Benchmark	SASB	
Financial Materiality	GHG		
Materiality	Carbon Budget	CDSB	
Sustainable Materiality	Carbon Policy	IIRC	
	Emissions		
<p><i>Note:</i></p> <ul style="list-style-type: none"> <li>- The double materiality constituents: include the keywords used in the definition and measurement of the concept like financial materiality, sustainability materiality, etc.</li> <li>- Double materiality references: items that aid and enhance the process of effectively measuring performance (from both financial and impact sides) of organizations like Baselines, benchmarks, Carbon pricing, etc.</li> </ul>			

The first term (TCFD) showed the most significant impact on the ratings obtained by four out of five ESG rating agencies' scores. This means that companies that used this term in their annual reports tend on average to achieve higher ratings. The two terms GRI and Carbon-CO2 showed a high significance with an impact on three out of the five rating agencies' scores. Terms like Materiality Matrix, Baseline, Carbon Tax, Carbon pricing and the non-financial reporting directive 2014/95/eu were moderately significant with only two out of five ratings. Moving to the terms double materiality, financial materiality, GHG, benchmark, and SASB, they were very weakly significant with only one out of five ratings being affected. Finally, the terms materiality, sustainability materiality, Carbon budget,

<sup>11</sup> Mann–Whitney U test represents a nonparametric test that investigates the null hypothesis that the probability of X being greater than Y is equal to the probability of Y being greater than X where X and Y are randomly selected values from two different populations.



Carbon policy, Emissions, CDSB and IIRC did not have any significant impact on the ratings provided. The general results show that sustainability framework keywords were the most influential to different ratings followed by the double materiality references and then the double materiality constituents which had the least significance. For a detailed analysis of every single term corresponding to each of the five ratings check **Appendix 6**.

The final test we conduct is Kruskal–Wallis one-way analysis of variance which is a non-parametric test used to determine whether the medians of three or more independent groups differ statistically. We first counted the number of keywords related to the three groups i) the double materiality constituents, ii) the emissions (double materiality references) and those related to iii) the sustainability reporting frameworks. After that we measured how much impact does this number have on the ratings obtained and the variation between them.

**Table 9: Emissions & Frameworks count impact on ratings.**

Sample 1018	Sig			Relation Polarity		
	Double materiality constituents	Emission Count keyword	Sustainability Framework Count	Double materiality constituents	Emission keyword Count	Sustainability Framework Count
Ratings/Scores						
Eikon ESG	1	1	1	Positive	Positive	Positive
CSRhub	0	0	1	-	-	Positive
MSCI	0	0	0	-	-	-
Sustainalytics	1	0	1	Positive	-	Positive
S&P global	0	0	1	-	-	Neutral
Eikon Emission Score	0	1	1	-	Positive	Positive
ESG score-AVG	1	0	0	Positive	-	-
ESG score-SD	0	0	1	-	-	Negative

Note:

- The table measures the impact of more keywords related to one topic (e.g. the constituents of double materiality) on the ratings obtained from different rating agencies.
- For example in the first row Eikon ESG ratings were higher for firms that mentioned more words related to double materiality constituents (financial materiality, materiality matrix, etc.) in their reports.

The results in table 9 show if and how a one of the occurrence level of the three groups affect the rating obtained by the organizations. Regarding the significance part, the number 1 indicates that when more keywords are used (in a certain group) by the organization did impact the ratings (from different rating agencies) it achieved, and Zero reflects no impact. The second part of the table (Relation polarity) specifies the direction of the impact. This polarity explains how the level of occurrences of keywords (within a group) might impact the ratings.

The results show, that the number of terms related to the non-financial reporting standards has a high significant impact on the ratings provided by four (Eikon, CSRhub, Sustainalytics, and S&P Global) out of the five rating agencies. This means that a company that addresses these frameworks in its reporting, has a higher possibility to obtain higher ratings. From another perspective, the variation between the ratings provided by the different rating agencies to the same company decreases for companies that address the non-financial reporting standards in their disclosures. The results of this test were opposite for the terms

related to the double materiality references (the Emissions in our example). The ratings provided by four out of five rating agencies were the same for all companies regardless of them using the double materiality references terms or not. The variation between the ratings was also the same for all the companies and addressing double materiality references had minimal impact on their consistency. Finally, for the terms related to the double materiality constituents, there was a moderate significance with two out of five rating agencies having their evaluations affected by the number of mentions in addition to the average of the five ratings.

## **IV. Discussion**

### **A. Theoretical contribution**

#### **1. Our comprehensive definition to double materiality**

From the previous regulatory definitions of double materiality (European commission's 2019/C 209/01) and those in literature (Adams et al. 2021; Baumüller and Sopp 2021; Alexander 2022), we propose a more robust definition that apprehends most of the concepts' constituents previously addressed. Double materiality as the word "double" suggests encompasses two directions. As the second word "Materiality" recommends, the concept focuses on what matters and what might have a potential impact. While single materiality (Barker and Eccles 2020; Huston 2021; Rambaud and Chenet 2021) concerns investors and speaks to them as its primary audiences, double materiality seeks to instigate a wider spectrum of stakeholders. Double materiality bounds a measurement method that tries to capture the overall impact of an occurring event (Pronobis and Venuti 2021; Chiu 2022). This overall impact includes i) the impact of the climate on the company's performance and ii) the impact of the company's activities/operations on the surrounding stakeholders.

