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Environmental, Social and Governance issues: a journey towards the integration of financial and sustainability information

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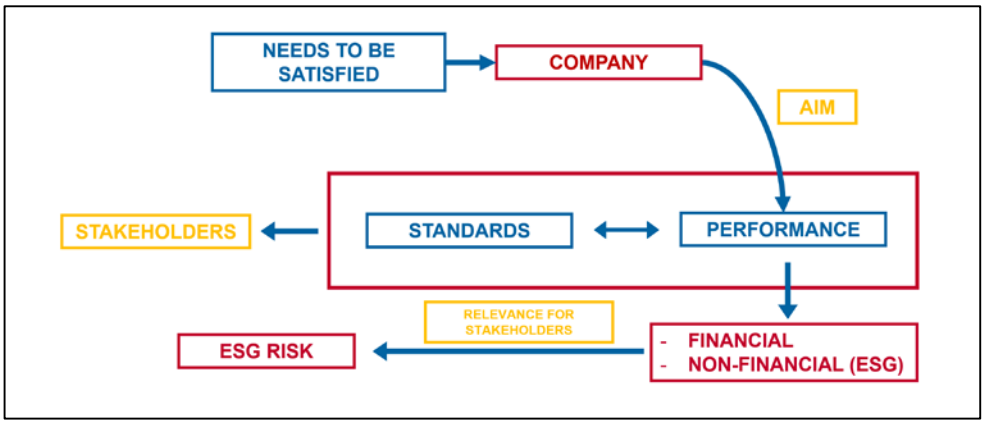
1. Introduction

Corporates are a set of people and assets that have to produce goods and provide services with the aim of satisfying human beings (Ferrero, 1987). The satisfaction of human beings must be pursued in a context characterized by an economic-financial *equilibrium* in the medium-long term. Thus, corporates may be defined as **dynamic system** (Brusa, 2013). In more detail, the definition makes reference to system because of the different elements that characterize the same company, framed in the overall structure and its functioning that are tied by their interdependence (e.g. machineries have to be supervised by people). On the contrary, the term "dynamic" is linked to the interdependence, namely the relationships that connect the several functions pertaining to a system (e.g. marketing, innovation and production). Therefore, in dynamic systems, several subjects establish relationships since the proximity of their interests. These subjects may be deemed as stakeholders since they are characterized by a "stake", or more in general, an interest, in the companies. Thus, companies have to provide adequate information to the stakeholders (Brusa, 2013; Ferrero, 1987). Nevertheless, core businesses and corporate objective's must be pursued in a context characterised by corporate's *equilibria,* that generally have been framed in the **economic-financial performance**. Thus, companies focused on the mere disclosure relating to key performance indicators such as EBITDA, ROI, ROE, Leverage etc. (Cantino, 2002; Pisoni and Devalle, 2016). Economic and financial disclosure may be defined as the production of information flows from the enterprise to the actual and potential users of this information (Ferrero, 1966; Ferrero, 1988; Onida, 1979), with the aim of spreading knowledge linked to the current and future economic and financial status. Disclosure has been boosted in the last few years due to many events. First of all, thanks to the globalization that led to, among the others, a more favorable access to the national and international markets. This evolution required different interventions from the

institutions (e.g. issue of International Financial Reporting Standards, IFRS and International Accounting Standards, IAS). Indeed, the most important inputs that are used by all the categories of stakeholders are financial statements. In other words, this rapid and wide enlargement of the financial market's boundaries has led the companies to evolve their economic and financial disclosure, ensuring transparency amid companies and markets (Devalle, 2010). Nevertheless, this evolution has led towards the need for reporting **sustainability disclosure** as well. This need has been rapidly enhancing and thus it deserves to be widely studied by academia and practice. The aim is to manage a transition towards an economy relying much more on sustainability matters. In this way, sustainability refers to the three-dimensional issues **Environmental Social and Governance (ESG)** that, when considered together, implicate a synergic and systemic relationship other than a growing environmental, social and economic balance. As a matter of fact, ESG configures itself as a corporate performance that deserves attention since, first of all, nowadays, the mere financial disclosure is not sufficient anymore for providing an accurate and adequate information towards stakeholder. Moreover, it deserves attention for managing **ESG risks** that could affect the business and, as a consequence, the going concern of the entity. Currently, ESG issues are becoming surviving conditions for the medium-long term period, thus, it is not enough disclosing ESG issues considering it as a mandatory task because a mistake in defining the company strategy could affect the going concern (Devalle and Cisi, 2023). ESG issues and ESG risks require a great cultural change from individuals and companies since they mainly affect banks and financial providers. Therefore, ESG risks might preclude the achievement of a business balance, reflecting their effect principally towards the generation of cash flows, EBITDA and Capex, among the others. The concept that has just been presented is summarized in Figure 1.

Figure 1 - Sustainability information and its settlement within the environment of the companies.



The studies to address the need to enhance the disclosure of sustainability and financial information are the following (Figure 2).

Figure 2 - Overview of the studies

AIM	STUDY	RESULTS
To feature the dimensions of NFI quality that should be considered to improve the current regulatory framework towards a more transparent disclosure	The multi-faceted dimensions for the disclosure of Non-Financial Information in revising Directive 2014/95/EU	common consensus between scientific literature and the annexed documents of the consultation process on the Review of the NFRD (e.g. double-materiality, relevance of NFI, integration of NFI)
To examine the extent of academic knowledge of sustainability materiality research since there is no academic review of this field	Sustainability materiality research: a systematic literature review of methods, theories and academic themes	Increase of scholarly studies about sustainability materiality that mainly anchors to stakeholder theory by adopting content analysis or qualitative approaches
To investigate whether the disclosure of SDGs affects the level of Integrated Thinking and Reporting (ITR) on a sample of European listed companies	Analyzing SDG disclosure and its impact on integrated thinking and reporting	SDGs disclosure has a positive and significant impact on the level of ITR meaning that SDGs disclosure improves the integration of financial and non-financial information.
To investigate whether the disclosure about IC positively or negatively affects the level of ITR by focusing on a multi-year observation, from 2013 to 2021.	Integrating Intellectual Capital disclosure in an Integrated Thinking perspective	IC_Disclosure positively affects the level of ITR. Thus, the more disclosure of intellectual capital is, the more financial and non-financial information are integrated.

The overall perspective is to maintain a steady-life quality by comparing it to the actual one. Therefore, sustainability is the main element around which a future development of the economies and companies lies. In other words, it has been defined as developing conditions for ensuring the meeting of the actual stakeholder's interests, without compromising the chance of the new generation getting their own. In this context, global development has achieved many side-effects such as, on the environment, the global warming of the planet but

significant social challenges as well that will generate future implications for future generations.

For many years, the European Union has been willing to support a turn-around and, in 2018, it has identified many measures aiming to set-up a plan for financing a sustainable growth. This plan is named "**Piano d'azione**" for sustainable development, through the achievement of the following goals:

- orienting cash flows towards sustainable investments aiming at realizing a sustainable and inclusive growth;
- managing financial risks deriving from climate change, resource scarcity, environmental degradation other than social challenges;
- promoting transparency and long-term vision in the economic-financial activities.

In order to achieve these objectives, in 2019, the European Commission presented a new growing sustainable strategy defined as Green Deal, in which the "Piano d'azione" has found a new settlement. It aims at transforming the European Union in a contemporary economy towards limiting the increase of global warming by respecting the limits of the agreement Paris-2015. Indeed, in recent times the Non-Financial Reporting Directive (NFRD or 2014/95/EU Directive) has been amended by Corporate Sustainability Reporting Directive (CSRD). It has to be applied from 16th December 2022. As a matter of fact, through these dispositions and standards, the European Union aims at managing with more interest sustainable activities that must be considered through the Taxonomy 2020, other than disciplinary measures towards the disclosure of non-financial information through the CSRD.

In this regulatory context, the **Taxonomy EU** is extremely important for sustainable activities by preparing a classification system for economic and eco-sustainable activities. Criteria have been determined to establish if an economic activity may be considered eco-sustainable aiming to identify the eco-sustainable

investment grade. An activity is defined as "eco-sustainable" if it contributes in a substantial way to achieve one or more of the environmental objectives, other than respecting the minimum preserving guarantees and being compliant to technical criteria of the European Commission.

For environmental objectives it refers to:

1. Climate change mitigation;
2. Climate change adaptation;
3. Sustainable usage and protection of water resources;
4. transition towards a circular economy;
5. prevention and reduction of pollution;
6. protection and replacement of ecosystem biodiversity.

At this time, Taxonomy and the technical criteria refer only to two out of six environmental and climate goals, namely the climate change mitigation and the climate change adaptation. Taxonomy is used either in the financial markets or for disclosing and communicating which are the sustainable financial products in the field of disclosure about sustainability matters. Organizations that must adopt NFRD, and consequently CSRD, are required to disclose information referring to revenue coming from products and services linked to sustainable economic activities, capital expenditures associated with eco-sustainable activities. Thus, subjects are required to disclose such informativeness with reference to the amount to be invested linked to the Taxonomy for highlighting how the strategic planning meets the requirements of the ecologic transition and the commitment towards the achievement of sustainable goals. Thus, the Taxonomy allows performing an analysis of the investment's nature and the corporate positioning of the eco-sustainable business activities. Another usage of the Taxonomy depends on the stakeholders and it refers to the risk assessment (of the going concern as well). For instance, it could be referred to a firm that is not included in the Taxonomy that without a business re-orienting

towards a sustainable model, might find going concern issues. In such a scenario, the financing system will prudentially assess the credit rating of the firm. Therefore, transition towards a sustainable business model will be a mandatory path that each firm has to face in the next years. Disclosure is extremely important for stakeholders and their interest. Therefore, the going concern must be preserved aiming at planning the corporate management, supervising the performance, the relationships' quality and the health of the business model. Historically, firms focused on mere financial disclosure (e.g. cash flows, ratios). Nevertheless, in recent times, financial disclosure has confirmed its usefulness highlighting that it is not enough for meeting the stakeholders' requirement. Information about environmental, social and governance issues deserved much attention, principally due to matters such as global warming, the Pandemic Covid-19, among others. Thus, a new visualization and sensitivity towards these issues has been developing in a massive way, aiming at limiting the human impact that has implications on the environment and society. As a consequence, firms are required to provide sustainability information, and not focus on mere financial disclosure. Generally, this disclosure relies on qualitative information that must be quantified (e.g., amount of CO2, water saving). As a matter of fact, **sustainability information is becoming a vital condition** for the enterprises **in a long-term vision**. In other words, if an entity is not able to manage and monitor risk coming from social and environmental issues, it will surely find difficulties and hurdles in conducting the business and meeting the stakeholder's interests. However, disclosing sustainability information remains a challenge since it could lack transparency and credibility. Thus, this issue can be mitigated or overcome by reporting sustainability issues that are relevant for companies and stakeholders. This process is known as materiality analysis and helps companies in identifying, assessing and prioritizing corporate sustainability practices. Thus, sustainability materiality analysis guides the assessment of the relative importance of various sustainability issues, and it can help companies in

managing trade-offs between different areas of sustainability. In this regard, the study "*Sustainability materiality research: a systematic literature review of methods, theories and academic themes*" (Fiandrino, Tonelli and Devalle, 2022) aims at highlighting the state-of-the-art about scholarly studies on sustainability materiality. In more detail, the study found that studies on sustainability materiality have increased exponentially since the 2010s, mainly addressing the stakeholder theory, content analysis and qualitative approaches.

Undoubtedly, reporting sustainability information has to be framed not as a mandatory reporting task because a mistake in managing sustainability matters could have negative implications on the going concern. Nowadays, ESG issues may be considered as a worldwide priority that has been addressed in the Agenda 2030 in sight of the Sustainable Development, an action program for people, planet signed by 193 states pertaining to ONU. Agenda 2030 encompasses 17 **Sustainable Development Goals** for an overall number of 169 targets. The official starting of the SDGs has been 2016 and will be a guide for the adopting companies over the next 15 years, namely 2030.

Surely, for the enterprises and their business not all the SDGs are relevant. Indeed, it is extremely useful considering that all the objectives must be analyzed according to the priorities with regards to the business model and the business activity. In more detail, each firm must identify which SDGs are impacting on the core business, set up objectives that must be achieved for enhancing their performance, carry out actions linked to these themes, monitor the results and, finally, start new remedial actions in line with what has been planned. In the on-going study *"Analysing SDG disclosure and its impact on integrated thinking and reporting" (*Rizzato, Tonelli, Fiandrino, Devalle, on-going review process)*,* that will be presented more in depth in the next sessions, it has been analyzed if the disclosure of SDGs may be framed as a determinant for improving the level of integration of financial and sustainability information.

Results demonstrate that reporting information about how the company has addressed the disclosure of SDGs positively affects the level of integration of financial and non-financial information.

Sustainability information is thus at the core of the debate concerning sustainability reporting (SR). The first step of sustainability reporting has been the issue of directives aiming at making the reporting of ESG issues mandatory for bigger listed companies, and, consequently, enhancing its application to SMEs. Apart from mandatory requirements, many firms voluntarily disclose sustainability information for being and becoming accountable on behalf of investors, financial providers and stakeholders. The objective is thus representing the strategy for integrating a sustainability mind-set within the processes and for assuring the creation of the value in a long-term period considering coherently the variables ESG. For instance, some financial institutions do not provide financials to firms that have not adopted sustainable practices. Or otherwise, financial providers fund companies with ESG goals in a more favorable way by reducing the financing cost.

Initially, the normative framework reported "non-financial information" but after the publication of the CSRD (par. 8) the terminology "non-financial information" is inaccurate since it seems to be that information goes out of the financial perspective. Nevertheless, this kind of disclosure is pertinent on the financial side. Therefore, it is preferable to use the expression "sustainability information" instead of "non-financial information".

In the European Community the standards aiming at disciplining this field has been first of all the Directive 2014/05/UE (Non-Financial Reporting Directive, NFRD), consequently amended and substituted by the **Corporate Sustainability Reporting Directive (CSRD)** from NFRD. Thanks to NFRD, sustainability reporting was boosted, requiring companies to provide disclosure in this regard. The main topics are linked to environmental and social matters

(as risks linked to these matters, the respect of human rights). The NFRD identified the general topics that deserve attention in order to set the guidelines for providing adequate disclosure. Thus, the NFRD left a large degree of flexibility to member states in defining the best standards according to the national context. For instance, in Italy the NFRD has been issued on 30th December 2016 through the D.Lgs. 254/2016 and it mainly focuses on information regarding usage of renewable resources, emissions of greenhouse gasses, social matters linked to employees (e.g. gender equality), respect of human rights among the others. The NFRD highlighted some weaknesses that must be overcome through the CSRD. The study *"The multi-faceted dimensions for the disclosure quality of non-financial information in revising directive 2014/95/EU"* (Fiandrino, Gromis di Trana, Tonelli and Lucchese, 2022) aims to identify the dimensions of non-financial information quality that have to be considered for enhancing the current regulatory framework towards a more transparent disclosure. Therefore, the study compared the scientific literature and the annexed document of the consultation process about the Review of the NFRD and it has identified commonalities in the need to improve the double-materiality perspective, to provide specific contents on sustainability issues, to clarify the relevance of non-financial information and to embed it within the management report by adopting an integrated approach. Moreover, it has been found a substantial alignment about timeliness towards risk management procedure and a forward-looking approach. In addition, it has been confirmed that companies are struggling with getting, identifying and understanding the information deserving to be disclosed due to the presence of many standard setters (Fiandrino, Tonelli and Devalle, 2022) and the limited number of subjects that have to report sustainability information. CSRD was issued on 14th December 2022, n. UE 2022/2464 and it was published in the Official Journal of UE on 16th December 2022. It amends the regulatory framework UE n. 537/2014, the

Directive 2004/109/CE, the Directive 2006/43/CE and the Directive on 2013/34/UE.

The main novelties are:

- a wider mandating scenario that includes companies of different size, even if they are not listed. The exclusion refers to listed micro-enterprises;
- more details for the information that must be disclosed, by requiring to present by respecting the UE standards;
- disclosure must be settled in an ad hoc section, creating a sort of integrated report;
- information must be assured and certified by third parties;

Moreover, there will be a progressive application of the standards taking into account the size of the organisation. In more detail, the CSRD will be in force from 2024 to 2028 as follows:

- from 1st January 2024 for the bigger public entities with more than 500 employees already subjected to NFRD. The deadline for the disclosure is in 2025;
- from 1st January 2025 for the bigger public entities with more than 250 employees, 40 mln of revenue or 20 mln of total asset, that are not already subjected to NFRD;
- from 1st January 2026 for the SMEs and other listed companies. There is the chance of delaying the application until 2028 for SMEs (the choice must be motivated).

According to CSRD, firms have to report the sustainability information according to the principle of the double materiality principle. This principle has two perspectives:

- financial materiality (outside-in perspective): disclosure about the impact in terms of sustainability on the results and the positioning of the entity;
- impact materiality (inside-out perspective): disclosure about the impact of the entity on the main sustainability matters.

Information required by CSRD is the following:

- short description of the business model, the corporate strategy in sight of risks linked to sustainability matters. It has to include information by including budgets, forecasts and future investments with the aim of demonstrating that they are in line with the limitation of global warming and climate neutrality. This information has to be framed in a context of meeting the interests' stakeholders.
- brief description of the objectives that must be achieved by 2030 or 2050 respectively relating to sustainability matters and the actions for achieving them;
- description of the board of directors relating to sustainability matters, their skills for doing this kind of work and the incentives that could get when achieving goals;
- description of the procedure for surveilling the actions that must to be taken for achieving the objectives;
- description of the risks linked to sustainability matters;
- ratios for communicating these kinds of information.

Sustainability information needs to be disclosed by adopting the standards issued by EFRAG, named **European Sustainability Reporting Standards (ESRS).**

Nowadays, the standard setters issuing rules and procedures for managing approaches towards ESG practices are several. This is a signal that ESG topics are worth, but the presence of 255 standards could blur the scenario.

The well-known are:

- Global Reporting Initiative (GRI) Standards issued by Global Sustainability Standards Board and reviewed in 2021 by EFRAG through the European Sustainability Reporting Standards that will be adopted from 2024.
- IFRS Sustainability Disclosure Standards issued by International Sustainability Standards Board;
- International IR, Integrated Reporting Framework;
- Sustainability Accounting Standards Board (SASB) Standards;
- Task Force on Climate-Related Financial Disclosures (TCFD) recommendations.

