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Toward an Experimental Common Framework for Measuring Double Materiality in Companies

Christian Bux ^{1,*}, Paola Geatti ², Serena Sebastiani ³, Andrea Del Chicca ³, Pasquale Giungato ⁴,
Angela Tarabella ³ and Caterina Tricase ¹

¹ Department of Economics, University of Foggia, 71121 Foggia, Italy; caterina.tricase@unifg.it

² Department of Economics and Statistics, University of Udine, 33100 Udine, Italy; paola.geatti@uniud.it

³ Department of Economics and Management, University of Pisa, 56124 Pisa, Italy;

serena.sebastiani@phd.unipi.it (S.S.); andrea.delchicca@phd.unipi.it (A.D.C.); angela.tarabella@unipi.it (A.T.)

⁴ Department of Chemistry, University of Bari, 70126 Bari, Italy; pasquale.giungato@uniba.it

* Correspondence: christian.bux@unifg.it

Abstract

In Europe, corporate sustainability reporting through the double materiality assessment was formally introduced with the Corporate Sustainability Reporting Directive in response to the European Sustainability Reporting Standards. The double materiality assessment is essential not only to determine the scope of corporate sustainability reporting but also to guide companies toward an efficient allocation of resources and shape corporate sustainability strategies. However, although EFRAG represents the technical adviser of the European Commission, there are numerous “interoperable” standards related to the assessment of double materiality, including the Global Reporting Initiative (GRI), or UNI 11919-1:2023. This research intends to systematically analyze similarities and divergences between the most widespread double materiality assessment standards at the global scale, highlighting their strengths and weaknesses and trying to identify a comparable path toward the creation of a set of common guidelines. This analysis is carried out through the systematic study of seven standards and by answering nine questions ranging from generic ones, such as “what is the concept of double materiality?”, to more technical questions like “does the standard identify thresholds?”, but adding original prospects such as “does the standard refer to different types of capital?”. Findings highlight that EFRAG, UNI 11919-1:2023, and GRI represent the most complete and least-discretionary standards, but some methodological aspects need to be enhanced. In the double materiality assessment, companies must identify key stakeholders, material topics and material risks, and must develop the double materiality matrix, promoting transparent disclosure, continuous monitoring, and stakeholders’ engagement. While comparability is principally required among companies operating within the same sector and of similar size, this does not preclude the possibility of comparing firms across different sectors with respect to specific indicators, when appropriate or necessary.

Keywords: corporate sustainability disclosure; corporate sustainability reporting directive (CSRD); double materiality assessment; European sustainability reporting standards (ESRS)



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1. Introduction

Economic, social and environmental sustainability has become of global importance for large, small- and medium-sized enterprises (SMEs) [1,2]. The pursuit of sustainability

requires a holistic intervention by different actors, namely individuals, institutions, companies and organizations who are increasingly aware of the need for sustainable economic growth [3,4]. Although the Sustainable Development Goals (SDGs) were introduced by the United Nations in 2015 [5], sustainability strategies (and their communication) were already debated in Europe in 2011, with the introduction of the Communication “A renewed EU strategy 2011–2014 for Corporate Social Responsibility (CSR)”, which laid the foundations for CSR, understood as “the responsibility of companies for their impacts on society”. Companies are the main actors in achieving sustainability goals, but they need standardized tools for measuring and communicating sustainability with stakeholders [6,7]. In Europe, sustainability communication was introduced with Directive 2014/195/EU on the Non-Financial Statement [8], amended by Directive 2022/2464 in the corporate sustainability reporting, which established new principles for non-financial reporting [9]. Sustainability communication is even more felt by organizations in response to the orientation of credit institutions towards Environmental and Social Governance (ESG) issues, which tend to favor so-called “sustainable investments” [10,11]. Furthermore, the growing emphasis on ESG among investors underscores the necessity for companies to disclose non-financial information and adopt stakeholder-oriented governance [12].

Sustainability disclosure by companies has grown widely in the literature [13,14], in parallel with the introduction of non-financial reporting regulations and national and European standards [15] that focus on communicating environmental impacts, stakeholder relationships, or corporate risks. In Europe, in response to the European Sustainability Reporting Standards (ESRS) [16], the materiality matrix (and double materiality) was introduced with the Corporate Sustainability Reporting Directive (CSRD) [17], which helps companies identify, assess and prioritize corporate sustainability strategies that impact either the company (internal assessment) or their stakeholders (external assessment) [18]. However, although this topic has been discussed in the literature and analyzed from an economic–managerial perspective [19], the high diffusion of materiality (and double materiality) measurement standards has only increased the level of confusion among operators and made the comparability of results between different companies inhomogeneous [20], thus undermining the objectives of “comparability” and “replicability” of sustainability measurement.

One of the main challenges in the homogeneous measurement of materiality (and double materiality) is the wide diffusion of different standards at the global level. The European Financial Reporting Advisory (EFRAG) represents the technical adviser of the European Commission in the development of the ESRS [21] and provides an interesting key to understanding materiality measurements. However, both at the European and national levels, several standards have been introduced, which can be defined as “interoperable standards” or “supplementary standards” to the EFRAG technical norms. Most of the materiality measurement standards were introduced in recent years. The effectiveness of the technical standards introduced by the Global Reporting Initiative (GRI) on material topics (GRI 3) is dated 1 January 2023, even if the first sustainability reporting standards came into force in July 2018 [22], while those introduced by UNI 11919-1:2023 are effective starting from August 2023 [23]. Less recent, but still released in 2020, are the Sustainable Development Goals Disclosure (SDGD) recommendations, or the standards developed by the Sustainability Standards Accounting Board (SASB) or the International Integrated Reporting Standard (IIRC), introduced in 2018 and 2013.

In light of these premises, this research intends to systematically analyze the similarities and divergences between the different materiality (and double materiality) assessment standards, highlighting their strengths and weaknesses and trying to identify a comparable path towards the creation of a set of homogeneous guidelines. This analysis is carried out

through a systematic study of the various standards and by answering nine questions, ranging from “what is the concept of dual materiality?” to “does the standard identify thresholds?”, but adding a point of originality, such as “does the standard refer to different types of capital?”. The findings are essential to guiding public authorities in defining standards for measuring double materiality and to guiding organizations in the intricate process of corporate sustainability reporting.

2. Theoretical Background

2.1. Concepts and Foundations of Double Materiality

The concept of materiality in accounting and sustainability has attracted considerable interest in both academic and professional fields and has become the subject of numerous technical reports and academic studies. Currently, there is no common definition of materiality [24], and its complex nature has given rise to diverse interpretations over time. Bernstein [25] observed that materialism is an element of “wisdom of life” that encourages people to avoid irrelevant, insignificant, or unimportant matters from a social standpoint, whereas Jones et al. [26] observed that materiality should be essentially associated with financial judgments, particularly in accounting and auditing. Frishkoff [27] placed materiality in the context of financial reporting to prioritize information that is relevant to users’ decision-making processes that ensures sufficient evidence that meets users’ expectations [20] and which may influence the stakeholders’ economic decisions, such as those related to financial investments [28]. Materiality analysis has become a valuable instrument for assessing ESG issues within organizations, serving as a key component for both internal assessments and external evaluations involving all relevant stakeholders.

Based on the social and environmental challenges imposed by climate change, biodiversity loss, resource depletion, and growing social inequalities, the notion of financial materiality as defined by previous research has become limited [29]. Nowadays, it has evolved into the concept of double materiality to expand the boundaries of corporate reporting inside and outside the ESG system [30] and include either financial materiality or impact materiality. The European Commission explicitly introduced “double materiality” within the CSRD, further elaborated by EFRAG [21]. This broader perspective encompasses both “the impact of the company’s activities on people and the environment” (i.e., impact materiality) and “how sustainability issues affect the company,” (i.e., financial materiality) and highlights the double prospects that companies must adopt in reporting their impacts: (i) the impacts suffered by companies in terms of performance and development, also defined as “outside-in” impacts; (ii) the impacts generated by companies on society and the environment, also defined as “inside-out” [31,32]. Conceptually, there is a correspondence between impact materiality, financial materiality and accounting elements in a value-creation perspective. Impact materiality takes care of four elements, such as company customers, stakeholders (including employees and shareholders) and nature, whereas financial materiality considers social and environmental risks, product quality (including security), and social and environmental responsibilities. In terms of accounting elements, these four topics may be linked to financial liabilities, product-related liabilities and commitments, social liabilities (including employee benefits) and environmental liabilities, respectively [33].

Materiality plays a key role in the context of corporate reporting [34] and has made significant progress in Europe over the past decades. The European Union formalized sustainability reporting through Directive 2014/95/EU, known as the Non-Financial Reporting Directive (NFRD), which requires large companies to disclose their ESG practices. Despite its ground-breaking role, the NFRD has been criticized for its limited scope, level of guidance and materiality issues [35]. These shortcomings led to the adoption of the

CSRD, which marked a key development in introducing significantly broader sustainability reporting requirements [36], with clear implications for the issue of materiality [37]. The CSRD laid the foundation for the ESRS, which aimed to provide more detailed guidance, standardized formats and clearer methodological frameworks. The EFRAG, responsible for the development of these ESRS, defined explicit standards specifying definitions, assessment methodologies, thresholds and disclosure requirements for double materiality, with the aim of improving consistency, comparability and transparency across European companies [38], responding to the growing stakeholder demand for clear and reliable sustainability information [39].

2.2. Historical Progression of Non-Financial Reporting and Double Materiality Assessment

The implementation of sustainability standards reflects the growing awareness of ESG factors in corporate operations and investment decisions [40]. These standards, developed by several initiatives and organizations, are designed to provide companies with a framework to assess, communicate and improve their sustainability practices and make performance comparable [41,42]. However, the diversity of sustainability standards stems from different approaches to materiality that determine the relevance and importance of information for stakeholders [20]. Some standards prioritize financial materiality, focusing on sustainability factors that directly influence a company's financial performance, while others have adopted a broader perspective that considers the social and environmental impact of a company's activities as a whole [18]. Understanding how major sustainability reporting standards interpret and present the concept of materiality is important because it directly influences the topics companies should cover in their reports and depends on the main recipients of the information, thus influencing the overall purpose of sustainability reporting [20].