Putting it in simple words, *double materiality is a reporting approach that introduces a new reporting method that evaluates the impact of a certain company-related event involving both, the interest of the company and that of the stakeholders.*

#### **2. Promoting the use of Double materiality references**

With the adoption of double materiality through the application of its references (carbon emissions, baselines, and benchmarks) enhances the comparability and traceability of the reporters' operations. That is, they are able to monitor the change in state of their performance in accordance with the execution of their previous operations. Companies could also obtain a better comparability by evaluating their performance (emissions levels) with respect to the industry, sector, size, or pairing with companies that have similar characteristics. Even though the double materiality references are not significantly considered by either the reporting entities nor the external assessing agencies, it remains that future consideration of such methods could significantly enhance the utility of the non-financial disclosures by the users through giving a more comprehensive input. This input can, eventually, lead to better decision making regarding financial and sustainable investment decisions. Finally, from a social and environmental perspective, using the references obliges the companies to put forward more effort into providing more accurate reports that describe the company's real performance. This type of reporting will, as a result, encourages the companies to perform better and conduct social and environmentally friendly operations.

### **3. Recommending non-financial reporting standards/frameworks**

As our results show, non-financial reporting standards were only explicitly adopted by a relatively low number of reporting entities. This low adoption did have a significant impact on the performance assessment of the reporters. It has been proven, by the scores obtained by different rating agencies, that the companies that have adopted sustainability standards have obtained significantly higher ratings from different assessing agencies. These ratings were also more convergent which means that different sustainability rating agencies provided similar scores, thus the assessment criteria were more comparable. These results trigger the need for a higher adoption of non-financial reporting standards by the reporters. It also signals the need for a unified, coherent, and comprehensive sustainability reporting framework/standard.

#### **B. Methodological contribution: a link between reporting methods and performance assessment**

This paper provides a new approach for tackling sustainability reporting. It introduces a new and original approach that helps investigate the status and condition of non-financial reporting in the context of double materiality. The method represents linking what is published by companies in their integrated reports to the ratings obtained from sustainability assessing entities "CSR ratings". This approach allows finding combinations between different notions and builds a relation between the structure and the content of the published reports and their assessment. The paper also provides a detailed description of the concept "double materiality", its constituents, references, and all the stages passed to reach it. In doing so the paper has clarified the concept which is still young and not heavily explored.

#### **C. Managerial contribution: an investigating double materiality in the context of corporate reporting**

From a managerial perspective, the paper investigates the concept of double materiality in the context of corporate reporting, a concept that derives from a well-known and extensively studied notion "materiality". It combines theoretical and quantitative sections and links them together to build a conclusion of the overall situation of corporate reporting. This paper speaks to a wide scope of entities interested in sustainability, accounting, and auditing matters. The reporting entities, the assessing entities, and researchers would find the outcomes of this paper relevant to their activities and how they approach corporate reporting in general and the non-financial sustainability reporting in specific. It would also signal the need for a well-structured non-financial reporting framework that takes double materiality into consideration.

### **V. Conclusion**

Double materiality is a relatively new concept that aims to enhance the reporting activity by addressing a wider spectrum of stakeholders. It tries to capture the true overall impact of occurring events that may cause a change to a company's financial status in addition to the impact it would have on the stakeholders surrounding it. Double materiality checks the effect of events from two opposing directions. The first represents how the company may influence the interests of the surrounding environment (stakeholders) and the second embeds the collective impacts the stakeholders impose on the company's interests.

In this paper, we discussed double materiality in the context of non-financial corporate reporting. We investigated companies' adoption of the double materiality concept, its constituents and references alongside the non-financial reporting standards. We then evaluated the impact of adopting double materiality and non-financial reporting standards on external performance assessment. To accomplish our target, we conducted both a qualitative and quantitative analysis and went through different stages. First, we investigated the constituents of double materiality and discovered all the phases that led to its emergence. In the beginning, we tackled double materiality from a theoretical perspective. We tracked its development moving from a single sided materiality, concerned with the financial status of a company, towards a double perspective assessing approach. We addressed the theoretical background of double materiality, the concept constituents, its references, and its link to non-financial reporting frameworks/standards.

In the second part of the paper, we empirically answered the research question **“Does organizations' adoption of the double materiality concept alongside non-financial reporting standards assist the assessment of their non-financial sustainability performance?”** alongside the multiple sub-questions related to i) the status of double materiality ii) a comparison of the adoption of financial vs non-financial standards iii) the convergence in the financial and non-financial performance assessments from different agencies iv) the link between the adoption of double materiality (constituents & references) and the non-financial reporting standards with respect the convergence of the assessments provided. The overall results of this paper highlight the deficiency in the sustainability / non-financial reporting and a weak adoption of double materiality. A significant divergence in the non-financial assessments (ratings) compared to the financial one, and a positive correlation between adopting non-financial frameworks and the convergence/consistency of the assessments. The results also signal the importance of the double materiality concept in enhancing the reporting process by addressing both financial and non-financial matters and engaging the stakeholders in the measurement and reporting process.