After the revision of the NFRD, the European Commission has proposed the elaboration of new European standards thanks to the support of EFRAG according to what has been already proposed by GRI. In November 2022, EFRAG defined the first set of European Sustainability Reporting Standard (ESRS) consisting in 12 documents split in two "Cross-Cutting Standards" as general informativeness and ten "Topical Standard" more linked to ESG issues. This first step of standards will be issued by 30th June 2023 whereas the second set (Sector Specific Standards and SMEs) will be published by 30th June 2024. Another recent novelty is associated with IFRS Sustainability Disclosure Standards (IFRS SDS) issued by International Sustainability Standard Board (ISSB) that operates under the supervision of IFRS Foundation that currently encompasses the International Integrated Reporting Council (IIRC), the Sustainability Accounting Standards Board (SASB) and the Climate Disclosure Standards Board (CDSB). Acknowledging a wide scenario consisting of many

standard setters, the main differences emerging from the comparison of GRI standards, ESRS and IFRS SDS refer to the users of the report. GRI standards and ESRS are oriented towards the entire stakeholders while the primary focus of IFRS SDS is the investor perspective. Moreover, IFRS SDS aims at consolidating SASB standards, Integrated Reporting Framework and TCFD Recommendations. Thus, in defining the standards, ISSB relies on principles and concepts of Integrated Reporting (IR) Framework. IR Framework was issued by the International Integrated Reporting Council (IIRC) in 2013 and further refined in 2021 with the objective of defining the guidelines and principles for the Integrated Report and the **Integrated Reporting**. Value creation is the core process of the IR Framework and it considers that disclosure about **value creation, erosion and preservation** will be the next step in enhancing the evolution of the reporting practices. Indeed, the **IR Framework relies on several capitals**, in addition to the financial one: natural, manufacturing, human, social and relational and intellectual. As a matter of fact, in a context where IR calls for providing more accurate and complete disclosure about what affects the value creation, preservation and erosion process, **intellectual capital (IC)** finds out a suitable place that deserves to be explored. Indeed, intangibles and IC are drivers of value creation that, considered in an integrated reporting context, organizations may identify in an easier way what can be considered as IC for improving the value creation process. In this vein, the study (Tonelli, Rizzato, Devalle, Busso, on-going review process) aims at identifying if the disclosure about IC improves the integration of financial and non-financial information.

The collection of papers includes the following studies:

- Academic article: The multi-faceted dimensions for the disclosure of Non-Financial Information in revising Directive 2014/95/EU,

Fiandrino, S., Gromis di Trana, M., Tonelli, A., Lucchese, A., Journal of Applied Accounting Research;

- Academic article: Sustainability materiality research: a systematic literature review of methods, theories and academic themes, Fiandrino, S., Tonelli, A., Devalle, A., Qualitative Research in Accounting and Management;
- Paper under review: Analysing SDG disclosure and its impact on integrated thinking and reporting, Rizzato, F., Tonelli, A., Fiandrino, S., Devalle A. The full paper has been presented to twice conferences: "16th EIASM interdisciplinary conference on intangibles and intellectual capital - sustainability and integrated reporting, governance and value creation, Lille, France, September, 23-24, 2021" and "44th European Accounting Association Annual Congress, Bergen, Norway, May, 11-13, 2022";
- Paper under review: Integrating Intellectual Capital disclosure in an Integrated Thinking perspective, Tonelli, A., Rizzato, F., Busso, D., Devalle, A. The long abstract will be presented to twice conferences: "ENTerprise REsearch InNOVAtion Conference - ENTRENOVA, Dubrovnik, Croatia, September, 14-16, 2023" and "16th annual Euromed Academy of Business (EMAB) conference, business transformation in uncertain global environments, Vilnius, Lithuania, September, 27-29, 2023 whereas the full paper will be presented to Aidea 2023 – Convegno Nazionale, 5-6 October 2023.

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2. Academic article: the multi-faceted dimensions for the disclosure of non-financial information in revising Directive 2014/95/EU

2.1 Abstract

Title – The multi-faceted dimensions for the disclosure of Non-Financial Information in revising Directive 2014/95/EU

Authors: Simona Fiandrino, Melchior Gromis di Trana, Alberto Tonelli and Antonella Lucchese

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Purpose –The aim of this paper is to provide the state of the art in the academic and professional debate on the disclosure quality of NFI. This analysis is driven by the need to feature the dimensions of NFI quality that should be considered to improve the current regulatory framework towards a more transparent disclosure.

Design/methodology/approach – The research is an integrative literature review that assesses and synthesizes the scientific knowledge and the annexed documents collected during the public consultation for the Review of Non-Financial Reporting Directive (NFRD) on the disclosure quality of non-financial information (NFI).

Findings – Findings show that there is a common consensus between scientific literature and the annexed documents of the consultation process on the Review of the NFRD on the need to enhance a double-materiality perspective, to provide specific contents on sustainability issues, to clarify the relevance of NFI, and to embed NFI into the management report in an integrated manner.

Furthermore, there is an alignment related to timeliness in favour of a risk management procedure and a forward-looking approach.

Research limitations/implications – The research engages the debate on the NFI disclosure quality, in light of the recent Review of NRFD and the new Proposal of Corporate Sustainability Reporting Directive that extends and enhances the non-binding reporting guidelines of NFI.

Practical implications – The research provides a dashboard of the dimensions of NFI disclosure quality that aggregates the academics' and practitioners' knowledge systematically. It shows the interplay between the scholarly developments and the recent measures arisen in the consultation process to undertake NFI disclosure quality.

Originality/value – The research provides a lens to analyse, classify and interpret the insights emerged during the consultation process of the NFRD.

Keywords – NFRD, Non-financial disclosure, Non-financial reporting directive, Disclosure quality, Accountability, Corporate reporting

Paper type – Literature review

DOI: https://doi.org/10.1108/JAAR-04-2021-0118

2.2 Introduction

In 2018, the European Parliament called for a further development of the reporting requirements in the framework of Directive 2014/95/EU known as Non-Financial Reporting Directive (hereafter NFRD). This reinforces the importance reliable, comparable and relevant information on sustainability risks, opportunities and impacts (European Commission, 2020a). The current revision of NFRD in its Inception Impact Assessment document aims to address the following problems: a non-sufficient comparability and reliability; a relevance matter based on an expectation gap between the NFI disclosed by companies and the NFI required by users, and a problem in readability that generates difficulties for the users to find NFI even when it is reported Therefore, there is the need to enhance both the disclosure of NFI and its accountability towards various groups of stakeholders because these elements can significantly affect the quality of NFI (European Commission, 2020b).

The sustainability accounting literature discusses the complexity and subjectivity nature of NFI disclosure quality (Ben-Amar and Chelli, 2018; Gray and Milne, 2015; Lokuwaduge and Heenetigala, 2017). Such literature identifies the need to expand the understanding of reporting and disclosure quality, by proposing several assessments of NFI quality (e.g. quantity, breadth, depth, managerial orientation criterion, time) (Michelon *et al.,* 2015; Plumlee *et al.,* 2015). As such, academics have initially considered the amount of disclosure (one of the most frequent metrics adopted in literature) but it is only one dimension, and if it is not combined with other criteria, it just describes one part of the whole disclosure practice. The quality of disclosure is a complex and multi-faceted concept, because it has a subjective nature with different perceptions and several interests involved (Campbell and Slack, 2011; D'Amico *et al.,* 2016; Helfaya and Whittington, 2019). Furthermore, the quality of narrative reporting requires reflection upon the purpose of corporate reporting, which can be subsumed into

three categories: valuation, stewardship, and accountability considering what type of information is relevant to different stakeholder groups (Michelon *et al.,* 2021, p. 2; Beyer *et al.,* 2010; Jonas and Blanchet, 2000).

This study aims to provide the "state of the art" on the quality of NFI disclosure in the context of the mandatory requirements of the NFRD and it is driven by the following motivations. First, academics, practitioners and regulators call for the need to provide the dimensions of NFI quality that should be considered to improve the current regulatory framework towards a more transparent disclosure. Second, prior literature review in the social and environmental disclosure field (Korca and Costa, 2021) builds a research agenda on the future directions on Directive 2014/95/EU. It suggests exploring the interplay between the Directive's content with the measures undertaken to contribute to greater accountability and move from the administrative reform to an institutional reform (Korca and Costa, 2021, p. 16). In accordance with Korca and Costa (2021), our research focuses on the interplay between the binding requirements and non-binding guidelines and its effects on the quality of NFI.

Therefore, this research reviews prior academic studies and combines them with the more recent discussion emerging during the consultation process of the NFRD. As a result of this linkage, the research method employed is an integrative literature review based on the analysis of 57 academic articles and 110 annexed documents of the public consultation. Our analysis develops a protocol for the papers and consultation reports collection, it conducts a screening procedure to select the main articles and it elaborates a synthesis of the main findings from scientific literature and public consultation drawing on a conceptual framework. The research informs academic scholars, regulators and practitioners with policy-related and practical implications because it advances the literature and the professional discussion on the NFRD by providing a dashboard of the quality dimensions of NFI mandatory disclosure that aggregates the academics' and practitioners' knowledge systematically.

The remainder of this paper is organized as follows. Section 2 addresses the institutional setting of mandatory disclosure. Section 3 describes the methodology of our investigation whereas Section 4 presents the descriptive results of NFI quality. This led to teasing out the dashboard of the main outcomes that is discussed in Section 5. Finally, Section 6 concludes with limitations and avenues for future research implementations.

2.3 The institutional setting of mandatory NFI disclosure

The NFRD introduces the mandatory regime of NFI disclosure with the aim to foster sustainable economic growth and build a common playing field with transparency at its core Disclosure quality for the NFRD 275 (European Parliament, 2014). In fact, transparency leads to lower financing costs, the retention of talented employees and long-term value to stakeholders. Before proposing the directive, around 2,500 large EU companies disclosed environmental and social information regularly, which was less than 10% of the EU large companies. Fewer than 10% of the largest EU companies disclosed such information regularly (European Commission, 2014). Thus, the legislator regulated minimum requirements on certain NFI to make such information consistent between member states (Kinderman, 2020; La Torre *et al.,* 2018). The NFRD has been constructed in a non-prescriptive manner, by leaving significant flexibility to member states, obliged to transpose the NFRD into national law (Biondi *et al.,* 2020). The explicit undertakings with a voluntary degree of implementation cover the scope of reporting; the choice between integrated report and separate report; NFI topics and contents; standard frameworks to rely upon; assurance provided by an independent assurance service provider and imposed penalties on companies which do not report adequately. The preferred approach adopted "a light touch intervention" against a one-size-fits all with a

strong regulatory setting (Aureli *et al.,* 2019) by accompanying non-binding guidelines on methodology for reporting NFI (Korca and Costa, 2021).

In this context, the high degree of discretion left to State Members led several academics to raise some concerns on less comparability of companies' disclosure (Aureli *et al.,* 2019) which were shared by public authorities and policy makers (European Coalition for Corporate Justice, 2020; Federation of European Accountants, 2015). For instance, the applied scope covers the largest companies within the EU, which are around 6,000 of the total 42,000 largest companies, though small and medium enterprises (SMEs) are out of the scope of the NFRD they account for a huge part of the European economy. Furthermore, the NFRD and the non-binding guidelines are principle-based and a certain degree of uncertainty remains if we consider, for instance, the principle of materiality (Jeffwitz and Gregor, 2017). NFI must be provided to "the extent necessary for an understanding of the company's development, performance and position and the impact of its activity" without specifying how to determine "the extent necessary" (Aureli *et al.,* 2019). Moreover, certain content issues are given on a general level, as for the business model for which the NFRD "does not state whether such business model should bear relevance to each ESG factor, or whether it should merely be referred to in order to inform the reader of the company's overall business approach" (Jeffwitz and Gregor, 2017, p. 4). Furthermore, the NFRD suggests relying on several international standard frameworks to report NFI. However, each of those frameworks vary significantly from one to the other in terms of contents and definitions. Moreover, the presence of variegated guidelines has led to difficulties in ensuring comparability, reliability and relevance of NFI. Thus, some companies have applied "cherry-picking" criteria to describe their sustainability practices. In this discretionary regulatory setting, misalignments between mandatory requirements and voluntary discretions have led to considerable concerns over un-sustainability levels, understandability of sustainability practices and

comprehensive disclosure. Consequently, like in a voluntary setting of disclosure, isomorphism led to the institutionalisation of sustainability disclosure (De Villiers *et al.,* 2014). In light of institutional theory, which explains how different practices become accepted in a particular social context (Powell and DiMaggio, 1991), NFI reporting practices become rules and/or norms that companies adopt in reaction to societal pressures. According to Kinderman (2020), the institutionalisation of standardised reporting practices could be hindered by the following: adjustment costs of politics for an upward regulatory harmonisation, previous political policies adopted in the different countries towards ESG practices, administrative expenses imposed to firms, cannibalization of "business as usual practices", and the loss of reputational reporting benefits.

Despite all these concerns, the Communication on the European Green Deal has stressed the need to strengthen the foundations of sustainable practices. Therefore, the regulatory setting has moved a step further to support the transition to sustainable development in a JAAR 23,1 276 decisive manner. The EU's policy objectives anchor to three main building blocks: sustainable finance, sustainable corporate governance and corporate sustainability reporting. In more detail, legislation on sustainable finance came into effect on 10 March 2021 with the Sustainable Finance Disclosure Regulation (SFDR) to pave behavioural patterns in the financial sector that discourage greenwashing and promote responsible and sustainable investments. Legislation on sustainable corporate governance aims to foster long-term sustainable and responsible corporate behaviour while legislation on corporate sustainability reporting has the objective to enhance companies' and financial institutions' reporting and disclosure. The Corporate Sustainability Reporting Directive (CSRD) proposal has been issued on April 21, 2021 after the public consultation for the Review of the NFRD which aimed to discuss eight thematic issues: quality and scope, standardisation, materiality, assurance, digitalisation, location of the reported

information, personal scope, simplification and reduction of administrative burden (European Commission, 2020a). Indeed, the EC highlights the need to extend the non-binding reporting guidelines because these "guidelines have not sufficiently improved the quality of NFI that companies disclosed in pursuant to the NFRD" (European Commission, 2020c). In so following, the European Financial Reporting Advisory Group (EFRAG) highlights that the EU non-financial disclosure ecosystem has inconsistencies emerging in terms of horizontal alignment (inconsistent requirements for a given data preparer) and vertical alignment (data outputs from data preparers not aligned with reporting obligations of data users) (EFRAG, 2021). In this ever-evolving context, in light of institutional theory, these administrative reforms along with a greater accountability with and for stakeholders, might act as a mechanism to increase the quality of NFI. Therefore, this study focuses on the quality of NFI disclosure because of the need to clarify its multi-faceted concept in light of the recent regulatory developments that precisely focus on improving the quality of NFI to ensure transparency to various stakeholders.

2.4 Methodology

The research is an integrative literature review (Snyder, 2019) because the objective of this study is to assess, critique, and synthesize the literature on emerging topics to enable new theoretical frameworks and perspectives to emerge (Torraco, 2005). Therefore, this method is the most suitable review approach, as it obtains information and improves specific knowledge emerging from academics and practitioners. To achieve this aim, the study integrates both the academic perspective by reviewing scientific articles and the annexed documents of the public consultation of the NFRD Revision.

The research plan has been developed considering the following methodological steps according with Massaro et al. (2016): the framework of

analysis, the search strategy and the screening procedure, and finally the content analysis of literature and annexed documents.

2.4.1 Framework of analysis

The framework of analysis is based on the research of Aureli et al. (2018) and Aureli et al. (2019), and the EC that identify eight dimensions of NFI quality as constructing concepts of transparency. They refer to completeness, reliability, accuracy, materiality and clarity, accountability. The framework of analysis is presented in Table 1. These eight concepts are the fil rouge of the search strategy, the screening procedure and the content analysis based on the coding assignment.

Dimensions of NFI disclosure quality	Definitions	Examples
Completeness	Coverage of the material topics and indicators and definition of the report boundary should be sufficient to reflect significant economic, environmental, and social impacts and enable stakeholders to assess the reporting organization's performance in the reporting period	List of topics, items, mandatory regime effects
Relevance	Information is relevant if it would potentially affect or make a difference in a user's decision	Materiality
Clarity	It refers to the perceived level of lucidity and comprehensibility of information received from a sender	Clear explanation, additional explanations
Comparability	Comparability permits the identification and understanding of similarities and differences between items of information	Comparison between peers, scope of application
Consistency	Consistency refers to the use of the same methods for the same items, either from period to period within a reporting entity or in a single period across entities	Disclosure of changes/ differences
Accessibility	It refers to the capability of the users to collect information easily	Within the management report, specific document
Timeliness	It refers to the need for accounting information to be presented to the users in time to fulfil their decision-making needs	Annual report, 6 months, quarterly
Reliability and accuracy	Reliability means that information is fair and true. Accuracy refers to the perception that information is precise to the extent possible given the relationship between sender and receiver	Assurance, audit on the presence of NFI, audit on the content of the NFI

Table 1.
Dimensions of NFI disclosure quality

2.4.2 Search strategy and screening procedure

The search strategy and the screening procedure involve the academic studies and the annexed documents of the consultation process on the Review of the NFRD and rely on the framework of analysis described above.

Considering the academic perspective, the query has been developed in the Web Of Science Core Collection (WoS) database WoS is considered to be a database which offers updated articles from 1900, assessing the importance and the relevance of publications (Falagas *et al.,* 2008).

The query string of keywords is the following:

Topic ("non-financial report*" OR "non-financial disclosure" OR "non-financial information" OR "non financial report*" OR "non financial disclosure" OR "non financial information" OR "sustainability disclosure" OR "sustainability report*" OR "CSR disclosure" OR "quality" OR "mandatory" OR "transparency" OR "completeness" OR "relevance" OR "clarity" OR "comparability" OR "consistency" OR "accessibility" OR "timeliness" OR "reliability" OR "accountability") AND ("Directive, 2014/95/EU" OR "Non-financial Directive" OR "Non financial Directive" OR "Non Financial Reporting Directive" OR "Non-financial Reporting Directive").

WoS selected 81 scientific publications. Subsequently, the authors employed the following criteria of selection. Firstly, only articles, early accesses or reviews were considered in order to enhance quality control in accordance with Mio et al. (2020). Thus, "other document/source types such as conferences, trade publications, books series, books or book chapters, and editorials" were omitted (Sivarajah *et al.,* 2017, p. 267). With this criteria, 23 scholarly publications were excluded.

Secondly, the time span ranges from 2016 to April 2021 in order to gather the new updates on this ever-changing and evolving topic. Thirdly, only articles in English were included in the sample, by maintaining an interdisciplinary view without excluding any papers published in specific thematic categories (e.g.

environment). Two articles were not available, thus, the final sample of academic articles under analysis is equal to 57.

The screening procedure was extended to the documents of the consultation process with a collection on the European Commission (EC) website. The total number of annexed documents sent to the EC was 128. Twelve non-English documents (written in French, Spanish, Italian, German, and other languages) were excluded to maintain comparability among them. Then, six duplicated documents have not been considered to avoid double counting. A final total of 110 annexed documents were used.