Figure 1 illustrates the timeline of the development of double materiality measurement standards, starting from the Task Force on Climate-related Financial Disclosures (TCFD) in 2017 to the latest UNI 11919-1:2023.

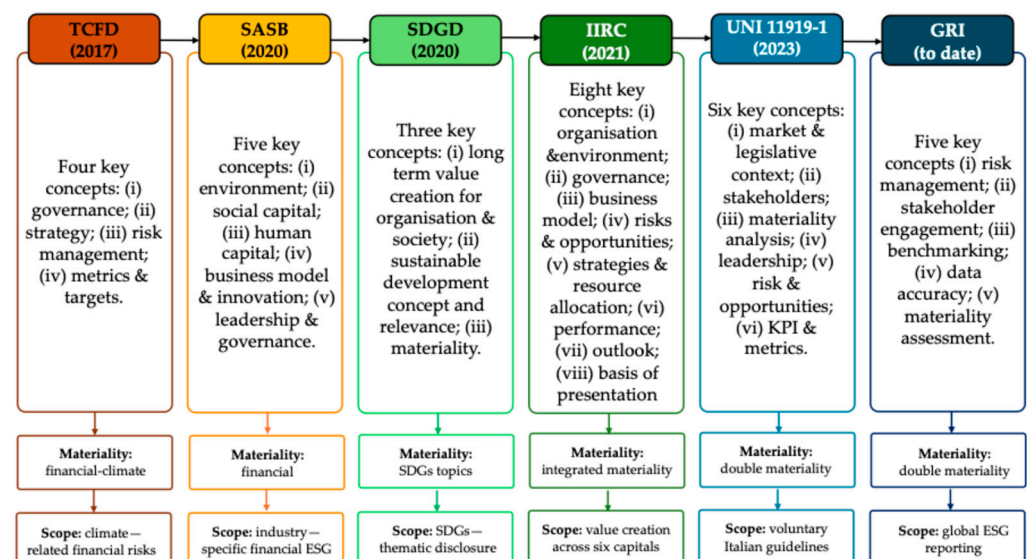


Figure 1. Timeline of the development of double materiality measurement standards. Personal elaboration by the authors.

In 2017, the TCFD focused on financial materiality with regard to climate-related financial risks and opportunities. It discussed that environmental impacts, such as climate change, have tangible financial implications on the performance and stability of companies. In 2020, the SDGD Recommendations provided a framework that explicitly aligns corpo-

rate sustainability reporting with the SDGs. This integration marks a shift in companies' approaches toward sustainability, encouraging them to go beyond traditional financial metrics and consider their broader impacts on society and the environment. According to Adams et al. [43], the novel definition of double materiality (i.e., "outside-in", "inside-out") should encourage organizations to consider long-term systemic impacts beyond immediate financial results, promoting alignment with global sustainability priorities. In January 2021, the IIRC introduced a set of principles with the aim of developing integrated reporting and assisting organizations in their disclosure processes on economic, financial, social, environmental and governance aspects [44]. The IIRC developed the International <IR> Framework, which represents a further development toward integrated reporting. This revision sought to improve the integration and interconnection of financial and non-financial information, incorporating sustainability topics into corporate reporting practices. According to the <IR> Framework, an issue is considered material if it can "significantly" affect the organization's ability to create value over time, including factors related to different types of capital: financial, productive, intellectual, human, social and relational and natural [44]. Specifically, the IIRC requires organizations to assess the most relevant issues that affect their strategy, governance, performance and future prospects, considering how material topics may generate risks, opportunities and impacts (consequences) on capital. The GRI established itself as a reference framework for sustainability reporting, promoting a global approach to the disclosure of organizations' impacts [45]. Since its introduction in 1997, the GRI has published several editions of guidelines, and the most significant revision was its fourth edition in 2013 [37], which introduced the concept of materiality [46]. In 2020, GRI further expanded the definition of materiality, with the aim of facilitating the transition from a traditional approach to the concept of double materiality, encouraging companies to assess relevant topics from both perspectives [47]. Lastly, based on ISO 26000:2020 [48], which provides guidelines on the social responsibility of organizations, the Italian standard UNI 11919-1:2023 proposes a structured framework to carry out the materiality analysis.

The sustainability-reporting and disclosure frameworks presented in Figure 1 differ conceptually in purpose, scope, materiality perspective, audience, and metric specificity. In summary, while EFRAG, GRI, and SDGD emphasize comprehensive, multi-stakeholder and impact-oriented reporting, SASB and TCFD are investor-centric, financially material frameworks. IIRC bridges these by integrating six capitals over time, whereas UNI 11919-1 offers national methodological guidance.

2.3. Double Materiality Between Sectors and Company Dimensions

Double materiality becomes crucial when analyzed across diverse sectors and company dimensions, which determine how materiality is interpreted and operationalized in practice. Materiality varies widely by sector due to inherent differences in operational footprints, stakeholder expectations, and regulatory exposure. For instance, in carbon-intensive sectors such as mining and energy, environmental impacts like emissions and resource depletion are predominant concerns for materiality assessment [49,50]. Conversely, in sectors like finance or information technology, intangible risks such as data privacy, digital inclusion, or ethical governance often dominate material disclosures [50]. This sectoral differentiation is acknowledged by standard setters, notably through sector-specific standards within the ESRS [51]. Moreover, company-specific dimensions, such as firm size, geographic scope, supply chain complexity, and governance structure, further influence double materiality assessments. Large multinational enterprises with intricate supply chains require complex studies concerning their indirect environmental and social impacts [49]. On the other hand, SMEs often contend with limited reporting capacities, focusing on more localized impacts, and may require proportionate materiality thresholds and streamlined guidance.

One important challenge lies in aligning interoperability across sectors and firm sizes to ensure comparability and consistency of disclosures. For instance, topics that are deemed material for an agribusiness company, such as biodiversity or water stress, may not apply to a logistics firm. Moreover, even within the same sector, companies with differing operational models or geographic contexts may assign different weights to identical ESG issues [52]. Comparability is required among companies operating within the same sector and of similar size. However, this does not imply that firms from different sectors cannot be compared with respect to specific indicators, such as water stress or child labor, if required. Therefore, materiality assessment must be dynamic and contextual, supported by stakeholder engagement and iterative reassessment mechanisms. However, despite the inherent challenges in reconciling these differences, it is imperative to establish common and replicable guidelines that can serve as a shared foundation applicable across all sectors and company sizes.

3. Research Methodology

The purpose of this research is to systematically analyze the similarities and divergences between the selected materiality (and double materiality) assessment standards, highlighting their strengths and weaknesses and trying to identify a comparable path towards the creation of a set of homogeneous guidelines. To achieve this goal, this research adopted a stepwise approach: (i) first, the identification of the main standards used in practice to assess materiality (and double materiality) in organizations (see Section 2); (ii) secondly, data analysis through a qualitative content analysis by answering nine specific questions; (iii) thirdly, data synthesis and interpretation for the proposal of identifying homogeneous standard guidelines.

3.1. Data Collection

The analysis of the measurement standards of double materiality focused on seven specific standards, namely, EFRAG [21], UNI 11919-1 [23], GRI [22,45–47,49,50,53,54], SDGD [43], IIRC [44], SASB [55–57], and TCFD [58]. The selection of these standards was guided by the recommendations set forth within the framework of the CSRD, and based on key parameters such as historical validity, completeness and robustness. In this context, the EFRAG was identified as the core standard for the CSRD implementation. This framework explicitly allows for the integration or supplementation of other standards, including the GRI, which are currently undergoing continuous updates. Tracing the historical evolution of non-financial reporting (see Figure 1), the authors deemed it necessary to compare earlier standards with more recent ones, such as the TCFD framework, which itself references both the IIRC and SASB. To ensure the representation of both international and national perspectives, the authors further selected the SDGD, which emphasizes the SDGs as key elements of double materiality, and UNI 11919-1:2023 standard, which provides a practical application of the guidelines introduced by ISO 26000 on corporate social responsibility. Moreover, these standards represent the most commonly used in practice at the global scale, as discussed by Fiandrino et al. [18], Ahmad et al. [40], and Cooper and Michelon [41].

Based on the synthesis of previous measurement standards [18], this research starts by identifying the information content, the intended audience, and the level of impact of the information of each standard. Moreover, considering the differences between one standard and another, and to capture all the aspects intended for the measurement of materiality, this research has identified nine assessment questions (AQ), each of which was investigated within each standard, as follows:

- AQ1. Which is the definition of materiality adopted in the standard?
- AQ2. What is defined as “sustainability materiality” in the standard?
- AQ3. What is defined as “financial materiality” in the standard?
- AQ4. Does the standard refer to different types of capital?
- AQ5. Who are the stakeholders identified in the standard?
- AQ6. How are the double materiality topics organized in the standard?
- AQ7. How is the materiality assessment performed in the standard?
- AQ8. Does the standard identify thresholds?
- AQ9. Does the standard suggest leveraging other sources?

Questions (AQ1–AQ9) were identified through an examination of the indices of the seven standards, which clearly outline the themes addressed within each document. Specifically, EFRAG [21] defines the key concepts upon which several of the primary questions were developed, namely, (i) materiality and double materiality (AQ1); (ii) impact materiality and financial materiality (AQ2); (iii) stakeholders (AQ5); sustainability matters and topics (AQ6). These concepts are cross-cutting and can be observed across multiple standards and were therefore selected as a foundation for the formulation of various AQs. To complement these “common concepts,” the research team further analyzed the indices of the relevant standards to identify more specific questions. Among these is the definition of natural capital (AQ4), derived from the IIRC standards. As for the practical assessment of materiality, questions AQ7–AQ9 were developed through a critical review of the relevant academic literature.