The problem faced in the development of this paper was the availability of data in the first place. All the ratings were obtained manually from free sources. This has significantly limited the number of observations obtained and has consumed a significant amount of time. Another limitation to this paper is focusing on the corporate reports (input side) and investigating their influence on the ratings obtained by assessing agencies (CSR ratings). This has led to discarding/overlooking the impact of different assessment methodologies / measurements / metrics used by different rating agencies (Processing side) on the ratings obtained.

For future research, it would be interesting and crucial to explore the change in the adoption of double materiality in the years to follow as it gives companies more time to acknowledge and implement the concept in their reports. It would also be significant to measure and confirm the relation between the adoption of non-financial reporting standards / frameworks and the ratings obtained across different rating agencies using an extended sample size and more accurate measurements. Finally, it would be important to aggregate and investigate both inputs (corporate reports) and the processes (different assessing methodologies) to obtain a more comprehensive understanding of the true reason for the inconsistency and reliability of corporate performance sustainability assessment (CSR ratings).

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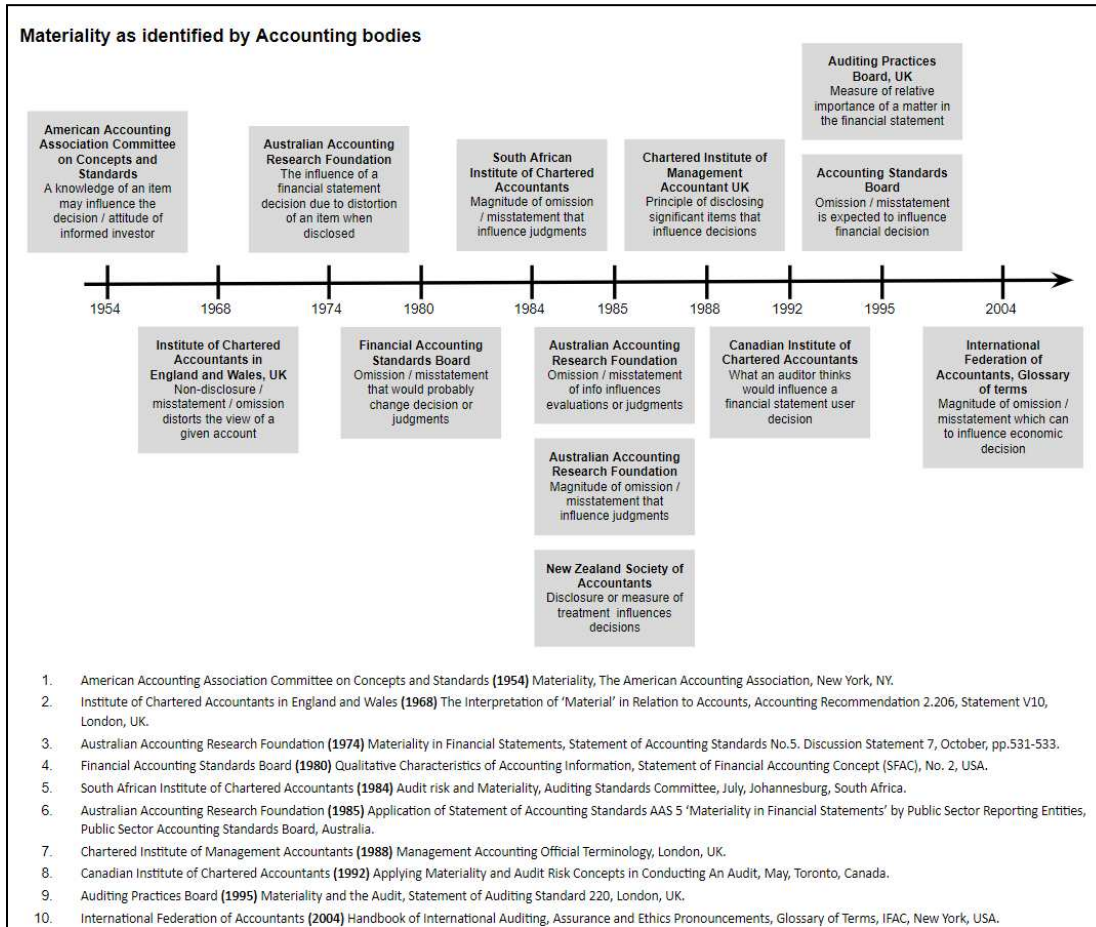