2.4.3 Content analysis

Content analysis "a research technique for making replicable and valid inferences from texts (or other meaningful matter) to the contexts of their use" (Krippendorff, 2004, p. 18). The content analysis has been employed considering Elo et al. (2014)'s procedural steps for validity and reliability of collected data. Both the scientific papers and the documents of the consultation process of the NFRD were read in depth. In more detail, the academic articles were analysed considering their abstract, introduction, findings and conclusions, while the documents of the consultation process of the NFRD were read in full. In this phase, five academic studies were excluded because they were out of the scope of this analysis. To reduce subjectivity bias, the authors implemented the coding assignment to the main contents of each document. The results were discussed among the authors to guarantee investigators' triangulation and, when divergences occurred, descriptive labels were double-checked to come to an agreement on a certain label related to the topic.

2.5 Results

2.5.1 Descriptive results

Table 2 shows the articles divided by year and describes the evolution of the NFI mandatory landscape and its scientific literature.

Year	#Papers	%	Cumulative frequencies
2021	6	10.71%	10.71%
2020	27	48.21%	58.92%
2019	7	12.50%	71.42%
2018	8	14.29%	85.71%
2017	6	10.71%	96.42%
2016	2	3.58%	100.00%
Tot	51		

Source(s): Author's elaboration

Table 2. Examined sample of academic articles ranked by number of the year

As shown above, the timespan of 2019–2021 covers 58.92% of the total sample and it highlights the recent evolution of this topic. The sample is further described by considering the academic classification of the journal ranking. Table 3 shows the classification of the academic research grouped by the international journal rankings, the ABS (the Association of Business Schools) 2015 ranking and ABDC (Australian Business Deans Council) Journal Quality List.

Then, results are described considering the dimensions of NFI disclosure quality.

ABS ranking	#Papers	ABDC ranking	#Papers
3	7	A*	1
2	10	A	15
1	5	B	10
Not ranked	29	C	8
		Not ranked	17
Tot	51	Tot	51

Source(s): Author's elaboration

Table 3. Publication by journal rankings – ABS and ABDC

2.5.2 Completeness

Completeness refers to the content of NFI and anchors to agency theory and legitimacy theory as theoretical underpinning. According to agency theory, the greater the agency problems, the more NFI is needed to reduce information asymmetry (Eng and Mak, 2003). According to legitimacy theory, companies disclose NFI in response to societal pressures in order to support stakeholders (An *et al.,* 2011; De Villiers and Marques, 2016). Completeness also refers to the mandatory regime of disclosure that introduces additional information to better embed NFI into the decision-making processes of investors and other users (Mio *et al.,* 2020). Completeness is also linked to the different stakeholder expectations that change over time (Mio *et al.,* 2020) with pressures for a more reliable, trustworthy, and objective disclosure for investors' decisions. In this way, De Luca et al. (2020) discussed the evolution from voluntary to mandatory disclosure, highlighting that NFI has increased pressure on organizations to set up risk management tools that assess sustainability risks. De Luca et al. (2020) found that investors and stakeholders pay a great deal of attention to the information that demonstrates how management addresses decisions based on risky scenarios. Concretely, this includes the consideration of risk factors, related consequences of the company's performance when risks are jointly linked with material issues. Furthermore, they also argue that policymakers are progressively oriented towards mandated risk information. There is substantial demand for a better risk-related disclosure quality. This is even more important if we take into account that quality non-financial risk disclosure is incrementally value relevant in a mandatory context (Veltri *et al.,* 2020). In the mandatory regime, several context issues have been assessed in detail. For instance, the study of Matuszak and Rozanska (2017) addresses the disclosure of specific CSR categories, i.e. anti-corruption, human rights which have not been disclosed before. They observed that a considerable amount of work is needed to improve the level of reporting. Carrillo et al. (2019) developed a corruption disclosure index related

to Directive 2014/95/EU. In contrast, other academic studies have highlighted that the NFI disclosure provided by State-Owned Enterprises has been reduced in the Integrated Reporting (Nicolo *et al.,* 2020). This emphasises the tendency to limit NFI disclosure in order to be only law-compliant with the Directive. Bernardi and Stark (2018) verified whether the contents of the disclosure are potentially useful for predicting future cash flows, or their levels of risk, or both, over some time horizon, for forecasts models and analysts' recommendations. Based on the above-mentioned academic suggestions, the completeness of the NFI contents is subjected to the number of sustainability issues included in the analysis. To pursue completeness of NFI, it is even more necessary to formalize a sustainability agenda which provides specific guidelines referring to the NFI topics related to the business model of companies (Fiandrino and Tonelli, 2021; Fiandrino *et al.,* 2019).

Consultation process.

The annexed documents highlight the need to extend specific contents of NFI to the mandatory regime. There is a great consensus on the need to specify certain social issues. The European Trade Union Confederation (ETUC), TCO Sweden and European Coalition for Corporate Justice (ECCJ) require mandatory Human Rights due diligence and compliance, tax transparency and a responsible business conduct, also covering supply and subcontracting chains. Moreover, Grupo Social Once suggests including disability as a factor of diversity of administrative, management and supervisory bodies and in relation to social and employee matters.

Even the governance matters are worthy of a thorough specification. The International Capital Market Association (ICMA) suggests the inclusion of governance metrics (e.g. board diversity) used by existing standards (GRI, SASB), including the reporting of the ratio of basic salary and remuneration of women to men. SASB also suggests governance KPIs (e.g. competitive

behaviour). The adoption of relevant metrics is certainly helpful but qualitative reporting should still be required. Equally, Federation of European Securities Exchanges (FESE) proposes to extend the disclosure requirements related to the board, accountability and oversight policies, along with remuneration.

The environmental issues have also been under analysis by considering the interlinkages with the EU Taxonomy on sustainable finance. Finance Filland addresses the EU taxonomy by taking into account the investment's environmental impacts. The European Savings and Retail Banking Group (ESBG) challenges specific disclosure on climate change, while Bloomberg LP suggests the inclusion of the Force on Climate-related Financial Disclosures (TCFD) recommendations grouped by industrial sectors to drive corporate actions towards a low- and zero-carbon economy.

2.5.3 Relevance/materiality

Materiality is a controversial issue because the NFRD did not clarify what materiality means. Moreover, this inconsistency is related to its application and impacts on the reliability of the information provided to users (Aureli *et al.,* 2019). Disclosure of less relevant information could mislead investors regarding the significance of the disclosure and its contextualisation.

There is a common ground around academics on the need to provide a common definition of materiality and to identify for whom the information is material. This gap is confirmed by different definitions of materiality provided by several international standard frameworks (Aureli *et al.,* 2019). This has led to different processes to assess material topics, e.g. entity specific, based on industry criteria and other factors with a multi-stakeholder perspective. According to Mazzotta et al. (2020), materiality is linked with stakeholder engagement and sustainability governance and represents "sincerity". They suggest narrowing the concept of materiality to reinforce the rate of

understandability of the disclosure. Tarquinio et al. (2020) highlight that companies may decide to focus solely on information material for companies and stakeholders, and avoid other issues that they do not consider to be relevant Villiers and Tsagas (2020) argue that the overabundance of choice and the sisyphus effect generate a lack of materiality and the disconnection between the required disclosures. The former refers to the discretion of the NFI contents while the latter deals with the variety of voluntary reporting and the uncertainties surrounding the utility of the information. Therefore, the implementation of the materiality determination process with an integrated perspective of decision-making, management and reporting will integrate "disclosures of material information pertaining to financial and non-financial performance" to "forge important relationships with different stakeholders, as they improve their stewardship and legitimacy with institutions and other interested parties" (Camilleri, 2018, p. 491).

Consultation process

The professional viewpoint addresses the heterogeneous definitions of materiality, the perspective of double-materiality and the link with assurance. These give rise to different interpretations on materiality assessment (Value Balancing Alliance).

Several professional entities (e.g. EY, Danish Institute Capitalor Human Rights, FESE, Coalitions) argue in favour of a strong revision of the concept of materiality by narrowing its definition and considering NFI issues that can be material to the business either how they impact on the business, or how the business affects the external environment.

Compagnie Nationale des Commissaires aux Comptes (CNCC), Carbon Disclosure Project (CDP), ESBG and Shift suggest the implementation of the double-materiality perspective, namely information necessary for understanding impacts of the company («inside-out») on the environment and information

necessary for understanding the position, performance and development of the company regarding climate change and environmental degradation («outside-in»). More specifically, both the effects of non-financial matters on a company's development, performance and position (dependencies) and the external impact of the company's activities should be taken into account when a materiality assessment is performed. These aspects are not distinct and affect each other. Therefore companies should use an overall approach to determine material topics for a long-term value creation, which could be applied equally to financial and non-financial information (Deloitte). In analysing the importance of the materiality assessment, Econsense and Assonime posit that it is also relevant to disclose the materiality matrix to connect strategic development with company's performance. The European Securities and Markets Authority (ESMA) invites companies to disclose their materiality assessment process in order to understand how the information is reported. The Committee of European Auditing Oversight Board (CEAOB) addresses the need to evaluate the reporting company's materiality assessment process as it is an essential part of the preparation of the NFI. Furthermore, Datamaran suggests a standardized and globally recognized materiality assessment procedure to identify material impacts, upon on key performance indicators (KPIs) can be defined.

2.5.4 Clarity

Korca and Costa (2021) state that the EU Directive serves as an administrative reform. However, it allows each organisation in every EU country to select the most suitable measurement based on the non-binding guidelines (EC, 2017). This lack of clarity means that each company can measure a given category in different ways, thus allowing a "cherrypicking" approach that inevitably limits clarity across nations. To ensure clarity, Raucci and Tarquinio (2020) suggest that companies should be more selective regarding what to report and not to report.

Clarity is essential to produce comparable information for their stakeholders (Kristofik *et al.,* 2016).

Consultation process.

Amfori underlines that being transparent is a way for companies to build trust with stakeholders and enhance accountability. The Deutsches Rechnungslegungs Standards Committee (DRSC) agrees with the view that financial and non-financial reporting should have more regard to the principle of connectivity that ensures clarity. This can be achieved by strengthening the linkages between non-financial and financial information and between the "inside-out" and "outside-in" perspective (CDP). Financial reporting should be tweaked for sustainability to enhance transparency to markets towards a holistic approach of corporate reporting which incorporates strategy, risk management, metrics and targets. Indeed, a high degree of integration and connectivity between financial reporting and non-financial reporting is deemed to be essential to understand and evaluate a company's development, performance and position (Allianz).

2.5.5 Comparability

One of the core goals of the directive is to enhance comparability of NFI throughout the EU (La Torre *et al.,* 2018). This objective is pursued by imposing minimum requirements whilst leaving Member States with high flexibility of action (Aureli *et al.,* 2019). Aureli et al. (2019) address a comparison between the UK, France and Italy and show that convergence of rules has mitigated old differences in the voluntary regime but has also produced new ones. Indeed, this mandatory context has emphasised a "coercive isomorphism" arising from the systematization of NFI matters disclosed by companies (Tarquinio *et al.,* 2020). This has led to a reduction of disclosure to achieve compliance because the

company's goal was not accountability, but only compliance with the law (Tarquinio *et al.,* 2020). Veltri et al. (2020), in accordance with other authors (Dumay *et al.,* 2015) confirmed that companies disclose because they have to. The authors highlight the need to strengthen a material harmonisation considering the interactions between rules and practices. To ensure comparability, disclosure needs to identify useable benchmarks to compare NFI indicators with those of other competitors operating in the same sector or in other ones. Empirical evidence shows that the company sector influences the level of its social, environmental, and sustainability disclosure (Raucci and Tarquinio, 2020) Other research identifies specific circumstances under which the comparability must be considered. For instance, De Luca et al. (2020) suggest ways to increase the quality of risk-related disclosure with risk assessment procedures and processes, internal structures, as well as the organizational philosophy and techniques.

Comparability extends the discussion of its application to the SMEs where constraints in structural capital are common, and it might lead to a poor disclosure practice. Thus, SMEs should pay more attention to investing and improving structural capital to ensure a better disclosure quality.

Consultation process

Comparability is essential both to assess companies' performance at a point in time, to observe any relevant long-term trends and to evaluate the evolution of the business sustainability strategy over time. Comparability is discussed considering different opposite views: an international solution for non-financial reporting, a sectoral approach and a combination of both. Allianz, Dutch Accounting Standard Board (DASB), and Eumedion recommend that EU initiatives on non-financial reporting should aim at an international alignment with the implementation of a global standard. This is especially important for companies that operate internationally to account for the global linkage of

financial markets and to avoid competitive disadvantages from differences in disclosure requirements. Oppositely, Deloitte, Chartered Institute of Management Accountants (CIMA), ESBG and CNCC, suggest that flexibility should be embedded in the system and that regional and sectoral standards could be developed based on a "core and more" approach. However, such flexibility should be kept at a minimum. In this line, EcoDa observes that standardization across companies would be counterproductive because benchmarks varies between sectors, therefore, a sectoral approach is preferred. Ultimately, ESMA suggests that these standards should take into account the need to provide both cross-sectorial comparability, as well as sector-relevant information when this is necessary to faithfully reflect the performance and position of an issuer. PricewaterhouseCoopers (PwC), Ernst and Young (EY), EuroCommerce, European Association of Guarantee Institutions (AECM), the ICMA, and the Danish Institute for Human Right encourage the EU to work towards rationalisation and harmonization of the voluntary frameworks and standards. They suggest an alignment on the most commonly used standards (GRI, SASB) to facilitate the actual reporting process. Similarly, CEAOB underlines the need for a robust non-financial reporting framework. Finance Filland suggests that the EU have to elaborate a single ESG reporting framework, building on the existing tested practices. DRSC sees the real danger of creating an unlevel playing field where European companies are subjected to higher cost and transparency requirements than their non-European competitors. And so, they strongly suggest drawing from those standards that are internationally recognised and sufficiently widespread in practice (e.g. GRI, TCFD, SASB) instead of developing a European non-financial reporting environment from the beginning.

Ultimately, considering comparability on the disclosure of SMEs, FESE, EcoDA and the Alternative Investment Management Association (AIMA) encourage the introduction of specific proportionate voluntary guidelines for

them (as defined in MiFID). This would cater to the need for transparency for investors but place a more proportionate burden in terms of costs for SMEs. It is clearly beneficial to have a harmonised standard for the reporting of NFI with a simplified version of these standards for SMEs.

2.5.6 Consistency

One of the main aims of the directive is to enhance the consistency of corporate NFI (La Torre *et al.,* 2018). One of the main concerns that affect consistency regards the methodology behind ESG metrics that are highly subjective, thus affecting transparency and standardization and making results inconsistent (Santamaria *et al.,* 2021). Tarquinio et al. (2020) identified a rationalisation in the quantity of the information (indicators reported), and the changes in the disclosure ranking of companies in 2018, compared with 2017 (first year of mandatory application) Furthermore, Raucci and Tarquinio (2020) reveal that each category of performance indicators (economic, environmental, and social) was largely used before 2012 (when NFI was voluntary) and less disclosed by the same companies in 2017 (when the NFI became mandatory). In fact, between 2012 and 2017, the three categories of indicators were characterized by an overall reduction in the disclosure level, thus jeopardising consistency over time. Taking into consideration the lack of consistency with the international reporting standards, Paun et al. (2020) suggest that a higher level of compliance with the benchmarks will become a top priority. Consistency on the reporting side will provide more meaningful and useful output on the assurance side. (Krasodomska *et al.,* 2021).

Consultation process.

Consistency requires coherence with related regulatory initiatives in the EU like taxonomy regulation and its delegated acts regardless of the timelines, core

content and terminology (Econsense). Moreover, the disclosure of KPIs over a range of years can ensure consistency over time. World Intellectual Capital Initiative (WICI) suggests that KPIs need quantitative and qualitative representations; this improves the consistency of the KPIs over time, the comparability for users and the credibility of the related narrative explanations. Similarly, EY argues that it is essential to assess the relative performance of companies at a point in time, any relevant long-term trends, and the evolution of the business sustainability strategy over time.

2.5.7 Accessibility

Accessibility refers to the disclosure presented within the management report or in other specific documents. The NFRD maintained flexibility on this matter. However, when the disclosure of NFI is presented in a separate report, the linkage with financial information is not directly related and substantially integrated. This has consequences on the accessibility of coherent information and favours a greenwashing behaviour. To avoid this concern, accessibility can be easily facilitated by an effective stakeholder engagement. However, the quality of stakeholder engagement needs to be strengthened (Cosma *et al.,* 2020). According to Cosma et al. (2020), the stakeholder engagement process is not structurally well organized, and the related developments are linked to changes in the Board of Directors' characteristics, regardless of the introduction of the NFRD. This implies that stakeholder engagement favours accessibility and, to develop it, it is necessary to implement a structured corporate governance.

Consultation process.

Several professionals argue that NFI should be disclosed in companies' mainstream corporate reporting (i.e. in the board's management report/the annual financial report disclosed by issuers), not in a separate report (EY, Capital

Coalition). This is strategic for companies, its shareholders and other stakeholders, because it gives a more holistic view of the company's ability to create value. As a matter of fact, EY reveals a growing trend toward integrated reporting of financial and NFI in the annual reports The CEAOB considers that all reports should be subject to the same level of supervision, the same accessibility and the same publication date when NFI is in a separate report outside the management report. However, professional evidence highlights that currently most of the Italian companies present the NFI disclosure in a separate report, arguing in favour of flexibility against a lower level of accessibility (Assonime).

Another issue related to accessibility deals with the digital categorization system of NFI. PwC argues that the use of technology could enhance the usefulness and accessibility of NFI. In fact, tagging NFI reduces the cost of collection for users (e.g. asset managers, banks and insurers) and helps research activities that require data series.

2.5.8 Timeliness

Timeliness relates to the managerial processes of NFI and structured management procedures with ex ante measures. With due diligence risk management or other procedures based on learning and comprehensive methodology, management bodies could identify any potential issues and risks in advance and, consequently, ensure timeliness (Buhmann, 2018). NFRD does not further discuss how to improve timeliness, therefore the Review of the NFRD is an opportunity to go beyond mere ex-post accountability by evaluating risks and apportion rewards (Buhmann, 2018). The systematic inclusion of sustainability performance indicators will increase the quality of communication

and improve the stakeholders' perceptions of transparency (Fernandez-Feijoo *et al.,* 2014).

Consultation process.

A corporate reporting framework that integrates the communication of narrative and quantified information in both financial and non-financial (i.e. non-monetary) terms can serve as a catalyst for an organization to evolve towards a positive cycle of value creation and meaningful communication with its markets. WICI underlines that the current financial reporting focuses primarily on historical performance, which, in isolation, does not facilitate a full understanding of the value creation process and intangibles from a future-oriented perspective. Euroclear suggests that forwardlooking sustainability data is an important prerequisite for improving assessments of the risks and opportunities associated with the future viability of companies and their external effects on the environment.