The answer to each of these questions was sought within the reference standards. For the analysis, synthesis and interpretation of the data, a database was created in Microsoft Excel that helped to identify similarities and differences within the seven standards (Section 3.2).

3.2. Data Analysis

Data collected on the seven selected standards have been thoroughly analyzed through a content analysis, as suggested by previous studies on similar topics [59,60]. The content analysis is defined as “the study of recorded human communications” [61], whose aim is to detect “underlying themes in the materials being analyzed” [62], not in terms of quantity, amount, intensity or frequency, but quality [63]. Findings from the content analysis, in business-managerial studies, have the chance to identify non-obvious perspectives, becoming the potential ground break for either academics or practitioners toward a homogeneous measurement of double materiality. Considering the nine AQs (from AQ1 to AQ9), the content analysis followed systematic procedure rules, devising the standard material into content analytical units [60], as follows: (i) summary, reducing material into meaning units and preserving the essential content (e.g., paraphrasing, general content, synthesis); (ii) explanation (or categorization), clarification and annotation of the keywords; (iii) interpretation, in a process that starts from the question and arrives at the interpreted answer.

The content analysis was conducted by the research team following a stepwise, replicable, and systematic approach. First, the authors identified within each standard the response to each analytical queries (AQ1–AQ9), selecting all excerpts potentially containing relevant answers to these queries. These excerpts were subsequently organized in Excel spreadsheets to facilitate a structured analysis of their content and the development of concise responses. This process adhered to the established content analysis methodology [60], which proceeds from the identification of the “snippet” to the creation of the “meaning unit”, and finally to the extraction of “keywords”. The identified keywords served as the foundation for the subsequent analysis and interpretation of non-financial reporting standards. An example is provided in response to AQ5, which concerns the typology of

stakeholders: (i) snippet: “since they are often complex, multi-localized organizations, with international structures and supply chains that extend across multiple continents, the organization should clearly define its internal and external interlocutors and possibly evaluate them according to an increasing criterion of relevance,” and “stakeholders include employees, collaborators, representatives of civil society, third sector entities, social communities, shareholders, social partners, suppliers, customers and commercial partners, financial and credit institutions” [23]; (ii) meaning unit: “internal and external interlocutors that may include employees, collaborators, representatives of civil society, third sector entities, social communities, shareholders, social partners, suppliers, customers and commercial partners, financial and credit institutions”; (iii) keywords: “internal stakeholders” and “external stakeholders”. In this light, interpretation plays a key role in qualitative content analysis, since it helps researchers reach the deepest understanding of the standard, from a neutral and objective perspective, on a descriptive level.

4. Results

4.1. Definition of Materiality (AQ1, AQ2, and AQ3)

The concept of materiality, double materiality and “relevance” (in the Italian standard) appears to be blurred, as there is no univocal and homogeneous definition among the standards. A first note to UNI 11919-1:2023 establishes that the term “materiality”, although it has entered the consolidated technical language, does not originate from normative documents. Furthermore, the term “materiality” is similar to the term “relevance” and refers, in a preliminary definition, to the relevance that a certain topic assumes for the organization and for the relevant stakeholders, and the impacts that such topics generate [23]. According to the practice (UNI/PdR 18:2016) [64], currently replaced by UNI 11919-1:2023, “materiality” means the “identification and understanding of priorities with respect to the context of social responsibility in which an organization operates. The priorities thus identified reflect the economic, social and environmental impacts that deserve to be considered” [64]. From these two first definitions, it appears rather clear the complexity for operators to understand what materiality is in practical terms.

The concept of “double materiality” is an evolution of the concept of materiality, as presented by the GRI or the IIRC, which refers to the impact on the economy, the environment and people that a company has, as well as the creation of value for the company, in the short-, medium- and long-term. From an environmentally oriented perspective, TCFD establishes that an organization must disclose “actual and potential impacts of climate-related risks and opportunities on the organization’s businesses, strategy, and financial planning”.

EFRAG distinguishes between two concepts, namely “impact materiality” and “financial materiality”, and SASB also mentions the topic of “financial materiality”. The other standards, more simply, define the so-called “material topics”, such as “material sustainable development” or “material risks”. Starting from the definition provided by EFRAG, it is possible to move from single materiality to double materiality, understood as a concept that provides criteria for determining whether a sustainability topic or information must be included in the undertaking’s sustainability report. Specifically, “a sustainability topic or information meets the criteria of double materiality if it is material from the impact perspective or from the financial perspective or from both of these two perspectives” [21].

Based on the definition provided by EFRAG, “impact materiality” refers to topics (or information) that impact on people or the environment and are related to sustainability over the short-, medium- or long-term, including those impacts directly linked to the company’s upstream and downstream value chain. Direct impacts are, for instance, carbon emissions connected with the production of specific goods (either direct or indirect emissions) but are not direct emissions generated by a business partner. “Financial materiality” refers to

sustainability topics that trigger financial effects on the company, so topics that generate risks or opportunities that influence or are likely to influence the future cash flows and the enterprise value in the short-, medium- or long-term. Considering the definition included in the SASB, information is financially material if its omission, inaccuracy or obscuration could reasonably be expected to influence the investment or lending decisions that users make, based on their assessments of the financial performance and value of the enterprise in the short-, medium- and long-term.

4.2. Types of Capital Considered in the Standard (AQ4)

The concept of capital, in the corporate context and considering the CSRD, is no longer static but dynamic. Nowadays, companies are no longer called to measure their economic-financial performance but are required to account for different types of capital, which is in line with the need to pursue economic, social and environmental sustainability. This approach is called “multi-capital”. However, not all standards have specified the different types of capital that must be measured for the purposes of the double materiality analysis.

EFRAG has identified six types of capital, namely “financial”, “manufactured”, “natural”, “intellectual”, “human”, “social and relationship”, and IIRC and SDGD identified the same, whereas SASB included all of them except for “manufactured” capital. UNI 11919-1:2023, GRI and TCFD do not explicitly suggest the adoption of a multi-capital approach. Table 1 summarizes the definitions of capital, according to a “multi-capital” approach.

Table 1. Concepts of capital in the double materiality standards (multi-capital approach). Source: Personal elaboration by the authors. Definitions of capitals are retrieved from IIRC [44].

Capital	EFRAG	UNI 11919	GRI	IIRC	SASB	SDGD	TCFD	Definition
Financial	X			X	X	X		Pool of funds that is available to an organization for use in the production of goods or the provision of services obtained through financing or generated through operations or investments (i.e., debt, equity, grants).
Manufactured	X			X		X		Manufactured physical objects that are available to an organization for use in the production of goods or the provision of services (e.g., buildings, equipment, tools infrastructure).
Natural	X			X	X	X		Renewable and non-renewable environmental stocks that provide goods and services that support the current and future prosperity of an organization (e.g., air, land, water, minerals, energy).
Intellectual	X			X	X	X		Organizational, knowledge-based intangibles (e.g., intellectual property, patents, copyrights, software).
Human	X			X	X	X		People’s competencies, capabilities and experience, and their motivations to innovate, but also employee turnover, labor/management relations, occupational health and safety, training and education, diversity and equal opportunities.
Social	X			X	X	X		Institutions and relationships established within and between each community, group of stakeholders and other networks (e.g., shared norms, key relationships, community).

Considering the IIRC standard, capitals are stocks of value that increase, decrease, or transform through the organization’s activities and results. However, considering these guidelines, organizations that disclose material information are not required to adopt this categorization or structure their report according to the different capital types.

4.3. Stakeholders to Whom the Standard Is Addressed (AQ5)

Stakeholders are the main users to whom the measurement of double materiality is addressed, but they are also the main actors in its measurement process. Their role is twofold: on the one hand, recipients of the analysis; on the other, providers of the data to be analyzed.

EFRAG identifies two categories of stakeholders, namely “affected stakeholders” and “users”, while UNI 11919-1:2023 identifies a broad category of stakeholders, exemplified as follows: employees, collaborators, representatives of civil society, third sector entities, social communities, shareholders, social partners, suppliers, customers and commercial partners, financial and credit institutions. The definition of stakeholder proposed by the GRI concerns “an individual or group that has an interest that is affected or could be affected by the organization’s activities” and is very close to that proposed by EFRAG. In addition, the GRI suggests that stakeholders be distinguished by activity, project, product or service, or other classifications that is relevant for the organization, underlining the importance of avoiding “data aggregation” processes, in favor of greater disaggregation. The definition of stakeholder proposed by the IIRC is the following: “Those groups or individuals that can reasonably be expected to be significantly affected by an organization’s business activities, outputs or outcomes, or whose actions can reasonably be expected to significantly affect the ability of the organization to create value over time. Stakeholders may include providers of financial capital, employees, customers, suppliers, business partners, local communities, NGOs, environmental groups, legislators, regulators and policymakers.” To better frame the categories of stakeholders, SASB identifies two categories, namely “primary users” and “use cases”, while the SDGD standard identifies the category of “key audience”, understood as providers of finance and key stakeholder groups, including communities impacted by SDGs disclosure, users, investors, reporting organizations, assurance providers. Its connotation is therefore more linked to financial materiality and less to impact materiality. Lastly, the TCFD defines specific categories of stakeholders, namely “investors”, “lenders”, “insurance underwriters”, “companies”, “financial market participants”, “organizations”, and “users”.

4.4. Topics of Double Materiality Considered in the Standard (AQ6)

Data needed to build a double materiality matrix must be collected by questionnaires and administered to the relevant stakeholders. However, the creation of questionnaires leaves ample room for the discretion of organizations. An example of a questionnaire is provided in the UNI/PdR 18:2016, currently replaced and integrated into UNI 11919-1:2023.