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## VII. Appendices

### Appendix 1: definitions of materiality by academicians and accounting bodies



### Appendix 2: identification of Materiality historical threads of literature

NB	Year	Title	Category	Citation
1	1952	A SUGGESTED SUPPLEMENT TO AUDIT TEST PROGRAMS.	The bases of materiality judgments	Carter, J. G. (1952). A Suggested Supplement to Audit Test Programs. The Accounting Review, 27(1), 89-93.
2	1960	FAULTY ADVICE ABOUT STATISTICAL SAMPLING--SOME COMMENTS ON 'A SIMPLIFIED STATISTICAL TECHNIQUE FOR USE IN VERIFYING ACCOUNTS RECEIVABLE'		Stephan, F. F. (1960). Faulty Advice about Statistical Sampling--Some Comments on "A Simplified Statistical Technique for Use in Verifying Accounts Receivable". The Accounting Review, 35(1), 29-32.
3	1959	PEDAGOGICAL IMPLICATIONS OF THE MATERIALITY CONCEPT.		Griffin, C. H. (1959). Pedagogical implications of the materiality concept. Accounting Review, 298-300.
4	2000	CURRENT MATERIALITY GUIDANCE FOR AUDITORS.		McKee, T. E., & Eilifsen, A. (2000). Current materiality guidance for auditors.
5	1999	A review of materiality research.		Iskandar, T. M., & Iselin, E. R. (1999, September). A review of materiality research. In Accounting Forum (Vol. 23, No. 3, pp. 209-239). Taylor & Francis.
6	2003	Materiality Uncertainty and Earnings Misstatement.		Patterson, E. R., & Smith, R. (2003). Materiality uncertainty and earnings misstatement. The Accounting Review, 78(3), 819-846.
7	2007	Effects of Qualitative Factor Salience, Expressed Client Concern, and Qualitative Materiality Thresholds on Auditors' Audit Adjustment Decisions.		Bu-Peow NG, T., & Tan, H. T. (2007). Effects of Qualitative Factor Salience, Expressed Client Concern, and Qualitative Materiality Thresholds on Auditors' Audit Adjustment Decisions. Contemporary Accounting Research, 24(4), 1171-1192.
8	2009	Materiality Decisions and the Correction of Accounting Errors.		Acito, A. A., Burks, J. J., & Johnson, W. B. (2009). Materiality decisions and the correction of accounting errors. The Accounting Review, 84(3), 659-688.
9	1964	Materiality	Guidelines and impact on materiality judgment	Hicks, E. L. (1964). Materiality. Journal of Accounting Research, 158-171.
10	1984	CAPITALIZATION OF INTEREST, MATERIALITY JUDGMENT DIVERGENCE AND USERS' INFORMATION NEEDS.		Morris, M. H., Nichols, W. D., & Pattillo, J. W. (1984). CAPITALIZATION OF INTEREST, MATERIALITY JUDGMENT DIVERGENCE AND USERS' INFORMATION NEEDS. Journal of Business Finance & Accounting, 11(4), 547-555.
11	2000	The New SEC Materiality Guidelines: When Are the Numbers Important Enough to Matter?		Weirich, T. R., & Rouse, R. W. (2000). The new SEC materiality guidelines: When are the numbers important enough to matter?. Journal of Corporate Accounting & Finance, 11(2), 35-40.