2.5.9 Reliability and accountability

Reliability is connected to the assurance of NFI. Mion and Adaui (2019) advance improvements on the credibility dimension through the implementation of Directive 2014/ 95/EU. However, academics have identified some constraints that jeopardize reliability. First, there is a lack of assurance processes. In fact, only a few EU Member States (France, Spain, and Italy, among the others) require mandatory independent assurance (Krasodomska *et al.,* 2021) in addition to a formal "check" of the NFI disclosed (La Torre *et al.,* 2018). Nevertheless, external assurance and a rigorous independent verification process would add credibility to NFI and, consequently, it would increase trust among

stakeholders (Santamaria *et al.,* 2021), i.e. investors will find NFI disclosure more reliable, trustworthy, and objective (Mio *et al.,* 2020).

Reliability is also influenced by the qualitative and narrative reporting and a lack of harmonisation on ESG topics (De Luca *et al.,* 2020). The effect of the fragmentation of sustainability reporting frameworks has limited assurance processes (Krasodomska *et al.,* 2020, 2021). In addition to this, a generalized low level of the knowledge on non-financial reporting issues among accounting specialists represents a threat to accountability.

In order to pursue the reliability of NFI, it is necessary for companies to "think twice about their practices", beyond the mere compliance approach (Ogrean, 2017). At the same time, it is necessary to enhance the education and training of accountants if they have to play a significant role in CSR reporting (Krasodmoska *et al.,* 2020). Both academics and practitioners argue in favour of mandating external assurance. In this vein, the Accountancy Europe (2020) position paper states that "assurance standards should apply to all assurance providers (i.e. statutory auditors, other independent practitioners working for accounting firms or other service providers such as engineering firms), and public oversight by existing bodies should cover all assurance service providers".

Consultation process

Reliability of non-financial reporting is a necessary precondition for its decision-usefulness and depends on the existence and robustness of external assurance (PwC). The CNCC suggests that wherever external assurance is provided, quality improves. The DRSC states that there are at least two big differences when it comes to non-financial reporting: firstly, the vast majority of NFI is narrative and consists of unstructured data. This means that data is not robust enough to enable a third party to objectively assess whether the information is factually correct or not. Secondly, as of today, a uniform set of high-quality auditing standards which could cover NFI does not exist. EY

recommends that external auditing of the NFI should be addressed by competent and independent assurance providers whereas EcoDa points the important role that extrafinancial rating agencies play.

Deloitte, CIMA, EcoDa, CNCC, CEAOB, ESBG, ESMA, Corporate Reporting Standing Committee (CRSC), Capital Coalition, Assonime, FESE explain how reporting under the standards may be adequately assured. The ESGB suggests that the type of assurance should depend on the company, beginning from limited assurance and improving it according to the relevancy of the indicators and their readiness. A restrictive approach is suggested by CNCC and VEB/European Investors Limiting that advocates reasonable assurance of the content of the non-financial statement from the statutory auditor. A more balanced perspective is provided by Eumedion because it invites auditors to provide at least limited assurance on the entire management report, whereas a reasonable assurance should at least be applied to the non-financial KPIs. Similarly, Deloitte proposed a target level of reasonable assurance on the entire NFI reporting. However, considering the maturity level of non-financial reporting in the EU, a limited assurance along with the materiality assessment process can be easily implemented Indeed, according to the European Central Bank (ECB) the current limitations of the existing data sources and definitions are further amplified by the lack of an auditing or verification process to assess the validity/reliability of the reported data.

The International Organization of Securities Commissions (IOSCO) underlies that some ESG disclosure may also be less reliable, on the basis that it may involve a degree of assumption about future and "what if" scenarios and the ICMA suggests that reliability is affected by related assumptions that are

inherently uncertain. Eumedion considers the variety of potentially relevant non-financial KPIs to be much wider than for financial KPIs.

2.6 Discussion

The analysis of the academic articles and annexed documents of the public consultation has revealed a unanimous consensus on the need for further implementations of the current NFRD. More specifically, contextualizing the disclosure of NFI into the discretionary transposition left to the State Members, this study focuses on the dimension of NFI disclosure quality that enhances transparency to various categories of stakeholders. In fact, a lack of transparency is not only a quantitative matter (lack of information), but also related to the quality of this information (European Commission, 2014). As the EC directly refers to reliability, accuracy, materiality and clarity as qualities of information, these dimensions have been further described and complemented using the literature on financial and sustainability reporting. In fact, most of the conditions identified in literature are grounds for transparency (see, e.g. Barth and Schipper, 2008; Hunton *et al.,* 2006).

The research draws on the dimensions of NFI disclosure quality identified by Aureli et al. (2019) as a lens of analysis which include completeness, relevance, clarity, comparability, consistency, accessibility, timeliness and reliability.

Regarding completeness, both academics and professionals underline the need to extend NFI to certain specific categories of topics. Furthermore, academics highlight the need to go beyond the mere number of NFI topics toward the introduction of specific issues related to the company's core business and linked to stakeholder expectations. The CSRD proposal addresses the mandatory sustainability contents, in line with both academics and practitioners. In particular, it advances the disclosure of sustainability issues linked to the business model and related strategy. New disclosures include, for instance, the resilience

of the undertaking's business model and strategy to risks of sustainability matters. Furthermore, it extends the disclosure of the whole value chain, including its own operations, its products and services, its business relationships, and its supply chain, as appropriate (p. 29).

Regarding relevance, academics and practitioners agree on the lack of a univocal definition of materiality. On the one hand, academics have provided several methodologies for its determination, attributing a crucial role of stakeholder engagement in defining material issues. On the other hand, in the consultation process, the perspective of double-materiality has gathered primarily importance along with the problematization of assurance linkages. In such vein, the CSRD proposal clarifies the principle of double-materiality which includes both sustainability matters that impact on people and the environment and the risks and the impacts of sustainability issues on the company's activity.

Regarding clarity, scientific literature underlines a more selective approach and the need for standardization to limit the "cherry-picking" approach in disclosing NFI. From the consultation, respondents emphasize the need to integrate financial and NFI. The CSRD proposal recommends a description of the targets related to sustainability matters in order to enhance clarity and to understand the processes towards their achievements. Furthermore, it demands to set sustainability reporting standards taking into consideration the technical advice of the EFRAG.

Regarding comparability, academics explain that the mandatory context has produced a "coercive isomorphism" and they suggest a modulation of the requirements based on regional and sectoral criteria. This is even confirmed by the consultation process of the Review. Literature gathers consensus from the consultation process on standardisation and it also specifies the need to extend the proportionality principle to SMEs. The principle of proportionality for SMEs has been introduced in the CSRD proposal thus, the disclosure

requirements need to be proportionate to the capacities and characteristics of SMEs.

Regarding consistency, academics underline the risks behind discretionary and subjectivity and highlight the rationalization of disclosure produced by quantitative information as a consequence of the NFRD. On the other hand, the consultation process emphasizes the operative role of KPIs and related narratives to explain its evolution over time.

Regarding accessibility, there is a common ground for an integration of financial and NFI into a unique document. Furthermore, during the consultation process, the digital categorization system has been proposed to improve accessibility. The CSRD proposal has suggested to prepare the financial statements and their management report in a single electronic reporting format.

Regarding timeliness, the consultation process is aligned with the literature in favour of an implementation of a forward-looking perspective with a subsequent improvement in the risk management procedures. The CSRD Proposal transposed the suggestion of improving qualitative and quantitative forward-looking information. Ultimately, reliability and accountability are related to assurance. In more detail, academics address the need to extend the training on NFI disclosure to both preparers and accountants, and the respondents raised the limit of the application to "what if" scenarios. The CSRD proposal mandates the assurance of sustainability information with a limited assurance and the option to move towards a reasonable assurance requirement. Based on the above arguments, Table 4 summarizes the main commonalities and divergences of each dimension that defines the quality of NFI disclosure in the mandatory context.

Dimensions of the quality of NFI disclosure	Academic literature	Consultation process
Completeness		(1) Specific content issues
	(2) Mandatory versus voluntary information	
	(3) Topics related to the core business	
	(4) Expectations of stakeholders on the disclosure	
Relevance		(1) Heterogeneous definitions/perspectives of materiality
	(2) Implementation of the materiality determination process	
	(3) Stakeholder engagement	
		(4) Double materiality perspective
		(5) Linkages with assurance
Clarity	(1) Towards a more selective approach	
	(2) Bias produced by the cherry-picking approach	
		(3) Integration and connectivity of financial and non-financial information
Comparability	(1) Coercive isomorphism	
	(2) Sector versus an international alignment	
	(3) Framework of standardisation	
	(4) Principle of proportionality for SMEs	
Consistency	(1) Subjectivity and discretionary requirements	
	(2) Rationalization of the disclosure	
		(3) KPIs and related narratives
Accessibility	(1) Separate or integrated reporting	
		(2) Digital categorization system of NFI
Timeliness		(1) Forward looking perspective
	(2) Risk management	
Reliability and accountability		(1) Assurance
	(2) Education and training of accountants and preparers	
		(3) "What if" scenario

Source(s): Authors' elaboration

Table 4. Outcomes of NFI disclosure quality

2.7 Conclusion

Our literature review draws on Korca and Costa (2021)'s suggestion to investigate the interplay between the binding directive and non-binding guidelines. Therefore, we employed an integrative literature review on its effect on the quality of NFI, in light of the recent developments on NFRD. This integrative literature review aims to provide the "state of the art" of NFI disclosure quality, considering both the current academic perspective and recent contributions from the annexed documents, to the public consultation of the NFRD. The Directive followed a regulatory approach beyond market freedom

and aimed to overcome a fragmented reporting landscape. However, the Directive has been criticized on the discretion left to State Members that have transposed the Directive into national laws differently. Consequently, an approach towards a mere compliance with the law has been developed in response to a mandatory regime and some scholarly research has labelled this concern as a reduction in NFI quality. Furthermore, empirical evidence demonstrates that, at the beginning of mandated requirements the quality of NFI was at a minimum level (Venturelli *et al.,* 2017) and this trend did not change with the introduction of the mandatory requirements (La Torre *et al.,* 2018). These above-mentioned considerations constitute the underlying reasons at the base of this study.

Considering a critical accounting perspective (Scapens, 2008; Gray and Milne, 2015), quality is a multidimensional and multi-faceted concept that is grounded on the scope of reporting (Michelon *et al.,* 2021). Indeed, academics have developed several evaluations of such a disclosure leading to different results when comparing different disclosure quality indexes (Helfaya and Whittington, 2019). This limits actions to enhance, or eventually, to refine dimensions of quality. Consequently, NFI quality cannot be interpreted with a unique dimension but needs to be analysed with a multidimensional perspective (Michelon *et al.,* 2021). This study provides eight dimensions of NFI quality referring to the financial and sustainability accounting literature (Aureli *et al.,* 2018, 2019) to evaluate the quality of the disclosure. This study brings these dimensions as a lens to analyse and synthesize academic research and the suggestions that arise from the consultation process. These dimensions have been useful labels for carrying on the content analysis of the integrative literature review.

Findings show that there is a unanimous consensus on the need to enhance comparability, to provide specific contents on sustainability issues, to clarify the relevance of NFI, and to embed NFI into the management report in an

integrated manner. Furthermore, there is an alignment related to timeliness in favour of a risk management procedure and a forwardlooking approach. In addition, the scientific literature relies on several theoretical reasons for completeness, relevance, clarity, consistency, accessibility, reliability and accountability, relying on legitimacy, institutional, agency, and stakeholder theory.

This study is not without its limitations. Firstly, the study takes into account only the annexed documents submitted to the EC. Secondly, the study has not analysed in depth the proposed Corporate Sustainability Reporting Directive which was issued on April 21, 2021 and focuses on assurance and proportionality scoping. However, this study supports future research that can implement empirical analysis oriented to evaluate the dimensions of NFI disclosure quality through a configurational approach and verify the evolution of NFI quality over time. Furthermore, future research can evaluate NFI disclosure quality by analysing cross-country and cross-sector differences.

Overall, the proposed CSRD is a progressive step further towards the reduction of greenwashing behaviour and enhancement of sustainable development. However, for a concrete realisation of the proposed CSRD, and, more broadly, the achievement of Sustainable Development Goals (SDGS) of the Agenda 2030, the decoupling of "talk and walk" has to turn into an integrative approach of practicing and reporting sustainability issues.

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Appendix – List of academic articles under analysis

Publication year	Authors	Article title	Academic journal	ABDC ranking	ABS ranking
2021	Santamaria, R; Paolone, F; Cucari, N; Dezi, L	Non-financial strategy disclosure and environmental, social and governance score: Insight from a configurational approach	Business Strategy and the Environment	A	3
2021	Pizzi, S; Rosati, F; Venturelli, A	The determinants of business contribution to the 2030 agenda: introducing the SDG reporting score	Business Strategy and the Environment	A	3
2021	Cosma, S; Leopizzi, R; Pizzi, S; Turco, M	The stakeholder engagement in the European banks: Regulation versus governance. What changes after the NF directive?	Corporate Social Responsibility and Environmental Management	C	1
2021	Korca, B; Costa, E	Directive 2014/95/EU: building a research agenda	Journal of Applied Accounting Research	B	2
2021	Stefanescu, CA; Tiron-Tudor, A; Moise, EM	Eu non-financial reporting research – insights, gaps, patterns and future agenda	Journal of Business Economics And Management	B	2
2021	Krasodomska, J; Simnett, R; Street, DL	Extended external reporting assurance: Current practices and challenges	Journal of International Financial Management and Accounting	B	2
2021	De Micco, P; Rinaldi, L; Vitale, G; Cupertino, S; Maraghini, MP	The challenges of sustainability reporting and their management: the case of Estra	Meditari Accountancy Research	A	1
2021	Krasodomska, J; Zarzycka, E	Key performance indicators disclosure in the context of the EU directive: when does stakeholder pressure matter?	Meditari Accountancy Research	A	1
2021	Fiandrino, S; Tonelli, A	A Text-mining analysis on the review of the non-financial reporting directive: bringing value creation for stakeholders into accounting	Sustainability	NA	NA

Publication year	Authors	Article title	Academic journal	ABDC ranking	ABS ranking
2020	Aureli, S; Salvatori, F; Magnaghi, E	A country-comparative analysis of the transposition of the EU non-financial directive: an institutional approach	Accounting Economics and Law-A Convivium	B	NA
2020	Tsagas, G; Villiers, C	Why less is more in non-financial reporting initiatives: concrete steps towards supporting sustainability	Accounting Economics and LAW-A Convivium	B	NA
2020	Raucci, D; Tarquinio, L	Sustainability performance indicators and non-financial information reporting. evidence from the Italian case	Administrative Sciences	NA	NA
2020	Kinderman, D	The tenuous link between CSR performance and support for regulation: Business associations and Nordic regulatory preferences regarding the corporate transparency law 2014/95/EU	Business and Politics	A	NA
2020	Ferrer, E; Lopez-Arceiz, FJ; del Rio, C	Sustainability disclosure and financial analysts' accuracy: The European case	Business Strategy and the Environment	A	3
2020	Veltri, S; de Luca, F; Phan, HTP	Do investors value companies' mandatory nonfinancial risk disclosure? An empirical analysis of the Italian context after the EU directive	Business Strategy and the Environment	A	3
2020	Mazzotta, R; Bronzetti, G; Veltri, S	Are mandatory non-financial disclosures credible? Evidence from Italian listed companies	Corporate Social Responsibility and Environmental Management	C	1
2020	Mio, C; Fasan, M; Marcon, C; Panfilo, S	The predictive ability of legitimacy and agency theory after the implementation of the EU directive on non-financial information	Corporate Social Responsibility and Environmental Management	C	1

(*continued*)

Publication year	Authors	Article title	Academic journal	ABDC ranking	ABS ranking
2020	Aureli, S; Salvatori, F; Magnaghi, E	A country-comparative analysis of the transposition of the EU non-financial directive: an institutional approach	Accounting Economics and Law-A Convivium	B	NA
2020	Tsagas, G; Villiers, C	Why less is more in non-financial reporting initiatives: concrete steps towards supporting sustainability	Accounting Economics and LAW-A Convivium	B	NA
2020	Raucci, D; Tarquinio, L	Sustainability performance indicators and non-financial information reporting. evidence from the Italian case	Administrative Sciences	NA	NA
2020	Kinderman, D	The tenuous link between CSR performance and support for regulation: Business associations and Nordic regulatory preferences regarding the corporate transparency law 2014/95/EU	Business and Politics	A	NA
2020	Ferrer, E; Lopez-Arceiz, FJ; del Rio, C	Sustainability disclosure and financial analysts' accuracy: The European case	Business Strategy and the Environment	A	3
2020	Veltri, S; de Luca, F; Phan, HTP	Do investors value companies' mandatory nonfinancial risk disclosure? An empirical analysis of the Italian context after the EU directive	Business Strategy and the Environment	A	3
2020	Mazzotta, R; Bronzetti, G; Veltri, S	Are mandatory non-financial disclosures credible? Evidence from Italian listed companies	Corporate Social Responsibility and Environmental Management	C	1
2020	Mio, C; Fasan, M; Marcon, C; Panfilo, S	The predictive ability of legitimacy and agency theory after the implementation of the EU directive on non-financial information	Corporate Social Responsibility and Environmental Management	C	1

(*continued*)

Publication year	Authors	Article title	Academic journal	ABDC ranking	ABS ranking
2020	Leopizzi, R; Iazzi, A; Venturelli, A; Principale, S	Nonfinancial risk disclosure: the state of the art of Italian companies	Corporate Social Responsibility and Environmental Management	C	1
2020	Moraru, RI; Paun, AP; Dura, CC; Dinulescu, R; Potcovaru, AM	Analysis of the drivers of occupational health and safety performance disclosures by Romanian companies	Economic Computation And Economic Cybernetics Studies and Research	C	NA
2020	Mittelbach-Hormanseder, S; Hummel, K; Rammerstorfer, M	The information content of corporate social responsibility disclosure in Europe: an institutional perspective	European Accounting Review	A*	3
2020	Artene, A; Bunget, OC; Dumitrescu, AC; Domil, AE; Bogdan, O	Non-financial information disclosures and environmental protection-evidence from Romania and Greece	Forests	NA	NA
2020	Di Vaio, A; Palladino, R; Hassan, R; Alvino, F	Human resources disclosure in the EU directive 2014/95/EU perspective: a systematic literature review	Journal of Cleaner Production	A	NA
2020	Masiero, E; Arkhipova, D; Massaro, M; Bagnoli, C	Corporate accountability and stakeholder connectivity. A case study	Meditari Accountancy Research	A	1
2020	Biondi, L; Dumay, J; Monciardini, D	Using the international integrated reporting framework to comply with EU directive 2014/95/EU: can we afford another reporting facade?	Meditari Accountancy Research	A	1
2020	Krasodomska, J; Michalak, J; Swietla, K	Directive 2014/95/EU accountants' understanding and attitude towards mandatory non-financial disclosures in corporate reporting	Meditari Accountancy Research	A	1