The creation of a questionnaire for collecting double materiality data begins with the identification of the topics that are the subject of double materiality. EFRAG identifies three levels of topics, distinguishing between “topics” (level 1), “sub-topics” (level 2) and sub-sub-topics (level 3). The first two levels are mandatory, while the third is optional. An example of a topic is, essentially, “environment”, “social” or “governance”, while a sub-topic can be, within the topic “environment”, “climate change mitigation”. The sub-sub-topic, following this line of interest, can be “disclosure”. Topics and sub-topics “are used with reference to a subject, a theme, a category or a general area of interest in the context of the specific topical standards to be drafted” by the researchers.

The first UNI/PdR 18:2016 distinguished between “fundamental themes”, “specific aspects”, and “actions”. For example, a fundamental theme can be “environment”, a specific aspect “sustainable use of resources” and an action “measures for the efficient use of resources and for the reduction of energy, water and other resources”. UNI 11919-1:2023, as an advanced version of UNI/PdR 18:2016, has introduced further clarifications. According to UNI 11919-1:2023, the topics can be those identified by ISO 26000 or the 17

Sustainable Development Goals (SDGs), using the related targets as specific aspects. With reference to ISO 26000:2020, the seven topics are organizational governance, human rights, labor relations and conditions, environment, correct management practices, specific aspects relating to consumers, community involvement and development.

The GRI, as in previous cases, distinguishes between the themes of economy, environment and society, not making specific reference to governance (but to economy). In the theme of people, like the social theme, explicit reference is made to human rights across the organization's activities and business relationships. Specifically, each GRI identifies the so-called "likely material topics", with reference to oil and gas (GRI 11), coal (GRI 12), agriculture, aquaculture and fishing (GRI 13), and mining (GRI 14). Textile and apparel and financial services are works-in-progress and are expected to be published in 2026. In the absence of sector-specific standards, the GRI identifies topic-specific standards that help companies understand how to manage the material topics identified within their boundaries. These topic-specific standard refer to (i) economic topics, such as economic performance (GRI 201), market presence (GRI 202), indirect economic impacts (GRI 203), procurement practices (GRI 204), anti-corruption behavior (GRI 205), anti-competitive behavior (GRI 206), tax (GRI 207); (ii) environmental topics, such as materials (GRI 301), energy (GRI 302), water and effluents (GRI 303), biodiversity (GRI 304), emissions (GRI 305), effluents and waste (GRI 306:2016), waste (GRI 306:2020), and suppliers environmental assessment (GRI 308); (iii) social topics, such as employment (GRI 401), labor/management relations (GRI 402), occupational health and safety (GRI 403), training and education (GRI 404), diversity and equal opportunity (GRI 405), non-discrimination (GRI 406), freedom of association and collective bargaining (GRI 407), child labor (GRI 408), forced or compulsory labor (GRI 409), security practices (GRI 410), rights of indigenous peoples (GRI 411), human rights assessment (GRI 413), local communities (GRI 413), supplier social assessment (GRI 414), public policy (GRI 415), customer health safety (GRI 416), marketing and labeling (GRI 417), and customer privacy (GRI 418).

IIRC, SASB and the TCFD do not refer to specific themes for developing the double materiality questionnaire, whereas the SDGD defines themes with reference to "the impact of the organization on the SDGs and on society in general" and "the importance of sustainability aspects for the creation of long-term value for the organization itself". In the first case, topics could be the use of natural resources, working conditions and human rights, whereas in the second case, topics could be climate risks that may affect the resilience of the business, market opportunities arising from sustainable products and regulatory changes.

4.5. Steps for Assessing Double Materiality (AQ7)

In practical terms, the measurement of dual materiality follows different steps. EFRAG identifies four different steps, as follows: (i) STEP A, which consists in understanding the context; (ii) STEP B, which regards the identification of the actual and potential impacts, risks and opportunities related to sustainability matters; (iii) STEP C, with reference to the assessment and determination of material impacts, risks and opportunities; (iv) STEP D, which consists in the final reporting.

UNI 11919-1:2023 simplifies the guiding steps for measuring double materiality, leaving room for researchers in the assessment. The explicitly identified steps are (i) "identification of stakeholders"; (ii) "analysis of material topics"; (iii) "construction of the materiality matrix" (disclosure). In the context of the identification of stakeholders and topics, UNI 11919-1:2023 suggests distinguishing between the "perspective of the organization" (top management figures, managers, committees, owners) and the "perspective of other company functions, personnel and other external stakeholders". In detail, data acquisition must take place by so-called "guided interviews" which can be either individual or group, and

“questionnaires”, which can be administered online or by telephone. Once the necessary information has been collected, the organization is required to build its own materiality matrix by assigning values to each issue identified as relevant, which will be inserted into a system of coordinated axes (i.e., disclosure). What is interesting is the statement according to which the double materiality analysis should be carried out with a frequency that can vary depending on the situation and the moment, generally every 2 or 3 years.

The steps identified by GRI and IIRC do not differ much from those identified by EFRAG. However, it is possible to identify an interesting specification proposed by IIRC in the analysis and disclosure phase: (i) prioritizing the matters based on their relative importance; (ii) determining the information to disclose about material matters. This last aspect implicitly clarifies that some aspects that are no longer considered relevant following the analysis may not be communicated in non-financial reporting. As for the steps identified by the SASB standard, there are six, and these are the (i) definition of financial materiality; (ii) assessment of the impact on financial results; (iii) consideration of the time horizon; (iv) research and continuous monitoring; (v) stakeholder involvement; (vi) applications of “characteristics” of decisional utility. Concerning the SDGD, five steps are identified, as follows: (i) understand sustainable development issues relevant to the organization’s external environment; (ii) identify material sustainable development issues that influence long-term value creation for organizations and society; (iii) develop strategy to contribute to the SDGs through the business model; (vi) develop integrated thinking, connectivity and governance; (v) prepare the annual report.

4.6. Thresholds (AQ8)

The measurement of double materiality must consider either impacts or risks and values associated with them, to build a faithful graphical representation of double materiality in organizations. Table 2 illustrates the variables and scores (threshold values) that each standard identifies for the measurement of double materiality. The threshold values are presented in detail only by EFRAG (Table 2) and by the UNI/DpR 18:2006, while the other standards refer to further regulations. Based on the definition provided by GRI, scale is “how severe the impact is”, scope is “how widespread the impact is, for example, the number of people affected or the extent of harm” and remediability is “how difficult it is to mitigate or remedy the resulting harm”.

EFRAG provides a materiality calculation Equation (1) to identify overall levels, as follows:

$$\text{Impact Materiality} = \text{Scale of Impact} + \text{Scope of Impact} + \text{Remediability} \quad (1)$$

The overall materiality score, as the sum of scale, scope and remediability, can range from 0 to 15, as follows: (i) <5, minimal impact; (ii) 5 to 8, informative; (iii) 8 to 10, important; (iv) 10 to 12, significant; (v) ≥ 12 , critical. As for financial materiality, this ranges from 0 (minimal) to 4 (critical). As regards the illustration of the results of a materiality analysis, EFRAG suggests presenting them through a “sectoral granularity” double-entry table, in which to present (i) the topic in the row; (ii) the sector (or business sector) of reference in the column. At the inter-section of the row and column, the result obtained through Equation (1) must be indicated (e.g., minimal impact, critical impact).

Table 2. Threshold value for the double materiality assessment. Source: Personal elaboration on EFRAG [21].

Standard	Item	Scale Impact	Note
EFRAG	Scale of impact	From 0 to 5	0 = None 1 = Minimal 2 = Low 3 = Medium 4 = High 5 = Absolute
	Scope of impact	From 0 to 5	0 = None 1 = Limited 2 = Concentrated 3 = Medium 4 = Widespread 5 = Global/total
	Remediability of impact	From 0 to 5	0 = Very easy to remedy 1 = Relatively easy to remedy (short-term) 2 = Remediability with effort (time and cost) 3 = Difficult to remedy or mid-term 4 = Very difficult to remedy or long-term 5 = Non-remediable/irreversible

Based on UNI 11919-1:2023, results of the double materiality analysis can be illustrated by developing the double materiality matrix, in which it is necessary to indicate, (i) on the x-axis, the relevance of the stakeholders; (ii) on the y-axis, the relevance for the organization. Items should be measured as presented in the UNI/DpR 18:2006, as follows: (i) 1 = not significant; (ii) 2 = low significant; (iii) 3 = significant; (iv) 4 = very significant; (v) 5 = priority.

UNI 11919-1:2023 also identifies some threshold values for the risk assessment in terms of sustainability, as presented in Table 3.

Table 3. Thresholds value for the material risk assessment. Source: Personal elaboration on UNI 11919-1:2023 [23].

Standard	Item	Scale Impact	Note
UNI 11919	Probability (of the risk)	From 1 to 4	1 = Unlikely 2 = Low likely 3 = Likely 4 = Very likely
	Consequence (of the risk)	From 1 to 4	1 = Negligible 2 = Mild 3 = Medium 4 = High
	K factor (human risk management)	From 1 to 4	1 = Low 2 = Medium 3 = High 4 = Optimal

It identifies an Equation (2) for the materiality assessment of the risk, as follows:

$$\text{Risk} = \text{probability} \times \text{consequence} / (\text{K factor}) \tag{2}$$

Risk assessment is essential for determining the impact of a given ESG event on a company’s economic and financial performance, particularly in terms of future cash flows, in accordance with the definition of financial materiality.