12	2000	Clarifying and Protecting Materiality Standards in Financial Statements: A Review of SEC Staff Accounting Bulletin 99.		Fang, K. C., & Jacobs, B. (1999). Clarifying and protecting materiality standards in financial statements: A review of SEC Staff Accounting Bulletin 99. <i>Bus. Law.</i> , 55, 1039.
13	2005	A Review and Integration of Empirical Research on Materiality: Two Decades Later.		Messier Jr, W. F., Martinov-Bennie, N., & Eilifsen, A. (2005). A review and integration of empirical research on materiality: Two decades later. <i>Auditing: A Journal of Practice &amp; Theory</i> , 24(2), 153-187.
14	2002	Materiality Judgments and Disclosure of Retiree Health Care Costs Under SFAS No. 81.		Liu, C. S., & Mittelstaedt, H. F. (2002). Materiality judgments and disclosure of retiree health care costs under SFAS No. 81. <i>Review of Accounting Studies</i> , 7(4), 405-434.
15	2002	An International Comparison of Materiality Guidance for Governments, Public Services and Charities.		Price, R., & Wallace, W. A. (2002). An international comparison of materiality guidance for governments, public services and charities. <i>Financial Accountability &amp; Management</i> , 18(3), 261-289.
16	2003	Measuring Stakeholder Materiality.		Cho, S. Y., Hagerman, R. L., Nabar, S., & Patterson, E. R. (2003). Measuring stockholder materiality. <i>Accounting Horizons</i> , 17, 63-76.
17	2007	Materiality from a Different Point of View.		Colman, V. P., & May, J. A. (2007). Materiality from a different point of view. <i>Financial Executive</i> , 23(5), 13-15.
18	2019	The Materiality of Accounting Errors: Evidence from SEC Comment Letters.		Acito, A. A., Burks, J. J., & Johnson, W. B. (2019). The materiality of accounting errors: Evidence from SEC comment letters. <i>Contemporary Accounting Research</i> , 36(2), 839-868.
19	2016	The Materiality Mystery.		Jacoby, J., & Levy, H. B. (2016). The materiality mystery. <i>The CPA Journal</i> , 86(7), 14.
20	2017	Refer to Materiality as a Legal Concept.		Chen, S., & Tsay, B. Y. (2017). Refer to materiality as a legal concept. <i>Journal of Corporate Accounting &amp; Finance</i> , 28(2), 55-61.
21	2019	MATERIALITY ANALYSIS IN SUSTAINABILITY REPORTING: A TOOL FOR DIRECTING CORPORATE SUSTAINABILITY TOWARDS EMERGING ECONOMIC, ENVIRONMENTAL AND SOCIAL OPPORTUNITIES.		Calabrese, A., Costa, R., Levaldi Ghiron, N., & Menichini, T. (2019). Materiality analysis in sustainability reporting: A tool for directing corporate sustainability towards emerging economic, environmental and social opportunities.
22	1966	MATERIALITY: THE LEGAL RULE OF THUMB.	Definition + use	Wiesner, D. A., & Harum, A. E. (1966). Materiality: The Legal Rule of Thumb. <i>Am. Bus. LJ</i> , 4, 58.
23	1967	The Concept of Materiality.		Bernstein, L. A. (1967). The concept of materiality. <i>The accounting review</i> , 42(1), 86-95.
24	1967	Materiality and the Economic Environment.		Patterson, R. G. (1967). Materiality and the economic environment. <i>The Accounting Review</i> , 42(4), 772-774.
25	1970	Toward an Empirical Measure of Materiality.		Rose, J., Beaver, W., Becker, S., & Sorter, G. (1970). Toward an empirical measure of materiality. <i>Journal of Accounting Research</i> , 138-148.
26	1970	Discussion of An Empirical Investigation of the Concept of Materiality in Accounting.		Stringer, K. W. (1970). Discussion of an Empirical Investigation of the Concept of Materiality in Accounting. <i>Journal of Accounting Research</i> , 133-137.
27	1976	An Investigation of the Materiality Construct in Auditing.		Ward, B. H. (1976). An investigation of the materiality construct in auditing. <i>Journal of Accounting Research</i> , 138-152.
28	1987	A Reexamination of the Concept of Materiality: View of Auditors, Users, and Officers of the Court.		Jennings, M., Kneer, D. C., & Reckers, P. M. (1987). A REEXAMINATION OF THE CONCEPT OF MATERIALITY-VIEWS OF AUDITORS, USERS, AND OFFICERS OF THE COURT. <i>AUDITING-A JOURNAL OF PRACTICE &amp; THEORY</i> , 6(2), 104-115.
29	1998	An Analysis of Materiality and Reasonable Assurance: Professional Mystification and Paternalism in Auditing.		Roberts, R. W., & Dwyer, P. D. (1998). An analysis of materiality and reasonable assurance: Professional mystification and paternalism in auditing. <i>Journal of Business Ethics</i> , 17(5), 569-578.
30	2001	Probability and Materiality. (cover story).		
31	2002	What Does "Materiality" Really Mean?		Chewning Jr, E. G., & Higgs, J. L. (2002). What Does "Materiality" Really Mean?. <i>Journal of Corporate Accounting &amp; Finance</i> , 13(4), 61-71.
32	2011	MATERIALITY IN ACCOUNTING.		Gordeeva, M. (2011). MATERIALITY IN ACCOUNTING. <i>Economics &amp; Management</i> , 16.
33	2014	A genealogy of accounting materiality.		Edgley, C. (2014). A genealogy of accounting materiality. <i>Critical Perspectives on Accounting</i> , 25(3), 255-271.
34	1974	Policy-Capturing on Selected Materiality Judgments.		Materiality measurement
35	1976	Modeling the Materiality Judgments of Audit Partners.	Moriarty, S., & Barron, F. H. (1976). Modeling the materiality judgements of audit partners. <i>Journal of Accounting Research</i> , 320-341.	
36	1977	The Risk Factor in Materiality Decisions.	Newton, L. K. (1977). The risk factor in materiality decisions. <i>Accounting Review</i> , 97-108.	
37	1979	Discussion of Materiality Allocation in Audit Planning: A Feasibility Study.	Loebbecke, J. K., & Ward, B. H. (1979). Discussion of Materiality Allocation in Audit Planning: A Feasibility Study. <i>Journal of Accounting Research</i> , 217-230.	
38	1979	Materiality Allocation in Audit Planning: A Feasibility Study.	Cushing, B. E., Searfoss, D. G., & Randall, R. H. (1979). Materiality allocation in audit planning: A feasibility study. <i>Journal of Accounting Research</i> , 172-216.	
39	1979	Discussion of A Judgment-Based Definition of Materiality.	Swieringa, R. J. (1979). Discussion of a judgment-based definition of materiality. <i>Journal of Accounting Research</i> , 139-147.	
40	1982	Evaluating the Materiality of Errors in Financial Statements.	Landsittel, D. L., & Serlin, J. E. (1982). Evaluating the Materiality of Errors in Financial Statements. <i>Journal of Accounting, Auditing &amp; Finance</i> , 291-300.	
41	1982	A Review and Integration of Empirical Research on Materiality.	Holstrum, G. L., & Messier Jr, W. F. (1982). A review and integration of empirical research on materiality. <i>Auditing: A Journal of Practice &amp; Theory</i> , 2(1), 45-63.	
42	1987	AN ECONOMIC MODELING APPROACH FOR THE DETERMINATION OF MATERIALITY IN AUDITING.	Crosby, M., Plante, R., & Tang, K. (1987). An economic modeling approach for the determination of materiality in auditing. <i>Decision Sciences</i> , 18(1), 108-115.	
43	2005	A Fuzzy Logic Approach to Assessing Materiality.	Comunale, C. L., & Sexton, T. R. (2005). A fuzzy logic approach to assessing materiality. <i>Journal of emerging technologies in accounting</i> , 2(1), 1-15.	