(*continued*)

Publication year	Authors	Article title	Academic journal	ABDC ranking	ABS ranking
2019	Fiandrino, S; Busso, D; Vrontis, D	Sustainable responsible conduct beyond the boundaries of compliance Lessons from Italian listed food and beverage companies	British Food Journal	B	1
2019	Arraiano, IG; Hategan, CD	The stage of corporate social responsibility in EU-CEE countries	European Journal of Sustainable Development	NA	NA
2019	Martin-Ortega, O; Hoekstra, J	Reporting as a means to protect and promote human rights? The EU non-financial reporting directive	European Law Review	C	NA
2019	Wozniak, J; Pactwa, K	Analysis of the socio-environmental policy of selected mining companies on the basis of non-financial reporting	Gospodarka Surowcami Mineralnymi-Mineral Resources Management	NA	NA
2019	Venturelli, A; Caputo, F; Leopizzi, R; Pizzi, S	The state of art of corporate social disclosure before the introduction of non-financial reporting directive: a cross country analysis	Social Responsibility Journal	B	NA
2019	Carrillo, MIA; de La Cruz, AMP; Chicharro, MN	The impact of corporate governance on corruption disclosure in European listed firms through the implementation of directive 2014/95/EU	Sustainability	NA	NA
2019	Mion, G; Adaui, CRL	Mandatory nonfinancial disclosure and its consequences on the sustainability reporting quality of Italian and German companies	Sustainability	NA	NA
2018	Sava, A; Bogdan, M; Kocsi, K	Online disclosure of non-financial information in romanian large companies	Acta Technica Napocensis Series-Applied Mathematics Mechanics and Engineering	NA	NA
2018	Sierra-Garcia, L; Garcia-Benau, MA; Bollas-Araya, HM	Empirical analysis of non-financial reporting by spanish companies	Administrative Sciences	NA	NA

(*continued*)

Publication year	Authors	Article title	Academic journal	ABDC ranking	ABS ranking
2018	Buhmann, K	Neglecting the proactive aspect of human rights due diligence? A critical appraisal of the EU's non-financial reporting directive as a pillar one avenue for promoting pillar two action	Business and Human Rights Journal	C	NA
2018	Milena, P; Lahorka, H	Exploring the quality of social information disclosed in non-financial reports of Croatian companies	Economic Research-Ekonomska Istrazivanja	NA	NA
2018	Bernardi, C; Stark, AW	On the value relevance of information on environmental and social activities and performance – Some evidence from the UK stock market	Journal of Accounting And Public Policy	A	3
2018	Malecki, C	French implementation of the EU CSR directive: sustainable corporate governance has begun	Law and Financial Markets Review	B	NA
2018	Shoaf, V; Jermakowicz, EK; Epstein, BJ	Toward Sustainability and Integrated Reporting	Review of Business	NA	NA
2018	Manes-Rossi, F; Tiron-Tudor, A; Nicolo, G; Zanellato, G	Ensuring more sustainable reporting in europe using non-financial disclosure-de Facto and de Jure evidence	Sustainability	NA	NA
2017	Dumitru, M; Dyduch, J; Guse, RG; Krasodomska, J	Corporate reporting practices in Poland and Romania – an ex-ante study to the new non-financial reporting European directive	Accounting in Europe	A	2
2017	Hojnik, J	Environmental corporate reporting under EU law: historic achievement or just a moderate step forward?	Journal for European Environmental and Planning Law	NA	NA

(*continued*)

Publication year	Authors	Article title	Academic journal	ABDC ranking	ABS ranking
2017	Szabo, DG; Sorensen, KE	Non-financial reporting, CSR frameworks and groups of undertakings: application and consequences	Journal of Corporate Law Studies	A	NA
2017	Ogrean, C	The directive 2014/95/EU – is there a new beginning for CSR in Romania?	Studies in Business and Economics	C	NA
2017	Matuszak, L; Rozanska, E	CSR disclosure in polish-listed companies in the light of directive 2014/95/EU requirements: empirical evidence	Sustainability	NA	NA
2017	Venturelli, A; Caputo, F; Cosma, S; Leopizzi, R; Pizzi, S	Directive 2014/95/EU: are Italian companies already compliant?	Sustainability	NA	NA
2016	Kristofik, P; Lament, M; Musa, H	The reporting of non-financial information and the rationale for its standardization	E & M Ekonomie a Management	NA	NA
2016	Ahern, D	Turning up the heat? EU sustainability goals and the role of reporting under the non-financial reporting directive	European Company and Financial Law Review	NA	NA

3. Academic article: Sustainability materiality research: a systematic literature review of methods, theories and academic themes

3.1 Abstract

Title – Sustainability materiality research: a systematic literature review of methods, theories and academic themes.

Authors: Simona Fiandrino, Alberto Tonelli and Alain Devalle

Journal: Qualitative Research in Accounting and Management, Vol. 19 No. 5, pp. 665-695

Purpose - This systematic literature review (SLR) aims to examine the extent of academic knowledge of sustainability materiality research. There is no academic review of this field; therefore, this study aims to close this research gap.

Design/methodology/approach – The paper systematically reviews the existing literature on sustainability materiality research. Papers were qualitatively classified and analysed in accordance with the theoretical underpinning, research methods and academic themes of sustainability materiality research.

Findings – The findings of the review show that scholarly work on sustainability materiality has increased exponentially since the 2010s. In terms of research methods, scholars have examined sustainability using content analysis techniques and qualitative approaches. A common theoretical foundation was missing, but an increasing number of articles have been anchored to stakeholder theory. The academic themes have progressively enriched empirical evidence on the evaluation of materiality in sustainability information.

Research limitations/implications – This review can be useful as an academic basis to open avenues for strengthening theoretical and empirical research on new emerging issues regarding double materiality and dynamic materiality.

Originality/value – This paper conducts the first SLR of academic knowledge on sustainability materiality research. Eight academic themes are proposed to classify sustainability materiality. Thus, it is an aid to future research in this area.

Keywords – Materiality, Social and environmental accounting and reporting (SEAR), Sustainable development, Accountability, Systematic literature review, Sustainability materiality assessment.

Paper type – Literature review

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"Materiality is like packing a backpack for a hike: you can only bring the supplies that are absolutely critical, otherwise the weight will slow you down and eventually bring you to your knees"

3.2 Introduction

In recent years, corporate sustainability has progressively become of paramount importance in regulators', companies' and stakeholders' agendas confronting urgent environmental and societal challenges, such as biodiversity collapse, climate change and social inequalities. In this regards, corporate sustainability is the contribution of business firms to sustainable development (Bansal, 2005; Dyllick and Hockerts, 2002; Bansal and Roth, 2000) to attain environmental integrity, address social equity and sustain economic prosperity (Bansal, 2005). Progressively, various categories of stakeholders have taken an interest in information on corporate sustainability and have, therefore, witnessed the emergence of sustainability accounting and reporting[1]. Indeed, companies

[1] According to Adams (2020), "Sustainability accounting and reporting" can be alternatively called "Corporate social responsibility" accounting and reporting, "CSR accounting and reporting"; "social and environmental accounting and reporting (SEAR)" or more recently is also called "ESG (environmental social and governance)' accounting (and reporting). For consistency purposes, we will use 'sustainability accounting and reporting" throughout this literature

have been called to be accountable for their ethical, social and environmental responsibilities by integrating corporate sustainability into their core business activities (Burritt and Schaltegger, 2010; Nicholls, 2020; Patten and Shin, 2019) and by reporting related policies, practices, performance and targets (Adams, 2017; Adams and Larrinaga, 2019). To support the exigence of reporting on sustainability across industries globally, new standards have emerged for measurement and reporting to ensure high-quality sustainability information (Jørgensen *et al.,* 2022, p. 342).

However, the challenge of transparency and the credibility of the sustainability information disclosed remains a challenge (Ruiz-Lozano *et al.,* 2021). The major risk is that corporate managers can disclose their environmental and social impacts as a mechanism for legitimising organisational actions (Murphy and McGrath, 2013; Sepúlveda-Alzate *et al.,* 2021). To mitigate or eventually overcome this issue, the inclusion of sustainability issues that are relevant for companies and stakeholders is fundamental to sustainability accounting and reporting (Ferrero-Ferrero *et al.,* 2021). This process, also known as materiality analysis, helps companies identify, assess and prioritise corporate sustainability practices that impact both the company and its stakeholders.

Sustainability materiality analysis guides the assessment of the relative importance of various sustainability issues, and it can help companies in managing trade-offs between different areas of sustainability (Jørgensen *et al.,* 2022). In this vein, sustainability materiality analysis is of great importance to the reporting process of sustainability issues (Puroila and Mäkelä, 2019; Unerman and Zappettini, 2014) because companies' sustainability efforts require prioritisation regarding which practices should be conducted, which indicators should be chosen as measures of performance and which sustainability

review. We place our article within the field of sustainable business generally and sustainability accounting reporting specifically (Jørgensen *et al.,* 2022; p. 342).

information should be disclosed (Jørgensen *et al.,* 2022, p. 342). Furthermore, considering the great emphasis on the increased guidance from the Global Reporting Initiative (GRI) Standard and other international standard frameworks, sustainability materiality analysis in practice seems to be more difficult in the reporting of sustainability issues than in the reporting of financial matters (Mio, 2013; Sepúlveda-Alzate *et al.,* 2021).

In addition, an increasing number of researchers have started to investigate the contested concept of materiality (Calace, 2019; Reimsbach *et al.,* 2020; Zadek and Merme, 2003) because there is not yet an apparent consensus about materiality; rather, there is still confusion about this issue (Jørgensen *et al.,* 2022). Prior literature on sustainability materiality has addressed methods used to assess subjects that are material to companies and stakeholders (Hsu *et al.,* 2013), evaluation of materiality disclosure (Torelli *et al.,* 2020), ethical implications resulting from materiality judgements (Clark, 2021) and the transposition of different definitions (Calace, 2019). Furthermore, the emergence of different standard frameworks that have provided several definitions of materiality has led to divergences in judgement and uncertainty in assessments (Calabrese *et al.,* 2016; Clark, 2021; Puroila and Mäkelä, 2019).

As standard frameworks appear to adopt different conceptions of sustainability materiality, there is a high degree of complexity in this field (Cooper and Michelon, 2022, p. 56); therefore, comprehensive research that brings together the literature on sustainability materiality is required. This is the first systematic literature review (SLR) intended to systematically analyse academic knowledge on sustainability materiality by mapping the evolution of this field and highlighting current and emerging trends. This research develops discussions to consider future research into materiality for sustainability accounting and reporting. With this aim, we conducted a systematic review of the existing literature using a sample of 90 peer-reviewed journal articles to identify the

developmental path, research methods, theoretical roots and main topics under analysis.

Our research has the following theoretical and practical contributions. From a theoretical perspective, we provide the first comprehensive and up-to-date SLR of sustainability materiality research, distilling the current state of knowledge and deriving eight thematic patterns that describe the stream of research by offering structure and clarity. We believe that this review can be useful as an academic basis for opening avenues to strengthen theoretical and empirical research on new emerging issues on sustainability materiality, such as double materiality and dynamic materiality. From a practical viewpoint, the findings may be useful to corporate managers preparing sustainability reports, who can benefit from the examples of models of materiality assessment grouped together in this SLR based on stakeholder engagement. Regulators and standard setters should further monitor the findings and the discussion to address how materiality should be redefined in the contested sustainability reporting standard setting. The findings of our SLR suggest mitigating the risk of riding current business trends or applying false myths in calls for the "harmonisation" of sustainability reporting (Adams and Abhayawansa, 2021) and indicate the need for more research on double materiality with a focus on sustainable development from a stakeholder perspective.

The structure of the remainder of the paper is as follows. In Section 2, we describe the institutional settings around the materiality principle by defining materiality for each standard framework. In Section 3, we outline the research design of the SLR by defining the procedural steps. In Section 4, we present the results of how research on sustainability materiality has been developed to date. Section 5 discusses both practical and theoretical implications for the sustainability materiality literature. Finally, Section 6 concludes with the research limitations and suggestions for future academic studies.

3.3 Institutional background

The materiality principle emerged in the financial accounting literature to evaluate relevant business transactions and to dispute some accounting treatment. Materiality was defined as "the relative, quantitative importance of some piece of financial information, to a user, in the context of a decision to be made" (Frishkoff, 1970, p. 116); therefore, an item was considered material if it rendered business events into financial data. In financial accounting, materiality is one of the most important accounting principles because it determines the importance of a matter for financial reporting purposes [Financial Accounting Standard Board (FASB), 1975]. The FASB stated that:

[...] the omission or misstatement of an item in a financial report is material if, in light of surrounding circumstances, the magnitude of the item is such that it is probable that the judgement of a reasonable person relying upon the report would have been changed or influenced by the inclusion or correction of the item (FASB, 2018, p. 9).

Similarly, the International Accounting Standard Board (IASB) defined information as material "if omitting it or misstating it could influence decisions that users make on the basis of financial information about a specific reporting entity" (International Accounting Standards Board, 2010). At its inception, materiality in financial accounting was defined as economic information (Jebe, 2019). However, it has no set of rules that can be adopted in the identification of thresholds (Gray, 2010); therefore, it is characterised by an absence of professional guidance (Lee, 2004), and it is considered an entity-specific aspect of relevance based on the nature, magnitude or both of the items.

Considering the expansion of human societies and economic activities exceeding the planetary boundary (Rockström *et al.,* 2009), sustainability matters have become of paramount importance and companies have started to report

related practices and performance. Relatedly, several initiatives have been initiated to uphold organisational, managerial and reporting practices, each of which has addressed sustainability matters from different perspectives (Haji and Hossain, 2016). The field of sustainable business in general, as well as sustainability accounting and reporting specifically (Jørgensen *et al.,* 2022), has been characterised by differentiation, not only in terminology but also in methodology and focus (de Colle and Gonella, 2002, p. 86). The development of sustainability accounting and reporting can be understood as "narratives of local events articulating the relationships of the organisation with its 'stakeholders' and/or its immediate substantive environment" (Gray, 2010, p. 47). According to Buhr et al. (2014), sustainability accounting:

[...] need to have a detailed and complex analysis of the organization's interactions with ecological systems, resources, habitats, and societies, and interpret this in the light of all other organizations' past and present impacts on those same systems (p. 51).

Then, standard setters and regulators have started to debate the institutionalisation of sustainability reporting practices by producing a broad set of national and international standards aimed at advancing corporate accountability (Gilbert *et al.,* 2011). In this regards, Buhr, Gray and Milne (2014) have examined the rationales underlying the main international standards frameworks, and several concerns regarding the standards' scope and targets have been discussed. For instance, GRI's purpose focuses on the sustainability of the planet and various categories of stakeholders, whereas, in the Integrated Reporting (IR) Framework, "the discussion is almost exclusively upon the needs of investors" (Buhr *et al.,* 2014, p. 65). In the International (IR) Framework, sustainable development has not yet been considered, and it focuses almost exclusively on the needs of investors, whereas simultaneously ignoring other stakeholders' interests (Buhr *et al.,* 2014; Milne and Gray, 2013). These

multifaceted perspectives lead to diverse engagement in determining the extent of accountability through corporate commitments and disclosures, both in the nature of the drivers and in the approaches adopted by companies (de Colle and Gonella, 2002, p. 86). Therefore, these different conceptualisations and contested overlapping areas of the standards have created problems for managers who must decide for or against the adoption of material sustainability initiatives (Gilbert *et al.,* 2011). Furthermore, each standard provides a diverse definition of the materiality principle.

The materiality principle has been defined in several frameworks provided by international standards, such as the GRI (GRI, 2021), Sustainability Accounting Standards Board (SASB, 2017, 2020), AccountAbility Framework (AccountAbility, 2018), International Integrated Reporting Council (IIRC, 2021) and Sustainable Development Goals Disclosure (SDGD) Recommendations (Adams *et al.,* 2020). All of these frameworks provide different definitions that can be discussed by considering the intended audience (i.e. investors and stakeholders), the processes to determine materiality in terms of information content (financial/economic, social and environmental) and the level of impact of the information (i.e. significance, magnitude and relevance) (Clark, 2021). Table 1 presents a synthesis of the definitions of materiality provided by the standard frameworks according to the categories identified by Clark (2021).

Considering the intended audience, SASB and IIRC focus on investors and providers of financial capital. The GRI, AccountAbility Framework, SDGD Recommendations, Social Value International (Social Value International framework, 2018), Impact Management Project, World Economic Forum and Deloitte (2020), European Financial Reporting Advisory Group (EFRAG) and European Commission adopt a wider perspective by including stakeholders and society at large. International Auditing and Assurance Standards Board (IIASB) guidance is devoted to auditors' assurance. Considering the processes of determining materiality in terms of information content, SASB and IIRC include

sustainability practices that have only financial implications. GRI, Sustainable Development Goals (SDGs), AccountAbility and Social Value adopt a wide perspective, considering social and environmental impacts on society as well. Considering the level of impact of the information, the GRI addresses the relevance for companies and their stakeholders, whereas the IIRC addresses the likelihood of occurrence and the magnitude of the matter's effects. However, few guidelines suggest how the magnitude of sustainability issues should be measured.

More recently, the principle of materiality has evolved into a double-materiality perspective that focuses on a requirement for companies to report both on how sustainability issues affect their performance, position and development (the "outside-in" perspective) and on their impact on people and the environment (the "inside-out" perspective) (European Commission, 2021). This approach removes any ambiguity regarding the fact that companies should report information necessary to understand how sustainability matters affect them, as well as information necessary to understand the impact they have on people and the environment (European Commission, 2021, pp. 1, 14). Linked to this, European Financial Reporting Advisory Group – EFRAG (2021, p. 8) has specified that double materiality means "to identify sustainability matters that are material in terms of the impacts of the reporting entity's own operations and its values chain (impact materiality), based on:

- the severity (scale, scope and remediability) and, when appropriate, the likelihood of actual and potential negative impacts on people and the environment;
- the scale, scope and likelihood of actual positive impacts on people and the environment, connected with companies' operations and value chains; and
- the urgency derived from social or environmental public policy goals and planetary boundaries".

Ultimately, a dynamic concept of materiality has been addressed; that is, "sustainability topics that a company once considered immaterial for disclosure can become material, based on evidence of an organisation's impacts on the economy, environment and/or people" (Impact Management Project, World Economic Forum and Deloitte, 2020, p. 10).

Grouping these considerations together, we can acknowledge that the concept of materiality has been extensively developed, and these definitions have created the organisational context in which corporate reporting is practised (Clark, 2021). However, the landscape has led to confusion in practice regarding assessment and disclosure (Cho *et al.,* 2020; Park and Ravenel, 2015) because a clear-cut dividing line between material and non-material matters is still not established. Therefore, this literature review assesses academic knowledge on sustainability materiality to better describe the developmental path, current trends and future directions.