4.7. Integration with Other Sources (AQ9)

Relevant in all standards is the explicit reference to additional metrics, also called “interoperability”. This continuous reference to measurement standards of double materiality could make it more complex for operators to apply them, and underlines the “incompleteness” of each standard. For example, EFRAG invites researchers to measure double materiality by consulting the GRI or other sources, such as the TCFD or the ISO. The same applies to UNI 11919-1:2023, which refers to the GRI model, or the SASB, which generically establishes that “the metrics in the SASB standards should, where feasible and appropriate, align with metrics contained in other reporting standards or regulations and/or with metrics that are already in use within an industry”. This continuous reference to additional standards, although it may represent an integration in an extensive sense, could be a further source of confusion and distancing from homogeneity and comparability.

5. Discussion

The steps to measure double materiality could be of a “macro” and “micro” nature. The macro ones could include the steps identified by UNI 11919-1:2023, namely, (i) “identification of stakeholders”; (ii) “analysis of material topics”; (iii) “construction of the materiality matrix” (disclosure). Within each of them, and especially with regard to point (ii), it will be necessary to prioritize the material topics based on their relative importance and determine the information to disclose about material matters (as established by the IIRC). Finally, as established by the SASB, it will be appropriate to adopt research and continuous monitoring practices and consider stakeholder involvement. In the “analysis of material topics”, companies are asked to estimate not only their relevance (through the measurement of scale, scope and remediability, as suggested by EFRAG), but also the probability, consequences and possibility of dealing with the risk of material events (as established by UNI 11919-1:2023). Figure 2 illustrates the steps for measuring double materiality.

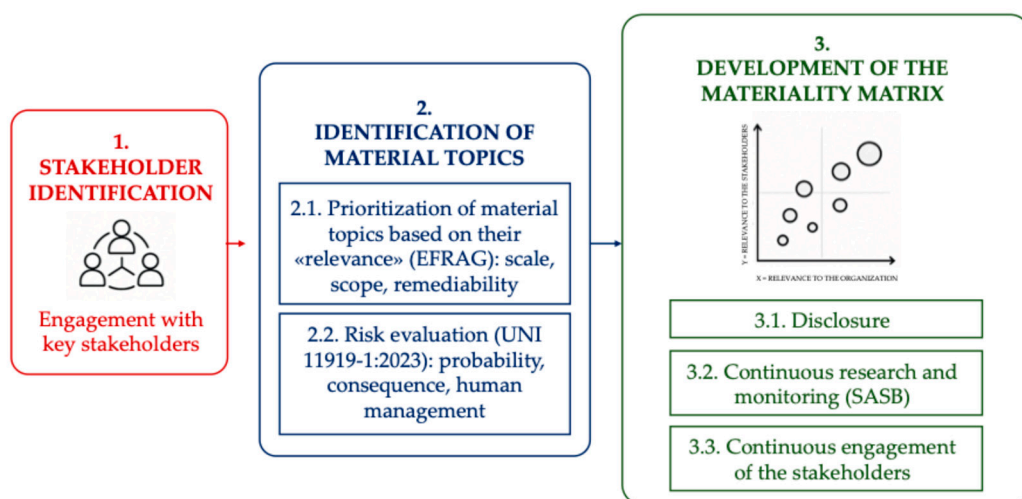


Figure 2. Proposal for homogeneous standard guidelines. Source: Personal elaboration by the authors.

5.1. Discretion or Determinism in Defining Double Materiality Measurement Guidelines?

Findings highlight numerous similarities between the various standards, but also several differences that may raise questions about the reliability of the assessment of double

materiality and the comparability of non-financial reporting, especially between companies operating in the same sector and located in neighboring geographical areas (but not only). The presence of different standards, each of which explicitly refers to the use of additional measurement standards, would be acceptable if companies called upon to measure double materiality had the skills to navigate the sea of sustainability reporting. However, in the absence of particular skills, competences and company departments responsible for measurement (often, small companies have no knowledge of ESG issues, and cannot easily access external consultancy services, which are expensive), the high variability of the standards and the heterogeneity of the guidelines can create (and actually creates) dispersion. Some focal points arise from this, namely, (i) why should a company choose one standard rather than another? (ii) Would it be better to leave broad discretion to companies in measuring double materiality, or would it be better to conceptualize the measurement and make it “the same for everyone”, to facilitate replicability of methods and comparability of results?

The choice of one standard over another currently depends on the type of company (e.g., sector and size) and the skills acquired by the personnel called to perform the measurement. However, the choice of a standard is said to be “of convenience”, that is, it depends on the time available to a company, or on the complexity of the standard to be applied. Where there is greater discretion, the application should be simpler. This, as already anticipated, could distort the system and compromise the information communicated externally. The issue of discretion in the application of materiality measurement methodologies is discussed by Ward Heimdal [65], as the different types of standards are evident, which leave more or less room for discretion. What emerges from this research fuels doubts about the reliability/quality of the information reported in non-financial balance sheets, which by definition should be a transparent tool for external communication. The identification of a single (or universally accepted) standard, as may be the case with ISO 59020:2024 [66] for circular economy assessment or the under-development ISO 14055 [67] for natural capital accounting, could improve transparency [68] and reduce the margin of dispersion between the different standards and contribute to the identification of a homogeneous methodology for measuring double materiality.

In other words, if companies have the chance to choose at their discretion “how” to measure double materiality and “which” information to report, the likelihood that they will choose the easiest (often the least sustainable) path is high, as demonstrated by previous studies on other circularity measurement standards [69]. In the absence of a common standard or a common questionnaire (as that provided by the UNI/PdR 18:2016), it would be desirable to identify at least some common pillars (e.g., a package of minimum questions) that are equal for all companies, regardless of the sector or product category, to make even different companies (or similar ones) comparable to each other. This need arises in the light of the different materiality themes promoted by EFRAG, GRI or by UNI 11919-1:2023. The first and the second identify the topics (level 1) in ESG themes, referring to “environmental”, “social”, and “governance”. The themes proposed by UNI 11919-1:2023, borrowed from the international standard ISO 26000, expand the categories from three to seven, as follows: (i) organizational governance; (ii) human rights; (iii) labor relations and conditions; (iv) environment; (v) best management practices; (vi) specific consumer needs; (vii) community engagement and development. This expansion, rather than complicating the analysis of double materiality, could facilitate it since it declines the theme of “social sustainability”, still nuanced [70], in topics that are more usable by organizations (e.g., labor relations and conditions, community engagement and development). This could facilitate the interpretation of the “social sustainability” pillar by companies and by stakeholders.

Primary topics (level 1) must be clear and common for all companies. Once the primary topics (level 1) have been accepted, organizations must then proceed to the identification and prioritization of the most suitable subtopics (level 2). In this direction, the GRI identifies specific material topics for each sector, which can be taken into consideration according to the needs of each company. To date, only those relating to oil and gas (GRI 11), goal (GRI 12), agriculture, aquaculture, and fishing (GRI 13) and mining (GRI 14) are available. In the absence of sector-specific subtopics, companies may refer to topic-specific standards, as identified by the GRI. Precisely, economic topic-specific standard goes from GRI 201 to GRI 207, environmental topic-specific standards from GRI 301 to GRI 308, and social topic-specific standards from GRI 401 to GRI 418 (see Section 4.4). In line with Section 2.3, the assessment of double materiality is inherently complex and varies according to the specific sector and company size. Nevertheless, each organization is required to prioritize the identification of material topics (see Section 2.1, Figure 2), giving precedence to those most relevant to its business operations during the selection process. The question of comparability and the establishment of a “common assessment basis” must enable comparison across both sectoral and dimensional boundaries. Furthermore, different sectors can be compared with respect to specific indicators, such as water stress or child labor, when appropriate. Cross-sectoral comparisons are essential not only to evaluate the economic, social, and environmental progress within individual sectors but also to understand the performance of diverse companies operating within a given geographical context. For this reason, the diversity of sectors and company sizes should not be used as a lever for “discretion in measurement,” but as a further element of convergence for inter-sectoral and cross-sectoral assessments, on the basis of common variables and indicators.

One possible “common path” for measuring double materiality is provided by the checklist identified in Table 4, which borrows (and combines) the ideas developed by EFRAG, ISO 26000 and GRI. This “common path” does not mean that all companies must disclose all variables within their non-financial report. If this were the case, the concept of “identification” and “prioritization” of material topics would be lost, and the (unachievable) ideal of a super-standard would be pursued, making double materiality assessment quite impossible for most of the SMEs asked to adopt the CSRD. On the contrary, the “common path” aims to establish a unified foundation applicable to all companies, regardless of sector or size, from which each organization can select the most relevant variables according to the seven identified topics. This shared base serves as a comprehensive repository of potential indicators, obviating the need to integrate disparate standards or rely on reports that may be inaccessible. By grounding all disclosures in a single theoretical framework, the common path reduces discretionary variability and enhances comparability across non-financial reports.

Table 4. Topics and subtopics toward a “common path” for measuring double materiality. Source: Personal elaboration by the authors.

TOPIC (ISO 26000)	SECTORS			
	Oil and gas (GRI 11)	Coal (GRI 12)	Agr. Aqua. Fis. (GRI 13)	Mining (GRI 14)
ORGANIZATIONAL GOVERNANCE	Anti-competitive behavior		Anti-competitive behavior	
	Anti-corruption	Anti-corruption	Anti-corruption	Anti-corruption
	Payments to governments	Payments to governments		Payments to governments
	Public policy	Public policy	Public policy	Public policy

Table 4. Cont.