44	2006	Assessing Materiality.		Rosner, R. L., Comunale, C. L., & Sexton, T. R. (2006). Assessing materiality. <i>The CPA Journal</i> , 76(6), 26.
45	1970	Discussion of Toward an Empirical Measure of Materiality.	Argument (questioning materiality + implementation)	Jaedicke, R. K. (1970). Discussion of Toward an empirical measure of materiality. <i>Journal of Accounting Research</i> , 149-153.
46	1979	Discussion of Materiality Allocation in Audit Planning: A Feasibility Study.		Scott, W. R. (1979). Discussion of Materiality Allocation in Audit Planning: A Feasibility Study. <i>Journal of Accounting Research</i> , 231-238.
47	1986	A Simulation Analysis of the Power Characteristics of Some Popular Estimators Under Different Risk and Materiality Levels.		Smieliauskas, W. (1986). A simulation analysis of the power characteristics of some popular estimators under different risk and materiality levels. <i>Journal of Accounting Research</i> , 217-230.
48	1982	Reporting Materiality for Investors.	Impact of materiality judgments	Wright, G. B., & Taylor, R. D. (1982). Reporting materiality for investors. <i>Journal of Accounting, Auditing and Finance</i> , 5, 301-309.
49	1997	Auditors' materiality thresholds: Some empirical findings based on real data.		Waters, J. M., & Tiller, M. G. (1997). Auditors' materiality thresholds: some empirical findings based on real data. <i>American business review</i> , 15(2), 115-119.
50	1999	Materiality Decisions in the Computer Age.		Seidler, L. J. (1999). Materiality decisions in the computer age. <i>The CPA Journal</i> , 69(5), 22.
51	2000	CURRENT MATERIALITY GUIDANCE FOR AUDITORS.		McKee, T. E., & Eilifsen, A. (2000). Current materiality guidance for auditors.
52	1981	Accounting and Review Services.		Gutberlet, L. G. (1981) Accounting and Review Services. <i>Journal of Accounting Auditing and Finance</i> , 4, 169-178.
53	1988	Consistency Expectations: Materiality Judgments and Audit Firm Structure.	Consistency of materiality judgments	Morris, M. H., & Nichols, W. D. (1988). Consistency exceptions: Materiality judgments and audit firm structure. <i>Accounting review</i> , 237-254.
54	1988	Effects of Personal Characteristics on Materiality Decisions: A Multivariate Analysis.		Estes, R., & Reames, D. D. (1988). Effects of personal characteristics on materiality decisions: A multivariate analysis. <i>Accounting and Business Research</i> , 18(72), 291-296.
55	1989	Materiality: An Inter-Industry Comparison of the Magnitudes and Stabilities of Various Quantitative Measures.		Pany, K., & Wheeler, S. (1989). Materiality: An inter-industry comparison of the magnitudes and stabilities of various quantitative measures. <i>Accounting Horizons</i> , 3(4), 71.
56	1993	The Effects of Risk, Materiality, and Assertion Subjectivity on External Auditors' Reliance on Internal Auditors.		Whittington, R., & Margheim, L. (1993). The effects of risk, materiality, and assertion subjectivity on external auditors' reliance on internal auditors. <i>Auditing</i> , 12(1), 50.
57	1991	Disposition of Audit-Detected Errors: Some Evidence on Evaluative Materiality.		Icerman, R. C., & Hillison, W. A. (1991). Disposition of audit-detected errors-Some evidence on evaluative materiality. <i>Auditing-A Journal of Practice &amp; Theory</i> , 10(1), 22-34.
58	1992	EARLY DEBT EXTINGUISHMENT TRANSACTIONS AND AUDITOR MATERIALITY JUDGMENTS: A BOUNDED RATIONALITY PERSPECTIVE.		Carpenter, B. W., & Dirsmith, M. W. (1992). Early debt extinguishment transactions and auditor materiality judgments: A bounded rationality perspective. <i>Accounting, Organizations and Society</i> , 17(8), 709-739.
59	1997	The Impact of Materiality Decisions on Financial Ratios: A Computer Simulation.		Turner, J. L. (1997). The impact of materiality decisions on financial ratios: A computer simulation. <i>Journal of Accounting, Auditing &amp; Finance</i> , 12(2), 125-147.
60	1998	Evidence on Auditor and Investor Materiality Thresholds Resulting From Equity-For-Debt Swaps.		Chewning Jr, E. G., Wheeler, S. W., & Chan, K. C. (1998). Evidence on auditor and investor materiality thresholds resulting from equity-for-debt swaps. <i>Auditing</i> , 17(1), 39.
61	2002	The Effect of Misstatements on Decisions of Financial Statement Users: An Experimental Investigation of Auditor Materiality Thresholds.		Tuttle, B., Coller, M., & Plumlee, R. D. (2002). The effect of misstatements on decisions of financial statement users: An experimental investigation of auditor materiality thresholds. <i>Auditing: A Journal of Practice &amp; Theory</i> , 21(1), 11-27.
62	2008	MATERIALITY IN THE CONTEXT OF AN AUDIT BETWEEN PROFESSIONAL JUDGMENT AND SUBJECTIVISM.		Socol, A. (2008). MATERIALITY IN THE CONTEXT OF AN AUDIT BETWEEN PROFESSIONAL JUDGMENT AND SUBJECTIVISM. <i>Annals of the University of Petrosani Economics</i> , 8(2).
63	2015	Materiality Guidance of the Major Public Accounting Firms.		Eilifsen, A., & Messier Jr, W. F. (2015). Materiality guidance of the major public accounting firms. <i>Auditing: A Journal of Practice &amp; Theory</i> , 34(2), 3-26.
64	2012	Materiality Judgments and the Resolution of Detected Misstatements: The Role of Managers, Auditors, and Audit Committees.		Keune, M. B., & Johnstone, K. M. (2012). Materiality judgments and the resolution of detected misstatements: The role of managers, auditors, and audit committees. <i>The Accounting Review</i> , 87(5), 1641-1677.
65	2011	THE CONSTRUCTION OF MATERIALITY IN GOVERNMENT ACCOUNTING: A CASE OF CONSTRAINING FACTORS AND THE DIFFICULTIES OF HYBRIDIZATION.		Gårseth-Nesbakk, L., & Mellemvik, F. (2011). The construction of materiality in government accounting: a case of constraining factors and the difficulties of hybridization. <i>Financial Accountability &amp; Management</i> , 27(2), 195-216.
66	2014	Materiality disclosure and litigation risks: A Canadian perspective.		Cox, R. A., Dayanandan, A., & Donker, H. (2014). Materiality disclosure and litigation risks: A Canadian perspective. <i>International Journal of Disclosure and Governance</i> , 11(3), 284-298.
67	2018	Offsetting Misstatements: The Effect of Misstatement Distribution, Quantitative Materiality, and Client Pressure on Auditors' Judgments		Messier Jr, W. F., & Schmidt, M. (2018). Offsetting misstatements: The effect of misstatement distribution, quantitative materiality, and client pressure on auditors' judgments. <i>The Accounting Review</i> , 93(4), 335-357.
68	2015	Materiality and external assurance in corporate sustainability reporting.	Materiality of sustainability and ESG related matters	Jones, P., Hillier, D., & Comfort, D. (2016). Materiality and external assurance in corporate sustainability reporting: An exploratory study of Europe's leading commercial property companies. <i>Journal of European Real Estate Research</i> .
69	2015	A feedback-based model for CSR assessment and materiality analysis.		Calabrese, A., Costa, R., & Rosati, F. (2015, December). A feedback-based model for CSR assessment and materiality analysis. In <i>Accounting Forum</i> (Vol. 39, No. 4, pp. 312-327). No longer published by Elsevier.
70	2015	The adoption of the materiality concept in social and environmental reporting assurance: A field study approach.		Edgley, C., Jones, M. J., & Atkins, J. (2015). The adoption of the materiality concept in social and environmental reporting assurance: A field study approach. <i>The British Accounting Review</i> , 47(1), 1-18.
71	2017	NON- FINANCIAL REPORTING: CORPORATE SOCIAL RESPONSIBILITY, EXECUTIVES AND MATERIALITY.		WADHWA, P. (2017). NON-FINANCIAL REPORTING: CORPORATE SOCIAL RESPONSIBILITY, EXECUTIVES AND MATERIALITY. <i>CLEAR International Journal of Research in Commerce &amp; Management</i> , 8(6).
72	2019	Materiality judgments in an integrated reporting setting: The effect of strategic relevance and strategy map.		Green, W. J., & Cheng, M. M. (2019). Materiality judgments in an integrated reporting setting: The effect of strategic relevance and strategy map. <i>Accounting, Organizations and Society</i> , 73, 1-14.