Standard setter	Information content	Intended audience	Level of impact of the information
Global Reporting Initiative (GRI), GRI (2021)	"Material topics that represent the organization's most significant impacts on the economy, environment, and people, including impacts on their human rights"	Stakeholders	Material issues are based on the effect the organization has or could have on the economy, environment and people, including on their human rights, which can indicate its contribution (negative or positive) to sustainable development
Sustainability Accounting Standards Board (SASB), SASB (2017, 2020)	Information is financially material if omitting, misstating or obscuring it could reasonably be expected to influence investment or lending decisions that users make on the basis of their assessments of short-, medium- and long-term financial performance and enterprise value	Investors	Sustainability topics that are reasonably likely to have material impacts on the financial condition or operating performance of companies in an industry
Sustainable Development Goals Disclosure (SDGD) Recommendation Adams *et al.*, (2020)	A material sustainable development information is "any information that is reasonably capable of making a difference to the conclusions drawn by: stakeholders concerning the positive and negative impacts of the organisation on global achievement of the SDGs, and providers of finance concerning the ability of the organisation to create long term value for the organisation and society"	Providers of finance, stakeholders and society	Sustainable development issues that are relevant and material to an organisation's ability to create long term value and prevent value destruction present risks and/or opportunities for its providers of finance, stakeholders and society
International Integrated Reporting Council IIRC (2021)	An integrated report should disclose information about matters that substantively affect the organization's ability to create value over the short, medium and long term	Investors and providers of financial capital	A matter needs to be important in terms of its known or potential effect on value creation by evaluating the magnitude of the matter's effect and its likelihood of occurrence
AccountAbility (2018)	A material topic is a topic that will substantially influence and impact the assessments, decisions, actions and performance of an organisation and/or its stakeholders in the short, medium and/or long term	Organization and stakeholders	Materiality relates to identifying and prioritising the most relevant sustainability topics, taking into account the effect each topic has on an organisation and its stakeholders

Table 1.
Synthesis of the definitions of materiality provided by the standard frameworks

(continued)

Standard setter	Information content	Intended audience	Level of impact of the information
Social Value International Social Value International framework (2018)	Information must be included in the accounts to give a true and fair picture, such that stakeholders can draw reasonable conclusions about impact	Stakeholders	The basic judgement to make is whether a stakeholder would make a different decision about the activity if a particular piece of information was excluded
Impact Management Project, World Economic Forum and Deloitte (2020)	Materiality is defined as the magnitude of an omission or misstatement of accounting information that, in the light of surrounding circumstances, makes it probable that the judgement of a reasonable person relying on the information would change or be influenced	Stakeholders	What would be considered relevant to a financial investor/ shareholder, or whether materiality is defined by all stakeholders who are affected in a significant way by the entity's activities
European Commission (2021)	Double materiality addresses both on how sustainability issues affect their performance, position and development (the "outside-in" perspective) and on their impact on people and the environment (the "inside-out" perspective)	Investors and non-governmental organisations, social partners and other stakeholders	Material issues are based on how sustainability matters affect companies and their impact on people and the environment
European Financial Reporting Advisory Group – EFRAG (2021)	Double perspective: (1) financial materiality: on risks to the reporting entity's financial performance (2) environmental and social materiality: on the impacts on people, communities and the environment connected to a reporting entity's activities and business relationships	Stakeholders	Inclusion and prioritisation of specific information in corporate reports, considering the needs and expectations of the stakeholders of an organisation and of the organisation itself
International Auditing and Assurance Standards Board (IIASB) guidance (2020)	Materiality is a threshold of significance to decision-making considered by the practitioner in relation to potential and identified misstatements	Assurance	Consideration of the context of the entity's process to identify reporting topics
Natural Capital Protocol (2016)	An impact or dependency on natural capital is material if consideration of its value, as part of the set of information used for decision making, has the potential to alter that decision (Adapted from OECD 2015 and IIRC 2013)	Organization and stakeholders	The process that involves identifying what is material in relation to the natural capital assessment's objective and application

3.4 Reserach method

We used a SLR, a research method that identifies and interpretively assesses relevant research by collecting and analysing data from the corpus of literature (Snyder, 2019, p. 334; Tranfield *et al.,* 2003). We applied this method by collecting and analysing scholarly literature referring to sustainability materiality research. In doing so, we followed the research methods of prior SLRs (Dienes *et al.,* 2016; Hinze and Sump, 2019; Johnsson *et al.,* 2021; Mio *et al.,* 2020b; Roberts *et al.,* 2021; Veltri and Silvestri, 2020; Widyawati, 2020). Thus, we developed a research protocol consisting of methodological steps regarding the research plan, search strategy for conducting the review, content analysis of the extant literature and compilation of the findings. These steps are shown in Figure 1 to allow our research protocol to be replicable (Palmatier *et al.,* 2018).

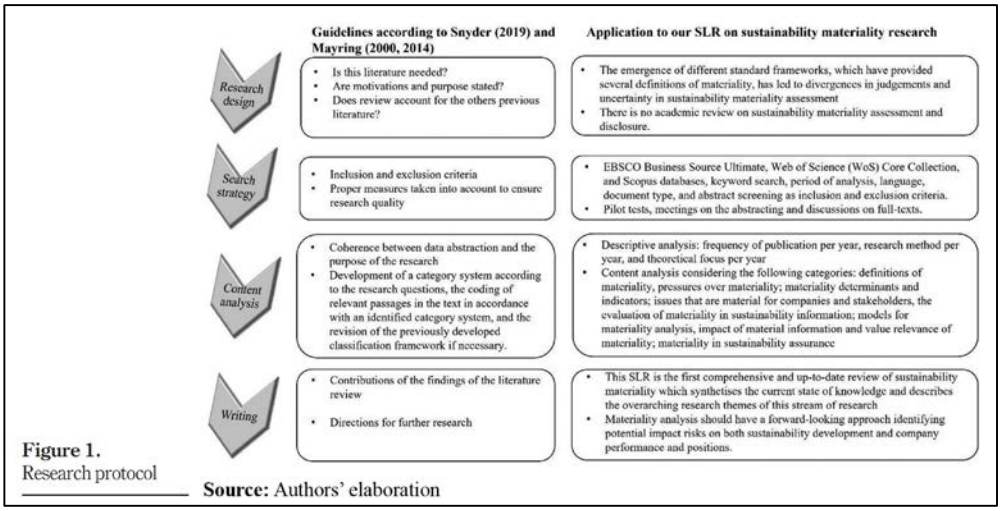


Figure 1.
Research protocol

Source: Authors' elaboration

Firstly, the research design clarifies why a review is needed; it aims to formulate the purpose, scope and specific research questions to consider (Tranfield *et al.,* 2003). Applying this to the present study, there is no academic review on sustainability materiality research that has systematically and comprehensively assessed the research methods, theoretical underpinnings and academic themes

of sustainability materiality. This study aims to close this research gap. In doing so, this SLR provides an overview of the current state of research and provides insight into its development from an academic perspective (Cook *et al.,* 2013; Denyer and Tranfield, 2006). The narrative-based assessment of existing academic knowledge provides a systematic overview of what is currently known on this topic and provides directions that can guide future research. Accordingly, an SLR is the most suitable literature analysis for this case, compared with, for example, a bibliometric analysis (Farrukh *et al.,* 2020), a meta-analysis (Zubeltzu-Jaka *et al.,* 2020) or a structured literature review (Massaro *et al.,* 2016). An SLR synthesises the scholarly debate on a specific topic by advancing knowledge and provides an overview of a complex research stream by integrating perspectives from many empirical findings (Snyder, 2019).

Secondly, the search strategy is a process that adjusts the final sample by setting the selection criteria that define the boundaries of the research (Snyder, 2019). Thus, the selection of academic knowledge identifies the inclusion and exclusion criteria for selecting articles. This SLR considered selected databases, keyword searches, period of analysis, language, document type and abstract screening as criteria. The selected databases are the EBSCO Business Source Ultimate, Web of Science (WoS) Core Collection and Scopus, in accordance with prior literature. EBSCO Business Source Ultimate addresses the field of business and economics; WoS offers updated documents, covers archived records starting in 1900 and evaluates the influence of specific publications, whereas Scopus indexes a larger number of journals than the other three databases studied (Falagas *et al.,* 2008, p. 339). The keyword search identified a combination of suitable keywords, according to the research objective, to be entered into the selected databases. The selected keywords were as follows: "materiality", "social and environmental accounting", "social and environmental reporting", "sustainability assess*", "sustainability disclosure", "sustainability reporting", "nonfinancial information", "non-financial information", "NFI" and "NFD".

WoS Core Collection provided 69 articles; EBSCO provided 116 academic papers; Scopus provided 119 articles. All the articles present in the WoS Core Collection and EBSCO had already been included in Scopus. In the time span, which ranged from 2010 to 30 September 2021, there were 119 publications. Then, we selected only academic papers (articles, early access and review articles) written in journals; we excluded conference papers, working papers and theses (Khan *et al.,* 2020), as it is argued that grey literature is unreliable (Harrison *et al.,* 2016). This led to 102 academic journal articles of which we included only papers written in English. We found 99 English academic papers. Finally, we started with the abstract screening process. We independently read each article's abstract to eliminate articles that were not related to the academic field of sustainability accounting and reporting and to ensure substantive alignment with our study's core topic. During this process, we removed nine academic journal articles in the fields of sustainable consumption and production, operations management, corporate finance and investment decisions. We double-checked the results obtained from the screening to identify consistency in the selection and ensure the validity of the process. We gathered a final sample consisting of 90 English-language academic articles ranging from 2010 to 30 September 2021. Table 2 details the screening process.

Search strategy	No. of papers
Query string of keywords on Scopus: TITLE-ABS-KEY ("Materiality") AND [TITLE-ABS-KEY ("social and environmental accounting") OR TITLE-ABS-KEY ("social and environmental reporting") OR TITLE-ABS-KEY ("sustainability assess*") OR TITLE-ABS-KEY ("sustainability disclosure") OR TITLE-ABS-KEY ("sustainability reporting") TITLE-ABS-KEY ("sustainability accounting") OR TITLE-ABS-KEY ("non-financial information") OR TITLE-ABS-KEY ("non-financial information") OR TITLE-ABS-KEY ("NFI") OR TITLE-ABS-KEY ("NFD")]	124
Refined by timespan: 2010–2021	5
Refined by document types (articles, early access and review articles) and source type (Journal)	17
Refined by language: English	3
Refined by topic: abstract screening manually conducted by the researchers	9
Final sample	*90*

Source: Authors' elaboration

Table 2. Journal screening

Thirdly, for the analysis of SRL, we classified and reviewed the literature. We considered the following categorisations of publications already adopted in prior SRLs (Roberts *et al.,* 2021) to describe the sample: frequency of publication per year, research method and theoretical focus. The categories of the research method were gathered from Dienes et al. (2016): literature reviews, theoretical studies, analytical studies, experimental studies, survey and interview studies, diffusion analysis, content analysis, case studies, determinant studies, effect studies, other studies and studies that developed mixed methods[2].

The theoretical underpinning has been analysed by considering the main theories to which the academic articles are anchored to explain results or to test or advance specific theoretical foundations. We included the following categories: institutional theory, legitimacy theory, stakeholder theory, multiple theories (if academics integrated multiple theories to explicate their findings or substantiate their discussions), other theories from other disciplines and no theories for cases in which a theoretical foundation was missing.

Then, through a close reading of the full texts of the scholarly articles, we applied Mayring's (2000, 2014) content analysis approach, which classifies relevant passages in the text by adopting a systemic, theory-guided perspective. As prior studies have underlined (Barros and da Costa, 2019; Moll *et al.,* 2006), the multifaceted nature of accounting practices can be analysed using qualitative methods (Barros and da Costa, 2019, p. 356). We identified various repeated

[2] Literature reviews describe the state of the art on a certain topic. Theoretical studies are based on theories and offer a conceptualisation of a certain issue. Analytical studies address mathematical models designed to optimise a given situation. Experimental studies observe the behaviour of test persons in a given situation. Survey and interviews studies use questionnaires or (structured) interviews to gather data on sustainability reporting practices or motivations. Diffusion analysis investigates the diffusion of sustainability reporting or the application of standards (e.g. GRI standards) and regulations (e.g. European Commission). Content analysis focuses on the content of sustainability reports. Case studies observe data for a single or a small number of companies or organisations. Determinant studies are devoted to identifying determinants and factors that influence the topic under analysis, whereas effect studies use regressions to investigate effects and impacts on the investigated topic. There are some other studies that refer to the topic under analysis but do not focus on issues specifically.

phrases, such as "materiality assessment", "materiality disclosure", "materiality determination process" and "materiality analysis"; thus, we distilled the key findings and constructs from each article (Mayring, 2014) by using labels to "assign symbolic meaning to the descriptive or inferential information compiled during a study" (Miles *et al.,* 2014, p. 79). The content analysis followed Mayring's (2000, 2014) steps, considering the development of a category system according to the research questions, the coding of relevant passages in the text in accordance with an identified category system and the revision of the previously developed classification framework, if necessary. To cater to the academic themes of sustainability materiality, we based our analysis on pre-existing classifications proposed by prior studies on sustainability materiality, which include six large research groups (Torelli *et al.,* 2020; Sepúlveda-Alzate *et al.,* 2021). Torelli et al. (2020) identified the following topics: "definitions of materiality", "materiality stress and the importance of the issue" (we renamed this category "pressures over materiality analysis" hereafter), "materiality determinants and indicators" and "issues that are material for companies and stakeholders" (Torelli *et al.,* 2020). Sepúlveda-Alzate et al. (2021) proposed other categories related to sustainability materiality: "the evaluation of materiality in sustainability information" and "models for materiality analysis" (Sepúlveda-Alzate *et al.,* 2021). Therefore, we classified our sample accordingly. Furthermore, in reading the academic papers in our sample, we included two additional categories that emerged inductively from the content analysis of the papers. We named these categories "impact of material information and value relevance of materiality" and "materiality in sustainability assurance". After conducting a trial run comprising approximately 10% of the material, we confirmed the existing categories (Mayring, 2014). Furthermore, to confirm internal validity, each paper was coded separately by the researchers, and differences in the coding procedure were discussed in several meetings to obtain

a unanimous view. External validity, and thus, repeatability, was ensured in the research protocol by documenting the search criteria described above.

The final step involved writing the main findings (Snyder, 2019; Veltri and Silvestri, 2020), which are presented in the next section in two distinct subsections. The first subsection presents the descriptive analysis of the journal articles, classified by academic articles per year, research method and theoretical focus to provide an overview of the research stream. The second subsection presents the content analysis of the journal articles grouped into the following themes: materiality definitions, pressures over materiality analysis, materiality determinants and indicators, issues that are material for companies and stakeholders, the evaluation of materiality in sustainability information, models for materiality analysis and the impact of material information and value relevance of materiality.

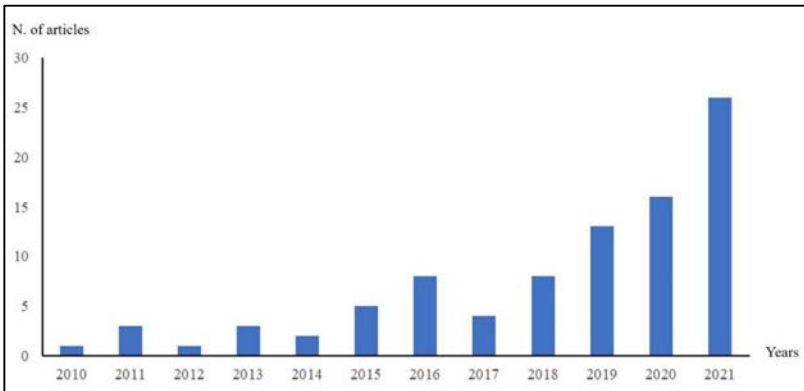
3.5 Findings

3.5.1 Descriptive analysis

Upon analysing the literature on sustainability materiality, we were able to conduct descriptive analyses that allowed us to examine the developmental path of this research topic. This section shows the trends discovered through descriptive analysis of the sampled scholarly articles, considering the increase of academic articles per year, the trend of research methods in sustainability materiality literature and the development of theoretical trends within the extant literature.

Firstly, the trend of the academic stream, in terms of the amount of research, has progressively increased since 2010, with slight decreases from 2015 to 2018. The year 2019 provided 14 research publications, and there were 16 publications

in 2020. The analysis revealed that research peaked in 2021, with 26 publications. Figure 2 shows the distribution of articles published per year.



Source: Authors' elaboration

Figure 2. Articles published per year

The results show a significant increase in the sustainability materiality literature over the past few years. This may be partially due to the rapid development of global academic research with an increasing number of submissions every year. It is expected there will be an increase in publications due to regulatory developments (e.g. the proposal for a Corporate Sustainability Reporting Directive and EU sustainability reporting standards) and the increasing discourse on the convergence of reporting frameworks (Impact Management Project, World Economic Forum and Deloitte, 2020).

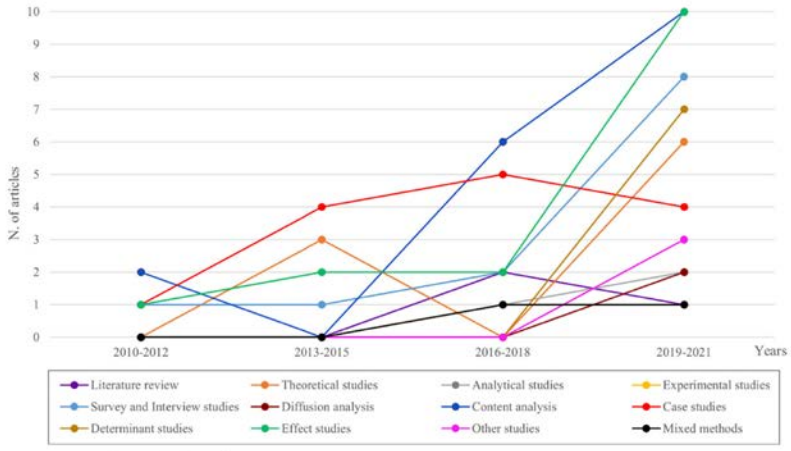
Secondly, the sustainability materiality literature has used a wide variety of research methods. The frequency of use of the different types of research methods is presented in Table 3, whereas the trend line of the development of research methods over time is shown in Figure 3.