TOPIC (ISO 26000)	SECTORS			
	Oil and gas (GRI 11)	Coal (GRI 12)	Agr. Aqua. Fis. (GRI 13)	Mining (GRI 14)
HUMAN RIGHTS	Occupational health and safety Non-discrimination and equal opportunity Forced labor and modern slavery	Occupational health and safety Non-discrimination and equal opportunity Forced labor and modern slavery Child labor	Occupational health and safety Non-discrimination and equal opportunity Forced or compulsory labor Child labor	Occupational health and safety Non-discrimination and equal opportunity Forced labor and modern slavery Child labor
LABOR RELATIONS AND CONDITIONS	Employment practices Freedom of association and collective bargaining	Employment practices Freedom of association and collective bargaining	Employment practices Freedom of association and collective bargaining Living income and living wage	Employment practices Freedom of association and collective bargaining
ENVIRONMENT	GHG emissions Climate adaptation, resilience, and transition Air emissions Biodiversity Waste Water and effluents Closure and rehabilitation	GHG emissions Climate adaptation, resilience, and transition Air emissions Biodiversity Waste Water and effluents Closure and rehabilitation	Emissions Climate adaptation and resilience Biodiversity Waste Water and effluents Natural ecosystem conversion Pesticides use Soil health	GHG emissions Climate adaptation and resilience Air emissions Biodiversity Waste Water and effluents Closure and rehabilitation Tailings
BEST MANAGEMENT PRACTICES	Asset integrity and critical incident management	Asset integrity and critical incident management	Animal health and welfare	Security practices Critical incident management
SPECIFIC CONSUMER NEEDS			Food safety Food security Supply chain traceability	
COMMUNITY ENGAGEMENT	Economic impacts Local communities Land and resource rights Rights of indigenous people Conflict and security	Economic impacts Local communities Land and resource rights Rights of indigenous people Conflict and security	Economic inclusion Local communities Land and resource rights Rights of indigenous people	Economic impacts Local communities Land and resource rights Rights of indigenous people Artisanal and small-scale mining Conflict-affected and high-risk areas

Note: Agr. Aqua. Fis. = Agriculture, Aquaculture, Fishing.

As illustrated in Table 4, there are many subtopics that are repeated within different sectors (e.g., emissions, waste, child labor, local communities, etc.). This suggests that, even in the absence of sector-specific standards, many subtopics can be easily adapted.

5.2. How to Translate Material and Financial Impacts into Concrete Corporate Strategies?

Double materiality assessment, considering its scale, scope, and remediability, alongside the quantification of risks associated with material topics, represents only the initial step in identifying corporate strategies aimed at improving ESG performance. Addressing financial materiality demands specialized expertise in detecting, analyzing, and interpreting material risks and opportunities so that they may translate into future cash flows and enhance enterprise value over the short-, medium-, and long-term. In this regard, it is crucial to move from theoretical constructs to practical application. To this extent, the topic of biodiversity loss in terms of natural capital (topic: “Environment”; subtopic: “Biodiversity”) may be considered as an example. Translating a qualitative biodiversity risk rating into a quantitative financial forecast typically involves several steps. First, firms should map the qualitative assessment (i.e., “minimal impact,” “informative,” “important,” “significant” or “critical”) [21,51] to a set of scenario parameters, such as the probability of regulatory fines, remediation costs, or reputational damages under each risk category [58]. Next, these parameters are assigned monetary values based on historical data, expert elicitation, or benchmark studies, such as remediation costs per hectare of degraded habitat or industry-specific penalty rates for biodiversity infractions [22,47]. Firms then employ deterministic or stochastic financial models (e.g., discounted cash flow or Monte Carlo simulation) to project the expected cost distribution over the planning horizon, integrating biodiversity impacts into cash-flow forecasts and enterprise value assessments [51,56,57]. Lastly, sensitivity analyses are conducted to test the robustness of forecasts under varying assumptions, thereby enabling decision-makers to quantify the potential financial exposure associated with biodiversity risks and to prioritize mitigation strategies accordingly.

This iterative process of translating qualitative variables into quantitative metrics is essential and constitutes the immediate subsequent step following the assessment of double materiality.

5.3. Graphic Communication of the Double Materiality

The graphical representation is a further element of heterogeneity between the various standards. EFRAG does not refer to the adoption of a double materiality matrix with an XY scatter diagram, preferring double-entry tables. UNI 11919-1:2023, on the contrary, prefers the scatter diagram [23]. Figure 3 illustrates a possible graphical solution that takes into account the seven topics (level 1) and the various subtopics (level 2), as integrated in Table 4. The graphical representation must follow the logical flow of the questions contained within the questionnaire, and must allow the threshold values (thresholds) to be immediately identified. In this case, the thresholds identified by EFRAG could represent the point toward a “common path”.

As recommended by UNI 11919-1:2023, the assessment of double materiality should be conducted on a non-fixed schedule, tailored to each organization’s circumstances. A scatter-plot diagram, whose construction does not require advanced mathematical skills, may be produced at regular intervals (e.g., every two to three years, as suggested by the standard) or in response to specific corporate events, such as the establishment of a new production line, the adoption of environmentally stringent policies, or the onboarding of new suppliers or clients. Performing a double materiality analysis either periodically or following defined triggers enables organizations to track their ESG trajectories over time and to delineate clearly the transition path undertaken. Moreover, the use of a materiality

matrix facilitates stakeholder comprehension by immediately highlighting progress or regression on a given topic (level 1) and its associated subtopics (level 2). Lastly, the key differences can be explicitly highlighted within sustainability reports, complementing the illustrations of the materiality matrices.

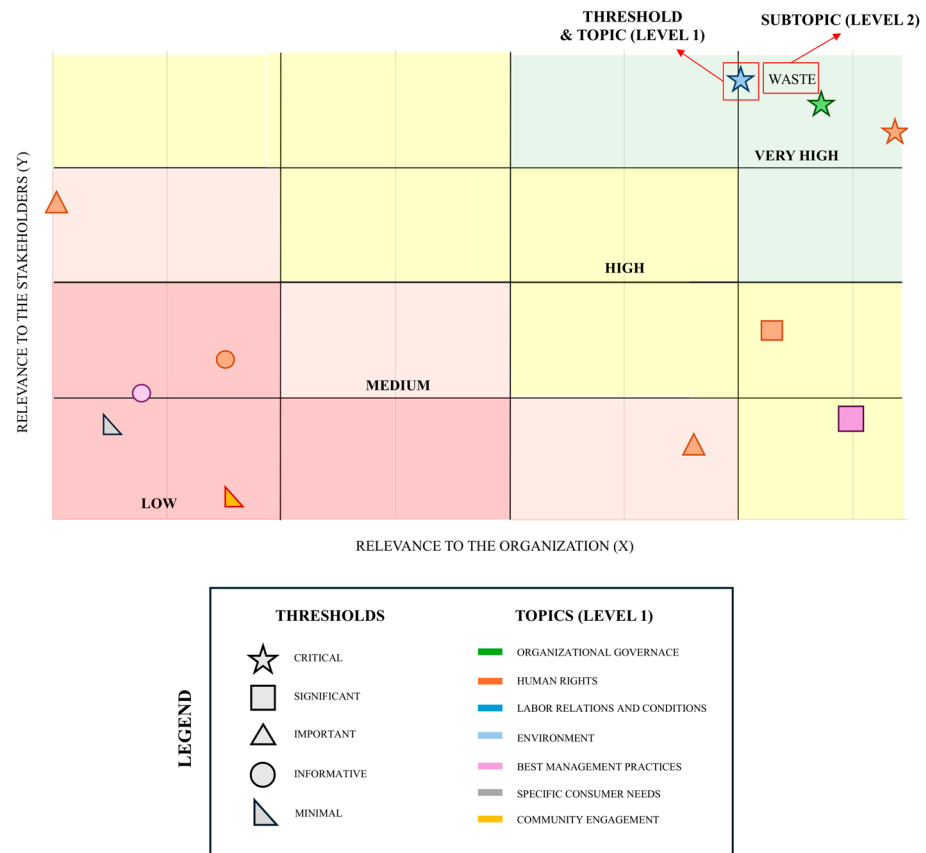


Figure 3. Graphical illustration toward a “common path” for measuring double materiality. Note: Each element indicated in the materiality matrix is composed of a symbol, a color and a text. The symbol indicates the value achieved (e.g., critical and minimal). The color indicates the reference topics (level 1) (e.g., human rights and environment). The text indicates, in detail, the subtopic (level 2) being evaluated (e.g., waste). Source: Personal elaboration by the authors.

In practice, some companies assess double materiality by assigning a different weight depending on the type of stakeholders. This is the case of Company X [71], which established an “identification of stakeholder categories by assigning a different weight based on the relevance of the stakeholders”, or Company Y [72], which in the 2023 impact materiality results stated that “the management assessment was weighted at 60%, while that of external stakeholders at 40%”. Company Y, in 2024, eliminated the discrepancy between internal and external stakeholders, confirming the tendency to give all stakeholders the same weight, toward a homogeneous assessment of materiality. EFRAG requires giving “equal importance” to both financial and impact materiality, without assigning a different weight to stakeholders [21].

6. Conclusions

This research investigated the similarities and divergences among seven double materiality assessment standards, with the aim of identifying a comparable path towards the creation of a set of homogeneous guidelines. The analysis was conducted through the use of content analysis, and data were collected by answering nine AQs of either a generic (e.g., AQ1: “Which is the definition of materiality adopted in the standard?”) or specific nature

(e.g., AQ8: “Does the standard identify thresholds?”). The critical points identified by this study concern the lack of homogeneity in the standards present at the international level, with the risk of companies being dispersed (in the choice and application of a standard) and reducing the transparency and comparability of the results pursued. Furthermore, as already highlighted by other studies on the measurement of circularity, if companies can choose “how” to measure double materiality and “which” information to report, the likelihood that they will choose the easiest (often the least sustainable) path is high. Therefore, a legislative intervention is needed that tends to “standardize” the measurement of double materiality and make it as homogeneous as possible, while respecting the (implicit) differences that exist between one application sector and another (often very different from each other).