73	2020	The double materiality of democracy in capitalist societies: challenges for social-ecological transformations	Double materiality	Pichler, M., Brand, U., & Görg, C. (2018). The double materiality of democracy in capitalist societies: challenges for social-ecological transformations. Environmental Politics.
74	2022	Double materiality and the shift from non-financial to European sustainability reporting: review, outlook and implications.		Baumüller, J., & Sopp, K. (2021). Double materiality and the shift from non-financial to European sustainability reporting: review, outlook and implications. Journal of Applied Accounting Research.

### Appendix 3: KPMG sustainability reporting comparison summary

Organisation		ISSB	EFRAG	SEC
<b>Audience</b>	Investors	TRUE	TRUE	TRUE
	Stakeholders	FALSE	TRUE	FALSE
<b>Principles of disclosure</b>	General Principles (Only climate matters)	FALSE	FALSE	TRUE
	Detailed Principles (climate matters + Other)	TRUE	TRUE	FALSE
<b>Mandatory Disclosure</b>	Low	FALSE	FALSE	TRUE
	Medium	TRUE	FALSE	FALSE
	High	FALSE	TRUE	FALSE
<b>Entities Concerned</b>	US-domiciled companies	FALSE	FALSE	TRUE
	EU-domiciled companies	FALSE	TRUE	FALSE
	International Companies	TRUE	FALSE	FALSE
<b>Materiality Lens</b>	Impact on economy, environment, and people	FALSE	TRUE	FALSE
	Enterprise value	TRUE	FALSE	TRUE
<b>Where and When to disclose?</b>	Financial statements	FALSE	FALSE	TRUE
	Annual Reports	TRUE	TRUE	TRUE
	Cross-referencing	TRUE	TRUE	TRUE
	In financial statement at the same time	TRUE	TRUE	TRUE
<b>Proposals's alignment with TCFD</b>	Governance Strategy Risk Management	Mostly Aligned	Different Categorisation	Broadly Aligned
	Metrics & Targets	Mostly Aligned	Partially Aligned	Broadly Aligned
<b>Disclosure</b>	Industry Specific disclosures required?	TRUE	FALSE	FALSE
<b>GHG emissions reporting required?</b>	Scope 1 & 2	TRUE	TRUE	TRUE
	Scope 3	FALSE	TRUE	TRUE
	Basis of org boundaries	GHG protocols	consistent with financial statements	consistent with financial statements
	Intensity metrics	TRUE	TRUE	TRUE
	Disclosure target	TRUE	TRUE	TRUE
<b>Proposal effective date</b>	Local Large companies	No effective date	2024	2023
	Other large companies		2025	2024
	Listed SMEs		2026	2025