QRAM

Research methods	2010–2012	2013–2015	2016–2018	2019–2021	Total	%
Literature review	0	0	2	1	3	3.33
Theoretical studies	0	3	0	6	9	10.00
Analytical studies	0	0	1	2	3	3.33
Experimental studies	0	0	1	1	2	2.22
Survey and Interview studies	1	1	2	8	12	13.33
Diffusion analysis	0	0	0	2	2	2.22
Content analysis	2	0	6	10	18	20.00
Case studies	1	4	5	4	14	15.56
Determinant studies	0	0	0	7	7	7.78
Effect studies	1	2	2	10	15	16.67
Other studies	0	0	0	3	3	3.33
Mixed methods	0	0	1	1	2	2.22
Total	5	10	20	55	90	100.00

Source: Authors' elaboration

Table 3.
Classification of academic articles by research method per year



Source: Authors' elaboration

Figure 3.
Trend of the research methods in sustainability materiality literature

Most studies on sustainability materiality applied content analysis and examined both different industries and countries; 18 studies applied content analysis. Given the growing adoption of sustainability reporting by different organisations across industries and countries and the increased mandatory requirements of regulators within the period 2019–2021, scholars have examined the disclosure of sustainability reports with content analysis techniques, as the trend line shows in Figure 3. We found 14 case studies, 12 interview and survey studies, 9 theoretical studies and 2 diffusion analyses. These qualitative research methods were used during 2010–2018, which can be explained by the

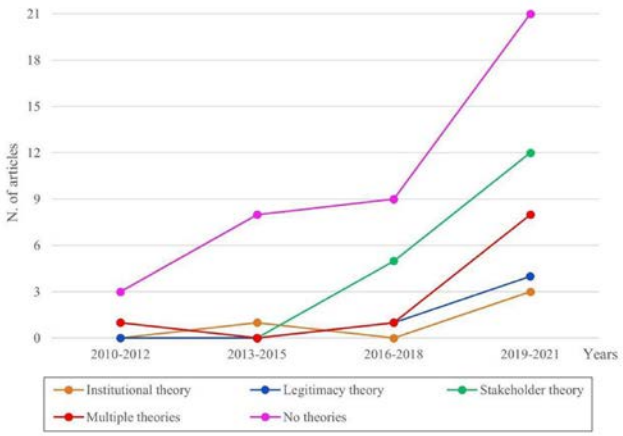
exploratory nature of this research topic. Furthermore, we encountered 15 effect studies, 7 determinant studies, 3 analytical studies and 2 experimental studies. These quantitative research methods increased in 2019–2021 because academics aimed to explain determinants of and impacts on sustainability materiality assessment with a large sample of data. We assessed three literature reviews and included three studies in the "other studies" category because academics used other research techniques, such as natural language processing or other inferences for understanding sustainability materiality. Finally, two studies applied mixed methods: a case study with content analysis and a case study with a survey.

Thirdly, the theoretical underpinning of research on sustainability materiality is multifaceted. The analysis of the theoretical focus on which the studies relied is shown in Table 4, whereas the trend of the theoretical underpinning is displayed in Figure 4.

Theoretical underpinning	2010–2012	2013–2015	2016–2018	2019–2021	Total	%
Institutional theory	0	1	0	3	4	4.44
Legitimacy theory	0	0	1	4	5	5.56
Stakeholder theory	1	0	5	12	18	20.00
Multiple theories	1	0	1	8	10	11.11
Other theories	0	1	4	7	12	13.33
No theories*	3	8	9	21	41	45.56
Total	5	10	20	55	90	100.00

Notes: *This category includes accounting disclosure theory; actor network theory; agency theory; decision usefulness theory and dual process theory of reasoning; logic and conversation theory; moral fictionalism; sociological theory of social constructionism; theory of professionalisation and upper echelons theory. There is one paper for each of the mentioned theory
Source: Authors' elaboration

Table 4. Classification of academic articles by theoretical focus per year



Source: Authors' elaboration

Figure 4.
Development of theoretical trends in sustainability materiality literature

In a considerable number of papers (41 of 90), an underlying theory was missing, and this trend increased exponentially starting in 2019. The predominant theory was stakeholder theory, which was addressed in 25 studies, followed by legitimacy theory, which was considered in 15 academic papers and institutional theory, which was included in 7 scholarly works. Stakeholder theory offers normative grounding for the inclusion of stakeholders (Crane and Ruebottom, 2011, p. 77) and discusses "a broader societal embeddedness of organisations and their interdependencies with the societal environment" (Hörisch *et al.,* 2014, p. 331) because it explains how relationships between companies and stakeholders work to create value in the long term. This theory gained increasing attention starting in 2013 due to its strategic management approach, which can be linked to materiality analysis. During the 2018–2021 period, 12 papers were anchored to stakeholder theory to explicate their findings. Legitimacy theory predicates the influence of social and political pressure, or threats to legitimacy, to explain companies' reactions to pressures to disclose (Zharfpeykan, 2021) and views sustainability reporting as part of an organisation's overall strategy to maintain its legitimacy. Institutional theory addresses organisations that are embedded in a comprehensive system of

political, financial, educational, cultural and economic institutions that exert institutional pressure on them (Lakshan *et al.,* 2021) and states that organisations should be accountable to the expectations of the institutional environment and adopt socially responsible behaviour (Campbell, 2007; Farooq and De Villiers, 2019). Ferrero-Ferrero et al. (2018) argued that a single theory is inadequate to explain the relationship between an organisation and the society within which it operates (Fernando and Lawrence, 2014); hence, stakeholder theory, legitimacy theory and institutional theory should be considered complementary rather than competing. Relatedly, 10 papers adopted multiple theories (such as legitimacy theory and institutional theory together, or stakeholder theory and legitimacy theory together) to discuss their findings; this trend increased from 2018 to 2021. Furthermore, 12 papers anchored to other theories, such as fuzzy set theory, actor-network theory and logic conversation theory, among others, explained the decision-making process of identifying material issues or developing models of materiality assessment. The use of alternative theories from other disciplines, such as the psychology of thinking (decision usefulness theory and dual-process theory of reasoning) or sociology (social constructionism), enriched the exploratory nature of this research field.

3.5.2 Content analysis

The content analysis of the journal articles considered the following categories: "definitions of materiality", "pressures over materiality analysis", "materiality determinants and indicators", "issues that are material for companies and stakeholders", "the evaluation of materiality in sustainability information", "models for materiality analysis", "the impact of material information and value relevance of materiality" and "materiality in sustainability assurance". Most of the studies on sustainability materiality were classified into "the evaluation of materiality in sustainability information" (34.44%), followed by "pressures over

materiality analysis" (21.11%). The category "the impact of material information and value relevance of materiality" grouped 14 articles corresponding to 15.56% of the sample, whereas the category "models for materiality assessment" had 8 papers, equal to 8.89% of the sample. Seven academic articles were grouped into the category "definitions of materiality" (7.78% of the sample), five papers belonged to the "materiality determinants and indicators" cluster (5.56% of the sample), four papers were classified into "issues that are material for companies and stakeholders" (4.44% of the sample) and the "materiality in sustainability assurance" group comprised two papers (2.22% of the sample). This classification revealed that academics have extensively discussed how companies evaluate materiality and highlighted concerns about sustainability materiality, whereas they have discussed issues that are material for companies and stakeholders less frequently. A summary of the results is presented in Table 5. In the next subsections, for each academic theme that emerged from the scholarly review, we describe the main findings of the sampled articles.

Academic themes	No. of papers	%
Definitions of materiality	7	7.78
Pressures over materiality analysis	19	21.11
Materiality determinants and indicators	5	5.56
Issues that are material for companies and stakeholders	4	4.44
The evaluation of materiality in sustainability information	31	34.44
Models of materiality assessment	8	8.89
Impact of material information and value relevance of materiality	14	15.56
Materiality in sustainability assurance	2	2.22
Total	90	100.00

Source: Authors' elaboration

Table 5. Classification of academic articles by content categories

Definitions of materiality

Academics have addressed materiality definitions by discussing the landscape of international reporting standards (Christensen *et al.,* 2021) and by investigating how these definitions were applied by companies (Beske *et al.,* 2020). These studies reflectively highlight that the various definitions of sustainability

materiality are not independent of the purpose of reporting and the users of sustainability information. Considering the landscape of international reporting standards, Christensen et al.'s (2021) literature review addressed materiality concepts by discussing single versus double materiality. This literature review points out that single materiality focuses exclusively on the information needs of investors, assuming that they care only about the financial consequences (or Net Present Value) of firm activities. However, this assumption is unrealistic because an increasing number of investors appear to make investment decisions not only based on expected future returns but also by considering non-monetary aspects and social norms. Therefore, considering that sustainability is often long term and intangible, double materiality is closely aligned with the scope of sustainability accounting and reporting because it relies on:

[...] the idea that broad corporate social responsibility (CSR) disclosures make firms internalise the (social) costs of their impacts on the environment and society and eventually lead to changes in how they operate (Christensen et al., 2021, p. 1222).

The European Commission acknowledges materiality in non-financial reporting (NFR) as a complex issue that should not be viewed from a single perspective, even if there are existing trade-offs between value to investors and value to society (La Torre *et al.,* 2020). Therefore, double materiality needs to be strengthened by empirical research and clearer suggestions by standards and regulators (Fiandrino *et al.,* 2022). This has implications for how companies apply the definitions of sustainability materiality (Beske *et al.,* 2020). Beske et al. (2020) addressed whether companies reported a definition of materiality analysis, the aspects/topics reported and the methods used to identify stakeholders and aspects/topics. The results indicated that materiality lacked explanations of the rooted processes and was conceived as a means of commitment to stakeholder engagement.

Pressures over materiality analysis

Prior academics have highlighted some concerns related to sustainability reporting processes that may impede the proper construction of a sustainability materiality analysis. These pressures over materiality analysis refer to greenwashing behaviour (Zharfpeykan, 2021), rhetorical or symbolic representation of sustainability (Unerman and Zappettini, 2014), ceremonial reporting processes (Haji and Anifowose, 2016), moral fictionalism (Boiral *et al.,* 2021), the consideration of sustainability through a financial materiality lens (Cerbone and Maroun, 2020) and different methodologies for materiality applications (Eccles *et al.,* 2020). For instance, Ferrero-Ferrero et al. (2021) found that companies with higher level of environmental performance could use materiality analysis to further embellish positive performance or for greenwashing purposes. Impression management strategy –that is, the symbolic use of disclosure to advance the corporate image (Chen *et al.,* 2014) – and the mismanagement of sustainability – that is, a firm's incorrect handling of sustainability issues in terms of the discrimination between material and immaterial sustainability topics – lead to greater performance levels on immaterial sustainability issues than on material ones (Maniora, 2018, p. 2). Materiality disclosures as image-enhancing marketing tools cause concerns regarding weak accountability and a deviation from the standards' objective of improving information quality (Lakshan *et al.,* 2021). To mitigate these risks, materiality analysis should be assessed based on the integration of useful information with stakeholders and risk management practices (Fiandrino and Tonelli, 2021) or, eventually, by considering the interrelated nature of dynamic risk materiality and dynamic accountability for a broader group of stakeholders so that they may adjust their risk management and reporting processes accordingly (Crovini *et al.,* 2021).

Furthermore, if individual preparers of integrated reports primarily use their financial expertise and they simply add sustainability issues, materiality is defined

only with reference to financial performance (Cerbone and Maroun, 2020; p. 15). In that case, sustainability issues are marginalised with respect to how they are intertwined into the business models, risk management practices and strategies of the company.

Ultimately, in the heterogeneous spectrum of sustainability metrics developed by data vendors (e.g. Kinder, Lyndenber, Domini (KLD) rating database and Innovest), there are difficulties in explaining and applying materiality (Eccles *et al.,* 2020). The research of Eccles et al. (2020) highlighted misaligned narratives among practitioners and academics who adopted diverse sustainability data and their own methodologies. This variation reflects a non-comprehensive understanding in which materiality is not articulated by considering priorities for the company's sustainability strategy and the nature of the relationship between the company and stakeholder interests. In this regards, agencies face challenges in the measurement of sustainability performance, particularly in terms of the materiality and reliability of the information collected (Boiral *et al.,* 2021). Therefore, rating agencies should collaborate to establish common indicators (Boiral *et al.,* 2021). There is a need to identify a solution for more entity-specific, communicative, "de-cluttered" corporate reporting (Rowbottom and Locke, 2016, p. 1).

Materiality determinants and indicators.

Sustainability materiality is positively associated with proactive behaviours towards sustainability. The following determinants of materiality have been identified in prior academic studies: learning effects, gender diversity, the assurance of sustainability information in the IR (Gerwanski *et al.,* 2019), involvement of board members (Cosma *et al.,* 2021) and, in particular, board activity and board independence (Sie and Amran, 2021), general factors of company size (Taliento *et al.,* 2019), industry (Fasan and Mio, 2017; Mio, 2010), country (Barkemeyer *et al.,* 2015) and ultimately, the complexity of companies,

their territorial extent and changes in the number of employees (Mio *et al.,* 2020a). Lambrechts et al. (2019) highlighted the need to strengthen the materiality of sustainability indicators across industries; therefore, organisations in the same industry can show compatible patterns in sustainability reporting. Establishing procedural rules for boards' tasks and practices, such as greater involvement in materiality assessment, could increase the likelihood that directors will acquire an awareness of sustainability issues and acknowledge their relevance (Cosma *et al.,* 2021).

Issues that are material for companies and stakeholders

Some sustainability issues are more material for companies, whereas other sustainability matters are more material for certain categories of stakeholder groups. For instance, Whitehead (2017) showed that environmental issues are the highest priority issues, followed by social issues relating primarily to worker well-being. Reimsbach et al. (2020) conducted an experimental study among capital market participants and employees regarding two specific sustainability issues: energy and biodiversity. The results showed that the employees evaluated non-financial information as more material than investors did, but both energy and biodiversity had equal importance; in contrast, market participants conceived of energy as a more material issue linked to performance and risk assessment than biodiversity. Furthermore, Busco et al. (2020) mapped generic sustainability issues based on the SASB and the related goals of the SDGs' agenda to understand the SDGs that are material for financial performance against those that are not. This empirical research was conducted on health care companies, specifically on their implementation of SDG 3: Good health and well-being. Finally, the study by Lindgren et al. (2021) investigated whether firms' intended users of sustainability disclosures are shareholders or other stakeholders. With a novel empirical and data-driven approach (topic model), the authors discovered that firms predominantly adopt a shareholder perspective

in sustainability disclosures, even when using stakeholder-oriented reporting guidelines, as well as in business environments, according to earlier literature in which stakeholders are favoured.

The evaluation of materiality in sustainability information.

Several academic works assessed the disclosure of the materiality process in the preparation of sustainability reports or integrated reports and, generally, companies changed their behaviour relating to the disclosure of material items by including only material sustainability disclosures than a broad range of disclosures (Herbert and Graham, 2021; Steenkamp, 2018). Several studies confirmed that companies did not disclose comprehensive and detailed sustainability information about their approaches to identifying material topics (Farooq *et al.,* 2021a; Machado *et al.,* 2021) and managers are evasive when disclosing their materiality criteria, decision-making processes and how they aggregate stakeholder feedback (Font *et al.,* 2016). The research of Farooq et al. (2021a) found that while most companies address a materiality assessment for sustainability reporting, only some use it to drive planning and decisionmaking. There is a lack of a clear link between materiality analysis and strategy and an insufficient forward-looking perspective (Tirado-Valencia *et al.,* 2020). Ruiz-Lozano et al. (2021) focused on the materiality process in the preparation of sustainability reports of stateowned enterprises and found a low amount of information disclosed about the materiality process because of the intent to create symbolic legitimacy. This was confirmed by the research of Farooq et al. (2021b), which highlighted a decrease in disclosure regarding how companies identify material issues because organisations consider sustainability issues through the use of established lists and materiality analyses following regulatory guidelines (Borgert *et al.,* 2018). Sepúlveda-Alzate et al. (2021) addressed the evaluation of materiality in sustainability information reported by Latin companies and highlighted that the disclosure of material sustainability

information is greater in industries related to the exploitation of natural resources that cause adverse effects on the environment.

Torelli et al. (2020) assessed the breadth and depth of implementation of the materiality analysis process and investigated how the process of stakeholder engagement could potentially affect materiality analysis. The findings from a sample of 152 Italian listed companies showed a strong association between the materiality principle and stakeholder engagement, especially in qualifying the materiality analysis process. Relatedly, stakeholder engagement is extremely important in defining material thresholds of sustainability issues (Ardiana, 2019; Bellantuono *et al.,* 2016; Ferrero-Ferrero *et al.,* 2018), because the absence of a systematic and continuous stakeholder dialogue leads to a lack of objective public judgement on the materiality and relevance of information (Manetti, 2011). In Puroila and Mäkelä's (2019) research, the authors proposed an inclusive materiality assessment with a critical dialogic accounting approach by incorporating divergent stakeholder values and perspectives. A value-laden, political judgement of what matters in corporate sustainability emerged from the analysis of material issues, the assessment of which was just a technical exercise favouring financial interests and jeopardising sustainable development. Other scholars have questioned the methods used for the analysis of material aspects (Beske *et al.,* 2020), who would decide what material information would be included, how material issues would be identified and what the outcome of this process would be (Puroila and Mäkelä, 2019). Finally, scholarly works have investigated the materiality assessment process in specific sectors, such as an airport (Karagiannis *et al.,* 2019), hotel (Guix *et al.,* 2019; Font *et al.,* 2016; Guix *et al.,* 2018; Font *et al.,* 2016), real estate (Rashidfarokhi *et al.,* 2018), cruise lines (Font *et al.,* 2016), health care (Consolandi *et al.,* 2020b) and utilities (Slacik and Greiling, 2019) and industries and commercial property companies (Jones *et al.,* 2015a, 2015b, 2016).

Models of materiality assessment

Academics have developed several materiality assessment models (Calabrese *et al.,* 2015, 2016, 2017; Eccles and Serafeim, 2013; Hsu *et al.,* 2013; Wu *et al.,* 2018) with concrete applications for clear-cut issues (Calabrese *et al.,* 2015) in delineated contexts (Hsu *et al.,* 2013; Lindman *et al.,* 2020; Olsen *et al.,* 2021). Guix and Font (2020) integrated the balanced scorecard as a well-established performance management system, with the inclusiveness, materiality and responsiveness principles of the AA1000 Stakeholder Engagement Standard, to aid an organisation in responding to its stakeholder expectations. Calabrese et al. (2019) integrated the GRI materiality matrix with a new "adequacy matrix" that is a zone matrix that would assess a company's "adequacy" as the ability to transparently communicate useful information to stakeholders. In this vein, the authors proposed the following steps: identifying stakeholders based on their representativeness and ability to offer relevant information on sustainability topics, assessing relevant sustainability aspects with a triple-bottom-line approach to accountability, gathering rankings from stakeholders and decision-makers, positioning the sustainability aspects in the zone matrices, prioritising the main aspects and considering managerial implications. Other studies have used an analysis of failure modes and effects to construct a model of materiality analysis to determine the issues to be included in sustainability reporting (Hsu *et al.,* 2013). Calabrese et al. (2016) proposed a fuzzy analytic hierarchy process method, integrating multi-criteria decision-making (MCDM) and fuzzy linguistic variables to support small and medium enterprises. Other studies reviewed screening methods by using publicly available external resources for the preliminary assessment of materiality, such as the SASB Materiality Map, the GRI Sustainability Topics for Sectors, the GRI Sustainability Disclosure Database, Social Life Cycle Assessment and Environmental Life Cycle Assessment screening (Wu and Huang, 2018), the materiality matrix (Wallbaum *et al.,* 2011) or alternatives with multiple decision criteria – MCDM (Calabrese *et*

al., 2017). The study of Betti et al. (2018) mapped SASB issues that are more material for a given SDG than others to guide companies and investors in understanding how value-creating sustainability performance can contribute to the SDGs.