Findings from this research highlighted the need to integrate methodological aspects proposed by EFRAG, UNI 11919-1:2023 and GRI, which represent the “most complete” and “less discretionary” standards among those analyzed. Companies that intend to measure double materiality must pay attention to some essential aspects, including (i) the identification of key stakeholders, who must also be continuously involved and updated during the process of measuring double materiality; (ii) the identification of material topics, with regard to “relevance” in terms of scale, scope and remediability and to “risk” in terms of probability, consequence and human management ability; (iii) development of a double materiality matrix, with the purposes of transparent disclosure, continuous monitoring and continuous involvement. Therefore, the measurement of double materiality is dynamic, not static. The choice of topics and subtopics can be made by looking at seven macro-categories and numerous subcategories, as long as they are standardized (and not highly variable), while the choice of graphic representation can follow the shapes of the XY scatter diagram, with the relevance that the topics have for the organization on the X-axis and the relevance for the stakeholders on the Y-axis.

The process toward transparent non-financial reporting is intricate, but a high level of standardization (and homogenization) can benefit the replicability of methods and the comparability of results.

Limitations and Future Research Directions

This study is limited to the analysis of seven frameworks for assessing double materiality and does not consider other potentially relevant international practices, such as the Carbon Disclosure Project (CDP), the Climate Disclosure Standards Board (CDSB) or the International Sustainability Standards Board (ISSB). Furthermore, it does not seek to compare empirical evidence by analyzing original sustainability reports, but instead focuses on the theoretical underpinnings of double materiality assessment. While it is true that practical applications and empirical evidence often serve as the basis for company-level analyses, particularly in the assessment of comparable scenarios, this initial study prioritizes the theoretical dimension as the foundational basis for understanding and measuring double materiality.

The application of materiality remains relatively limited, mostly adopted by large companies that are more advanced in their sustainability reporting. Materiality, in its most strategic and comprehensive sense, holds significant potential to inform both governance and corporate strategy. However, its implementation is still uneven. In this light, this research tried to provide a methodological simplification (and standardization) that may facilitate broader adoption of materiality assessments, particularly among SMEs and in geographical areas where non-financial reporting is still far from being adopted. Ongoing research is currently examining the practical implementation of the theoretical guidelines proposed in this study, with the aim of testing the applicability and feasibility of this

model in SMEs, which will be required to comply with the forthcoming CSRD mandates on non-financial disclosure. Further empirical evidence and model testing may lead to a refined version of the framework and allow for potential sector-specific and size-specific adjustments, given the need for supervisory bodies to verify the substance of disclosures in sustainability reports. In the absence of an applicable sector standard or an appropriate vigilance, critical material and financial issues risk being relegated to the sub-topic level or even omitted. Lastly, it is essential to ensure that double materiality analyses do not devolve into mere compliance-driven, box-ticking exercises. To achieve this, it is necessary that companies implementing and measuring such practices receive appropriate incentives, both indirect, such as increased loyalty from customers and suppliers, and direct, including tax relief or other financial support mechanisms (e.g., facilitated access to credit).

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References

1. Cicchini, D.; Cotana, M.L.; Filocamo, M.R.; Galeotti, R.M. Sustainability reporting practices in SMEs. A systematic study and future avenues. *Piccola Impresa Small Bus.* **2024**. [CrossRef]
2. Setyaningsih, S.; Widjojo, R.; Kelle, P. Challenges and opportunities in sustainability reporting: A focus on small and medium enterprises (SMEs). *Cogent Bus. Manag.* **2024**, *11*, 2298215. [CrossRef]
3. Chen, L.; Qalati, S.A.; Fan, M. Effects of sustainable innovation on stakeholder engagement and societal impacts: The mediating role of stakeholder engagement and the moderating role of anticipatory governance. *Sustain. Dev.* **2025**, *33*, 2406–2428. [CrossRef]
4. Matarazzo, M.; Oduro, S.; Gennaro, A. Stakeholder engagement for sustainable value co-creation: Evidence from made in Italy SMEs. *Bus. Ethics Environ. Responsib.* **2025**, *34*, 347–361. [CrossRef]
5. United Nations. The 17 Goals. Available online: <https://sdgs.un.org/goals> (accessed on 18 June 2025).
6. Kaur, A.; Argento, D.; Sharma, U.; Soobaroyen, T. Everything, everywhere, all at once: The role of accounting and reporting in achieving sustainable development goals. *J. Public Budg. Account. Financ. Manag.* **2025**, *37*, 137–155. [CrossRef]
7. Gudmundsdottir, S.; Sigurjonsson, T.O. A Need for Standardized Approaches to Manage Sustainability Strategically. *Sustainability* **2024**, *16*, 2319. [CrossRef]
8. Official Journal of the European Union. (2014/195/EU): Council Decision of 17 February 2014 authorising Member States to sign, ratify or accede to the Cape Town Agreement of 2012 on the Implementation of the Provisions of the Torremolinos Protocol of 1993 relating to the Torremolinos International Convention for the Safety of Fishing Vessels, 1977 Text with EEA relevance. *Off. J. Eur. Union.* **2014**, *106*, 4–6.
9. Official Journal of the European Union. Directive (EU) 2022/2464 of the European Parliament and of the Council of 14 December 2022 amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU, as regards corporate sustainability reporting. *Off. J. Eur. Union.* **2022**, *322*, 15–80.

10. Cardoni, A.; Kiseleva, E. Do SMEs have an ESG communication strategy? Exploring the quality and influencing factors of voluntary ESG disclosures using web-based and annual report channels. *Bus. Strategy Environ.* **2025**, *34*, 1267–1286. [CrossRef]
11. Momtaz, P.P.; Parra, I.M. Is sustainable entrepreneurship profitable? ESG disclosure and the financial performance of SMEs. *Small Bus. Econ.* **2025**, *64*, 1535–1564. [CrossRef]
12. He, J.; Zhang, Z. To whom are directors accountable? Stakeholder governance and the controversy over the amendment to Article 382-3 of the Korean Commercial Act. *Cogent Soc. Sci.* **2025**, *11*, 2524582. [CrossRef]
13. Diwan, H.; Amarayil Sreeraman, B. From financial reporting to ESG reporting: A bibliometric analysis of the evolution in corporate sustainability disclosures. *Environ. Dev. Sustain.* **2024**, *26*, 13769–13805. [CrossRef]
14. Barroso-Méndez, M.J.; Pajuelo-Moreno, M.-L.; Gallardo-Vázquez, D. A meta-analytic review of the sustainability disclosure and reputation relationship: Aggregating findings in the field of social and environmental accounting. *Sustain. Account. Manag. Policy J.* **2024**, *15*, 1210–1254. [CrossRef]
15. Baboukardos, D.; Gaia, S.; Lassou, P.; Soobaroyen, T. The multiverse of non-financial reporting regulation. *Account. Forum* **2023**, *47*, 147–165. [CrossRef]
16. European Commission. The Commission Adopts the European Sustainability Reporting Standards. 2023. Available online: https://finance.ec.europa.eu/news/commission-adopts-european-sustainability-reporting-standards-2023-07-31_en (accessed on 18 June 2025).
17. European Commission. Corporate Sustainability Reporting. 2025. Available online: https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en (accessed on 18 June 2025).
18. Fiandrino, S.; Tonelli, A.; Devalle, A. Sustainability materiality research: A systematic literature review of methods, theories and academic themes. *Qual. Res. Account. Manag.* **2022**, *19*, 665–695. [CrossRef]
19. Calace, D. Materiality: From accounting to sustainability and the SDGs. In *Responsible Consumption and Production*; Leal Filho, W., Azul, A., Brandli, L., Özuyar, P., Wall, T., Eds.; Encyclopedia of the UN Sustainable Development Goals; Springer: Cham, Switzerland, 2019.
20. Jørgensen, S.; Mjøs, A.; Pedersen, L.J.T. Sustainability reporting and approaches to materiality: Tensions and potential resolutions. *Sustain. Account. Manag. Policy J.* **2022**, *13*, 341–361. [CrossRef]
21. EFRAG. EFRAG Workstreams. 2025. Available online: <https://www.efrag.org/en/sustainability-reporting/esrs-workstreams> (accessed on 18 June 2025).
22. GRI. GRI 3: Material Topics 2021. 2024. Available online: <https://www.globalreporting.org/how-to-use-the-gri-standards/gri-standards-english-language/> (accessed on 18 June 2025).
23. UNI 11919-1:2023; Modello Applicativo Nazionale Della UNI EN ISO 26000:2020—Parte 1: Indirizzi Applicativi Alla UNI EN ISO 26000 Guida Alla Responsabilità Sociale. UNI: Milano, Italy, 2023. Available online: <https://store.uni.com/uni-11919-1-2023> (accessed on 18 June 2025).
24. Garst, J.; Maas, K.; Suijs, J. Materiality assessment is an art, not a science: Selecting ESG topics for sustainability reports. *Calif. Manag. Rev.* **2022**, *65*, 64–90. [CrossRef]
25. Bernstein, L.A. The concept of materiality. *Account. Rev.* **1967**, *42*, 86–95. Available online: <http://www.jstor.org/stable/243978> (accessed on 18 June 2025).
26. Jones, P.; Hillier, D.; Comfort, D. Materiality and external assurance in corporate sustainability reporting: An exploratory study of Europe’s leading commercial property companies. *J. Eur. Real. Estate Res.* **2016**, *9*, 147–170. [CrossRef]
27. Frishkoff, P. An empirical investigation of the concept of materiality in accounting. *J. Account. Res.* **1970**, *8*, 116–129. [CrossRef]
28. Lakshan, A.M.I.; Low, M.; de Villiers, C. Challenges of, and techniques for, materiality determination of non-financial information used by integrated report preparers. *Meditari Account. Res.* **2022**, *30*, 626–660. [CrossRef]
29. Delgado-Ceballos, J.; Ortiz-De-Mandojana, N.; Antolín-López, R.; Montiel, I. Connecting the Sustainable Development Goals to firm-level sustainability and ESG factors: The need for double materiality. *BRQ Bus. Res. Q.* **2023**, *26*, 2–10. [CrossRef]
30. Barker, R.; Mayer, C. Seeing double corporate reporting through the materiality lenses of both investors and nature. *Account. Forum* **2025**, *49*, 259–289. [CrossRef]
31. De Cristofaro, T.; Gulluscio, C. In search of double materiality in non-financial reports: First empirical evidence. *Sustainability* **2023**, *15*, 924. [CrossRef]
32. Goswami, K.; Islam, M.K.S.; Evers, W. A case study on the blended reporting phenomenon: A comparative analysis of voluntary reporting frameworks and standards—GRI, IR, SASB, and CDP. *Int. J. Sustain. Policy Pract.* **2023**, *19*, 35–64. [CrossRef]
33. Biondi, Y.; Haslam, C.; Malberti, C. *ELI Guidance on Company Capital and Financial Accounting for Corporate Sustainability*; European Law Institute: Vienna, Austria, 2023; ISBN 9783950531817. Available online: <https://ssrn.com/abstract=4339435> (accessed on 7 July 2025).
34. Mio, C.; Fasan, M.; Costantini, A. Materiality in integrated and sustainability reporting: A paradigm shift? *Bus. Strategy Environ.* **2020**, *29*, 306–320. [CrossRef]