Disclosure assurance required	Local Large companies	No assurance required	Limited assurance (2024)	Limited assurance (2024)
	Other large companies		Limited assurance (2025)	Limited assurance (2025)
	Listed SMEs		Limited assurance (2026)	

#### Appendix 4: lexicometry Analysis Results

## Search Results


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### Summary

Searched for : **materialsustainability**  
 In folder(s) : **C:\Users\Lenovo\OneDrive\Desktop\Universal Reg Papers**  
 Results : **69** document(s) with **130** instance(s)  
 Saved on : **2022-01-28 22:00:43**


File : [Sudzucker 2020\\_GB\\_2020-21\\_EN.pdf](#)  
 Title :  
 Subject :  
 Author :  
 Keywords :

Page : 210


 to **material sustainability** topics and activities and aims to provide balanced, clear, accurate

File : [BASF 2020 AR.pdf](#)  
 Title : BASF Report 2020 (BASF Group)  
 Subject : Economic, environmental and social performance  
 Author :  
 Keywords :


Page : 4

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### Appendix 5: Rating adjustment table

STEP	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Moody's	Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Caa				
Moody's ADJ %	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5				
S&P global	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	CC	C	SD	D	
S&P global ADJ %	99.82	95.48	91.48	86.8	82.46	78.12	73.78	69.44	65.1	60.76	56.42	52.08	47.74	43.4	39.06	34.72	30.38	26.04	21.7	17.36	13.02	8.68	4.34	
Fitch	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	CC	C	DDD	DD	D
Fitch ADJ %	99.84	95.68	91.5	87.36	83.2	79.04	74.88	70.72	66.56	62.4	58.24	54.08	49.92	45.76	41.6	37.44	33.28	29.12	24.96	20.8	16.64	12.48	8.32	4.16
MSCI	AAA	AA	A	BBB	BB	B	CCC																	
MSCI ADJ %	99.96	85.68	71.4	57.12	42.84	28.57	14.28																	

### Appendix 5: Double materiality and non-financial standards impact on external assessments

Term	Sample 1018			Ratings Sig						AVG & SD Sig	
	Mention count	Total	%	Eikon ESG	CSRhub	MSCI	Sustainalytics	S&P global	Emission Score	score AVG	score SD
Baseline	299	1018	0.293	1	0	0	1	0	1	0	0
Benchmark	565		0.555	1	0	0	0	0	0	0	0
Carbon-CO2	727		0.714	1	1	0	1	0	1	0	0
Carbon Budget	17		0.016	0	0	0	0	0	1	0	0
Carbon Tax	66		0.064	1	0	0	1	0	1	0	0
GHG	54		0.053	1	0	0	0	0	1	0	0
Emissions	9		0.008	0	0	0	0	0	1	1	0
Carbon Pricing	327		0.321	0	0	0	1	1	1	0	1
Carbon Policy	9		0.708	0	0	0	0	0	0	0	0
Materiality	542		0.532	0	0	0	0	0	0	0	0
Financial Materiality	11		0.010	0	0	0	1	0	0	0	0
Sustainable Materiality	69		0.067	0	0	0	0	0	0	0	0
Double Materiality	6		0.005	0	0	0	0	1	0	0	0
Materiality Matrix	165		0.162	1	0	0	0	1	1	0	1
GRI	313		0.307	1	1	0	0	1	1	0	0
TCFD	261		0.256	1	1	0	1	1	1	0	1
2014/95/eu	79		0.077	1	0	0	0	1	1	0	0
SASB	67		0.065	0	0	0	0	1	1	0	1
CDSB	7		0.006	0	0	0	0	0	1	0	0
IIRC	185	0.181	0	0	0	0	0	0	0	0	

### Appendix 6: Acronyms List

<IR> : [Integrated Reporting](#)

CDSB: [Climate Disclosure Standards Board](#)

CSR: Corporate Social Responsibility



CSRD: [Corporate Sustainability Reporting Directive](#)  
DM: Double Materiality  
ESG: Environmental social and governance  
GRI: [Global Reporting Initiative](#)  
IFRS: [The International Financial Reporting Standards Foundation](#)  
IIRC: [The International Integrated Reporting Council](#)  
NFRD: [Non-financial Reporting Directive](#)  
SASB: [Sustainability Accounting Standards Board](#)  
TCFD: [Task Force on Climate-Related Financial Disclosures](#)  
URD: Universal Registration Documents