35. Official Journal of the European Union. Report from the Commission to the European Parliament, the Council and the European Economic and Social Committee on the Review Clauses in Directives 2013/34/EU, 2014/95/EU, and 2013/50/EU (SWD (2021) 81 Final). 2021. Available online: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021DC0199> (accessed on 18 June 2025).
36. Hummel, K.; Jobst, D. An overview of corporate sustainability reporting legislation in the European Union. *Account. Eur.* **2024**, *21*, 320–355. [\[CrossRef\]](#)
37. Raith, D. The contest for materiality. What counts as CSR? *J. Appl. Account. Res.* **2023**, *24*, 134–148. [\[CrossRef\]](#)
38. Odobaša, R.; Marošević, K. Expected contributions of the European corporate sustainability reporting directive (CSRD) to the sustainable development of the European Union. *EU Comp. Law. Issues Chall. Ser.* **2023**, *7*, 593–612. [\[CrossRef\]](#)
39. Primec, A.; Belak, J. Sustainable CSR: Legal and managerial demands of the new EU legislation (CSRD) for the future corporate governance practices. *Sustainability* **2022**, *14*, 16648. [\[CrossRef\]](#)
40. Ahmad, H.; Yaqub, M.; Lee, S.H. Environmental-, social-, and governance-related factors for business investment and sustainability: A scientometric review of global trends. *Environ. Dev. Sustain.* **2024**, *26*, 2965–2987. [\[CrossRef\]](#) [\[PubMed\]](#)
41. Cooper, S.; Michelon, G. Conceptions of materiality in sustainability reporting frameworks: Commonalities, differences and possibilities. In *Handbook of Accounting and Sustainability*; Edward Elgar Publishing: Cheltenham, UK, 2022; pp. 44–66. [\[CrossRef\]](#)
42. Boiral, O.; Henri, J.F. Is sustainability performance comparable? A study of GRI reports of mining organizations. *Bus. Soc.* **2017**, *56*, 283–317. [\[CrossRef\]](#)
43. Adams, C.A.; Druckman, P.B.; Picot, R.C. *Sustainable Development Goals Disclosure (SDGD) Recommendations*; ACCA: London, UK, 2020. Available online: <https://integratedreporting.ifrs.org/resource/sustainable-development-goals-disclosure-sdgd-recommendations/> (accessed on 23 June 2025).
44. International Integrated Reporting Council (IIRC). *The International Framework*; IIRC: London, UK, 2021; Available online: https://integratedreporting.ifrs.org/wp-content/uploads/2024/08/IntegratedReporting_Framework_061024.pdf (accessed on 23 June 2025).
45. Adams, C.A.; Alhamood, A.M.; He, X. The development and implementation of GRI standards: Practice and policy issues. In *Handbook of Accounting and Sustainability*; Edward Elgar Publishing: Cheltenham, UK, 2022; pp. 26–43. [\[CrossRef\]](#)
46. GRI. *G4 Sustainability Reporting Guidelines*; Global Sustainability Standards Board (GSSB): Amsterdam, The Netherlands, 2013.
47. GRI. *GRI Universal Standards: GRI 101, GRI 102, and GRI 103—Exposure Draft*; Global Sustainability Standards Board (GSSB): Amsterdam, The Netherlands, 2020.
48. *ISO 26000:2020; Social responsibility*. ISO: Geneva, Switzerland, 2020.
49. CDP. *Supply Chain Report 2022*. Available online: <https://www.cdp.net/> (accessed on 7 July 2025).
50. Sullivan, R.; Gouldson, A. Environmental Policy and Business Strategy: Towards a Framework for Materiality Assessment. *J. Environ. Manag.* **2017**, *204*, 636–647.
51. EFRAG. *European Sustainability Reporting Standards (ESRS)*. Available online: <https://www.efrag.org> (accessed on 7 July 2025).
52. European Commission. *Guidelines on Non-Financial Reporting: Supplement on Reporting Climate-Related Information*. 2019. Available online: <https://ec.europa.eu/> (accessed on 7 July 2025).
53. Adams, C.A.; Alhamood, A.; He, X.; Tian, J.; Wang, L.; Wang, Y. *The Double-Materiality Concept Application and Issues*; Global Reporting Initiative: Amsterdam, The Netherlands, 2021.
54. GRI. *GRI 101: Foundation*; Global Sustainability Standards Board (GSSB): Amsterdam, The Netherlands, 2016.
55. SASB. *SASB Standards overview*. Available online: <https://sasb.ifrs.org/standards/> (accessed on 23 June 2025).
56. SASB. *SASB Conceptual Framework*; Sustainability Accounting Standards Board: San Francisco, CA, USA, 2017; Available online: <https://sasb.ifrs.org/wp-content/uploads/2019/05/SASB-Conceptual-Framework.pdf> (accessed on 23 June 2025).
57. SASB. *Proposed Changes to the SASB Conceptual Framework and Rules of Procedure: Bases for Conclusions and Invitation to Comment on Exposure Drafts*; Sustainability Accounting Standards Board: San Francisco, CA, USA, 2020. Available online: https://sasb.org/wp-content/uploads/2021/07/PCP-package_vF.pdf (accessed on 23 June 2025).
58. Task Force on Climate-related Financial Disclosures (TCFD). *Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures*; TCFD: Basel, Switzerland, 2017. Available online: <https://www.fsb-tcfd.org/> (accessed on 23 June 2025).
59. Benameur, K.B.; Mostafa, M.M.; Hassanein, A.; Shariff, M.Z.; Al-Shattarat, W. Sustainability reporting scholarly research: A bibliometric review and a future research agenda. *Manag. Rev. Q.* **2024**, *74*, 823–866. [\[CrossRef\]](#)
60. Amicarelli, V.; Aluculesei, A.C.; Lagioia, G.; Pamfilie, R.; Bux, C. How to manage and minimize food waste in the hotel industry? An exploratory research. *Int. J. Cult. Tour. Hosp. Res.* **2022**, *16*, 152–167. [\[CrossRef\]](#)
61. Babbie, E. *The Practice of Social Research*, 15th ed.; Cengage Learning: Boston, MA, USA, 2020.
62. Bryman, A. Quantitative and qualitative research: Further reflections on their integration. In *Mixing Methods: Qualitative and Quantitative Research*; Brannen, J., Ed.; Avebury: Brookfield, VT, USA, 1992; pp. 57–78.
63. Denzin, N.K.; Lincoln, Y.S. Introduction: The discipline and practice of qualitative research. In *The Sage Handbook of Qualitative Research*; Denzin, N.K., Lincoln, Y.S., Eds.; Sage Publications: Thousand Oaks, CA, USA, 2005; pp. 1–32.

64. UNI/PdR 18:2016; Responsabilità Sociale Delle Organizzazioni—Indirizzi Applicativi Alla UNI ISO 26000. UNI: Milano, Italy, 2016. Available online: <https://store.uni.com/uni-pdr-18-2016> (accessed on 18 June 2025).
65. Ward Heimdal, J. The Impact of Discretionary Sustainability Disclosure on Sustainability Performance. An Analysis of Firms in the Petroleum Industry and Their Greenhouse Gas Emissions. Master's Thesis, Copenhagen Business School, Copenhagen, Denmark, 2023; pp. 1–130.
66. ISO 59020:2024; Circular Economy—Measuring and Assessing Circularity Performance. ISO: Geneva, Switzerland, 2024.
67. ISO 14055; Environmental Management—Guidelines for Establishing Good Practices for Combatting Land Degradation and Desertification. ISO: Geneva, Switzerland, 2017.
68. Bahnaru, R.; Hlaciuc, E. Circular economy measurement tools, challenges, and global standardization. *Eur. J. Account. Financ. Bus.* **2024**, *12*, 102–110. [[CrossRef](#)]
69. Amicarelli, V.; Misino, E.; Primiceri, M.; Bux, C. An application of the UNI/TS 11820:2022 on the measurement of circularity in an electronic equipment manufacturing organization in Italy. *J. Clean. Prod.* **2023**, *420*, 138439. [[CrossRef](#)]
70. Nilsson, C.; Levin, T.; Colding, J.; Sjöberg, S.; Barthel, S. Navigating complexity with the four pillars of social sustainability. *Sustain. Dev.* **2024**, *32*, 5929–5947. [[CrossRef](#)]
71. Da.Mi. Bilancio di Sostenibilità 2023. 2024. Available online: https://dami.it/wp-content/uploads/2024/10/Dami-Bilancio-di-Sostenibilita-2023_compressed.pdf (accessed on 24 June 2025).
72. Sofidel. Clean Living. Report Integrato 2023. 2024. Available online: https://report-integrato.sofidel.com/wp-content/uploads/2024/06/Sofidel_Report_integrato_2023_IT.pdf (accessed on 24 June 2025).

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