Impact of material information and the value relevance of materiality

During 2019–2021, academics increasingly debated the impacts of material information and the value relevance of materiality – that is, when material information impacts the stock price. Consolandi et al. (2020a) investigated how sustainability materiality[3] explains equity returns on a sample of US companies from January 2008 to July 2019. The findings showed that not only environmental, social and governance (ESG) rating changes have a consistent impact on equity performance but also the market seems to reward companies operating in industries with a high level of ESG materiality concentration. The study of Jadoon et al. (2021) found that investors value corporate sustainability performance; however, the environmental dimension lacks financial materiality for investors. Some studies have highlighted that materiality assessment disclosures are positively influenced by greater financial performance (Habermann, 2021), lower leverage and corporate governance (Farooq *et al.,* 2021b). Disclosing material sustainability information increases stock price informativeness (Grewal *et al.,* 2020; Schiehll and Kolahgar, 2021), financial performance (Kim and Lee, 2020), future performance implications (Khan *et al.,* 2016), share price (Giorgino *et al.,* 2017) and investors' pricing and investment allocations (Campbell and Slack, 2011; Espahbodi *et al.,* 2018; Henisz and McGlinch, 2019; Kaiser, 2020). Khan et al. (2016) investigated changes in the materiality index with respect to firm size, market-to-book ratio, profitability (e.g. return on assets and financial leverage), the amount spent on research and

[3] In this study, sustainability materiality refers to the Environmental, Social and Governance (ESG) spheres.

development and advertising and institutional ownership. These studies underlined the usefulness of integrating sustainability information because of a decrease in risk and an increase in return potential (Kaiser, 2020). To confirm this viewpoint, the findings of Romito and Vurro (2021) corroborate the usefulness of materiality, as investors' decisions appear to be facilitated by comprehensive, well-balanced disclosures. Furthermore, Madison and Schiehll (2021) argued that financial materiality informs investment decisions based on sustainability performance because it affects the informative value of scores and rankings. Conversely, Cho et al. (2012) showed that the disclosure of environmental capital spending amounts was not quantitatively material and did not lead to strengthened environmental performance. Furthermore, the qualitative analysis proposed by Campbell and Slack (2011) revealed the uselessness of environmental reporting that "went generally unread and was usually considered immaterial and consequently of no decision usefulness to side-sell analysts: unread and immaterial; potential materiality, and recognition and assessment of environmental risk" (p. 59).

Materiality in sustainability assurance

The assurance of sustainability information is linked to materiality analysis, and due to the qualitative nature of sustainability information, it is difficult to transpose financial auditing techniques to sustainability assurance (Canning *et al.,* 2019). Because of the lack of guidance about materiality in sustainability assurance, some scholars have compared the financial auditing process with the non-financial auditing one to establish principles-based guidance in the materiality determination and assessment process within sustainability assurance (Canning *et al.,* 2019; Moroney and Trotman, 2016). Canning et al. (2019) showed that assuror flexibility is required when seeking technologies capable of addressing non-financial data and called for more practical aspects of discretionary assurance services. Similarly, Edgley et al. (2015) discussed that a

versatile, performative, social understanding of materiality was portrayed by auditors, with a forward-looking rather than a historic focus and relatedly, that stakeholder logic can significantly change the meaning and role of materiality. Furthermore, Michelon et al. (2018) argued that sustainability restatements can be seen as a tactic for building legitimacy towards the development of the sustainability assurance market and for providing reliable information to the users of the reports.

3.6 Discussion

The literature on sustainability materiality has received concerted scholarly and managerial interest since the 2010s, as shown by the developmental trend in published academic articles on this topic. This trend has gained traction in the multifaceted landscape of different international reporting standards. Standard setters and regulators have opened the debate around two distinct users of material sustainability information: investors and other stakeholders. This has led to difficulties in the practical applicability of materiality analysis (Edgley, 2014; Edgley *et al.,* 2015; Lee, 2004), with important reflections on the corpus of scholarly studies, which we discuss hereafter in terms of research methods, theoretical underpinning and academic themes.

In terms of the research methods adopted, the most commonly used qualitative approaches suggest that materiality analysis applies to a specific context and case and includes a stakeholder perspective linked to double materiality, which includes the identification of material impacts on sustainable development (impact materiality) and matters that are financially material to the company (financial materiality). Conversely, the quantitative approaches support empirical evidence of the positive association between financial performance and the quality of materiality disclosure, embracing an investor perspective focused on

financial materiality only (e.g. the value relevance of materiality) (Khan *et al.,* 2016).

In terms of theoretical implications, we found that in most studies (41 of 90), a theoretical foundation was missing. As other literature reviews suggest, "having a proper theory is quite essential to easily illustrate complex concepts, thereby indicating scope for future research to have richer theoretical support" (Fatima and Elbanna, 2022, p. 5). Despite this concern, we acknowledge an increasing number of articles based on stakeholder theory (i.e. suggesting the implementation of materiality assessments based on stakeholder engagement practices and directed towards society and the natural environment) (Puroila and Mäkelä, 2019). Applied to materiality considerations, firms' responsiveness to stakeholders' interests ensures that relevant issues raised by stakeholders are addressed in the decision-making process (Moratis and Brandt, 2017). Therefore, stakeholder engagement is fundamental to addressing proper materiality applications because it considers communication with and among stakeholders along with attitudes about a learning approach to scale sustainability-related objectives. This improves risk recognition and reporting and introduces targeted ad hoc disclosures to respond to the dynamically shifting materiality of risks (Crovini *et al.,* 2021).

In terms of academic themes, most of the studies agree upon the inclusion of sustainability issues that are material to short-, medium-and long-term enterprise value (i.e. financial materiality) (Madison and Schiehll, 2021; Schiehll and Kolahgar, 2021) and simultaneously address "the recognition of broader stakeholder impacts, non-financial impacts, and longerterm cumulative impacts, i.e., impact materiality" (Cooper and Michelon, 2022, p. 51). However, scholars argue that impacts on the environment and society are not presently borne by companies (Christensen *et al.,* 2021); therefore, executives and managers should shift from a solely financial perspective towards the assessment of financial,

economic, environmental and social impacts that comprehensively portray multiple values that companies co-create with stakeholders.

Therefore, grounded on the theoretical roots of stakeholder theory, regulatory initiatives that maintain a mere investor-focused perspective lead companies to report only risks and opportunities that affect financial performance rather than sustainable development (Cooper and Michelon, 2022; Michelon *et al.,* 2021). In the absence of these considerations, sustainable development can be seriously jeopardised with logic that is merely oriented towards a short-term view instead of a long-term one (Adams *et al.,* 2020). Based on the above-mentioned reflections, we suggest that there is room for more research on sustainability materiality analysis with a forward-looking approach that identifies potential impact risks on both sustainability development and company performance and positions. In approaching sustainability materiality, companies and practitioners should take sustainability:

[...] as the progressive maintenance of the life-supporting capacities of the planet's ecosystems with the subordination of traditional economic criteria to criteria based on social and ecological values in order to protect resources and ecosystems for future generations and other species (Milne and Gray, 2013, p. 16).

3.7 Conclusions and insights for future research

Building on the importance of sustainability materiality as a key principle for sustainability accounting and reporting, this study has presented a SLR of the evolution of the sustainability materiality literature.

Our research offers the following contributions: from a theoretical perspective, this research is the first comprehensive and up-to-date SLR on sustainability materiality. It synthesises the current state of knowledge in terms of research methods and theoretical underpinnings and derives eight academic themes

related to this stream of research. From a practical perspective, this study can be useful for companies, regulators and standard setters. Companies could implement sustainability materiality based on stakeholder engagement and improve their transparency to stakeholders – going beyond the business case. Accordingly, managers can make appropriate decisions to ensure that materiality analysis is properly implemented with a stakeholder logic that embraces multiple stakeholders' interests and is not solely restricted to investors. Managers can apply a strategic decisionmaking process and analyse interconnected risks and impacts on both sustainability development and company performance. Regulators and standard setters should further monitor the findings and the discussion of this study to address materiality in the contested sustainability reporting standard setting.

Our research has the following limitations. Methodologically, we adopted some exclusion criteria. For instance, we excluded book chapters and conference proceedings to ensure external validity. Furthermore, as the nature of this literature review is primarily "desk research", we do not reveal any new empirical evidence, but we provide state-of-the-art sustainability materiality research. Relatedly, we suggest the following future research directions that can be empirically tested using both qualitative and quantitative methods.

Firstly, qualitative longitudinal analysis of single or multiple case studies could investigate how the assessment of materiality has evolved to understand the extent, rate and type of responsiveness and accountability using grounded theory. Secondly, academics can focus on the materiality application of sustainability issues linked to value-based decisions for SDG implementations as important "grand challenges" in sustainable development for a more equitable, greener future. Thus, understanding how companies rank material judgements and value-based decisions for SDG considerations will address the theoretical and practical gap in SDG performance measurement and SDG disclosure (Mio *et al.,* 2020b). Thirdly, academic researchers could analyse how

companies account for the full range of risks borne by stakeholders concerning the implementation of material sustainability issues to address the interplay between materiality and risk management. Fourthly, empirical studies in the form of qualitative research are encouraged to determine a process for the double-materiality perspective, analysing the integration of financial materiality and impact materiality (Adams and Abhayawansa, 2021) to enhance the trustworthiness of material sustainability information for stakeholders. This situation calls for new models that assess reciprocal interdependencies of sustainability issues that are jointly integrated.

As no special issue on this research topic has been developed, academics may propose one that may significantly promote its development and highlight the under-researched themes found in this review. Journal editors can introduce special issues to promote sustainability materiality research on unexplored themes intertwined with theoretical stances and developed using diverse methodological approaches.

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4. Paper under review: Analysing SDG disclosure and its impact on integrated thinking and reporting

4.1 Abstract

Title – Analysing SDG disclosure and its impact on integrated thinking and reporting

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Journal – under review

Purpose – The research aims to empirically investigate whether the disclosure of Sustainable Development Goals (SDGs) affects the level of integrated thinking and reporting (ITR) on a sample of European listed companies.

Design/Methodology/Approach – The sample focuses on companies listed to the STOXX Europe 600 Index. Data have been gathered from Refinitiv DataStream for the period 2019-2020 for the measures of ITR level and SDG disclosure. Then, a multivariate regression analysis is developed to test whether or not, and if so, to what extent, SDG disclosure affects the level of ITR.

Findings – SDG disclosure has been increased over time and companies have primarily focused on SDG 8, SDG12 and SDG 13 demonstrating their awareness on sustainability issues close to the core business and on the climate urgency. Furthermore, SDG disclosure leads to a higher level of ITR meaning that SDG disclosure is an important pillar contributing to ITR.

Originality – The research contributes to literature in the stream of sustainability accounting, by adding new insights on ITR linked to SDG disclosure. The originality of the study lies in the inclusion of SDG disclosure as a determinant for ITR that has not been analysed by academics yet.

Research limitations – The empirical analysis has not deeply investigated each component of ITR and SDG disclosure.

Practical implications – The research can be useful for companies aiming to improve their commitment towards the SDG implementation with an integrated approach. Moreover, the study sheds light on the importance of the SDG disclosure as a determinant of ITR.

4.2 Introduction

Societal and environmental challenges have affected the perceptions of stakeholders, showing them the need to consider not only financial aspects, but also social, environmental, intellectual and ethical issues (Adams and Frost, 2008). The Agenda 2030 for the Sustainable Development Goals (SDGs) is the global framework that requires a common effort in doing concrete and shared actions towards sustainability challenges and 'provides a shared blueprint for peace and prosperity for people and the planet' (United Nations Foundation). It aims at protecting the planet and natural ecosystems, preserving biodiversity, ensuring economic growth, health and safety, promoting inclusion and gender equality and favouring responsible supply chains and sustainable infrastructure systems. These efforts have to be addressed together by governments, regulators, companies and individuals. In this context, companies have to implement corporate sustainability practices by integrating them into their core business. The mindset of integrating sustainability into the company strategy, the organisational structure and reporting practices is also known as integrated thinking. According to the International Integrated Reporting Council (IIRC) framework, integrated thinking is defined as follows: "the active consideration by an organisation of the relationships between its various operating and functional units and the capital that the organisation uses or affects. Integrated thinking leads to integrated decision-making and actions that consider the creation, preservation or erosion of value over the short, medium and long term". (IIRC, International IR Framework 2021, p. 3)

Prior studies on integrated thinking have addressed the level of integration of financial and non-financial aspects into the company's strategy, governance and performance (Busco *et al.,* 2019), which then considers the relationships between integrated thinking and stakeholder engagement (Devalle *et al.,* 2020) and identifies its measures (Malafronte and Pereira, 2021). Our research contributes to this emerging field of research with a twofold research objective. First, the present study aims to assess the level of ITR, and second, it aims to address its determinants on an empirical basis.

The current research addresses an empirical analysis based on the STOXX Europe 600 Index sample. The quantitative research method develops an ITR score that considers prior academic studies that have included the implementation of an integrated strategy, stakeholder engagement, governance mechanisms for the CSR Sustainability Committee, reporting practice for the GRI Standards, adherence to the Global Compact and UNPRI Signatory and external auditing to define the level of ITR. All data have been collected on DataStream Thomson Reuters (ASSET4), referring to 2019 and 2020. Then, a regression analysis was performed to assess the determinants of the level of ITR.

Prior research has suggested that size, leverage, bigger board size and meetings, sensitive sectors and higher environmental performance positively affect the level of integration and, as a matter of fact, can be considered a proxy of ITR (Maroun *et al.,* 2023, Vaz *et al.,* 2016, Malafronte and Pereira, 2021, Busco *et al.,* 2019, Frias-Aceituno *et al.,* 2014; Frias-Aceituno *et al.,* 2013). Furthermore, Busco *et al.* (2019) proposed going a step further by examining alternative measures and nonobservable characteristics. However, prior research did not take into consideration SDG disclosure as another explanatory variable leading to a higher level of integrated thinking. SDG reporting could be a further factor that may enhance the level of integration of financial and sustainability matters because it enforces an integrated approach to disclosure (Pizzi *et al.* 2020; Adams, 2017). Indeed, the IR framework may be framed as an opportunity for

organisations to address SDGs and their integration into the strategy and the reporting. Adams (2017) identified five steps for enhancing the focus on SDGs through the IR value creation process. These steps are a continuous process consisting of value creation aligned with sustainable development through the increase, decrease and transformation of capital. The process starts by understanding sustainable development issues and identifying their relevant nuances in terms of value creation. These steps lead to the development, first of all, of a strategy that contributes to the SDGs and, second, to integrated thinking, connectivity and governance. The process leads to the drawing up of the integrated reporting that, in a circular way, leads again to the beginning.

Therefore, we expect to find a positive relationship between SDG disclosure and the level of integration of financial and sustainability issues; namely, SDG disclosure should positively affect the level of ITR.

The present research contributes both practically and theoretically. From a practical perspective, the current research suggests that companies address both SDG disclosure and an integrated thinking approach to address societal challenges. Our results provide evidence on the importance of implementing monitoring processes that verify the practical implementations of sustainability programmes into the core business. Moreover, the present research can be helpful and useful for investors, nongovernmental organisations and, more generally, other stakeholders with reference to the meaning of integrated thinking and its practical application when considering the disclosure of SDGs. The present study provides the first measure of SDG disclosure that considers the SDGs that are the most relevant to the core business. From a theoretical perspective, the empirical research has suggested that an SDG's alignment with the strategy and disclosure generates an integrated process of managing and reporting. Furthermore, the issue of ITR and SDGs has been explored in the literature (Di Vaio *et al.,* 2021; Busco *et al.,* 2019; Busco *et al.,* 2018; Adams, 2017). However, most of the literature is still in the form of conceptual papers,

literature reviews and qualitative analyses. Therefore, the present research employs a quantitative regression method that enables the consideration of SDG disclosure as the determinant of integrated thinking[4]. In other words, the present study provides new insights into the determinants of ITR level by considering SDG disclosure that structurally depends on the industry of the company.

The paper is structured as follows: Section 2 provides the literature review on integrated thinking and reporting and presents the challenges for sustainable development, Section 3 describes the sample, data and research method. Section 4 presents the results, finally, Section 5 addresses additional robustness tests, Section 6 concludes with implications, limitations, and avenues of future research.

4.3 Theoretical background

4.3.1 Prior research on integrated thinking and reporting

Despite the increase of sustainability challenges, such as biodiversity collapse, environmental degradation and social and economic inequality, managers have ignored sustainability risks, which could have significant consequences in the long term (Adams, 2015). Therefore, regulators and policymakers have started to set regulatory frameworks to systematise the processes and disclosures of sustainability information. This regulatory development is considered a historic breakthrough towards more accountability and responsiveness to sustainable development (Kinderman, 2020; Howitt, 2014). In this context, academics have extensively analysed the evolutionary paths of these regulatory developments and how companies have transposed the mandatory requirements into their reporting processes (De Luca *et al.* 2020, Mio *et al.* 2020). The literature has

[4] We would like to thank an anonymous reviewer for suggesting this last point.

highlighted that sustainability disclosure has been presented in separate reports from financial statements, while few companies have included sustainability information in the management report in an integrated way (Stubbs and Higgins, 2018; Jebe, 2019). Thus, companies have integrated different types of capital (e.g., natural, social, human and intellectual capital) into their business models differently. However, the integration of financial and sustainability disclosures is relevant because it helps both companies and their stakeholders better understand the financial and sustainability impacts of their business activities.

According to institutional theory, rules and regulations, industry norms and standards can influence a firm's social behaviour to a great extent (Campbell, 2007). Institutional theory evolved from a 'top down' approach with a focus on institutional forces of organisational conformance and isomorphism to the assimilation of an 'organisation's perceived strategic responses' (Scott 2008). Therefore, neoinstitutional theory suggests that institutions in society, governance mechanisms and actors should support the legitimacy of companies' actions (Shahab and Ye, 2018). According to legitimacy theory, companies address corporate sustainability practices so that they are in line with the values and expectations of society (Laine *et al.,* 2022). Thus, the choice of adopting integrated thinking or IR depends on how the organisation deals with legitimacy. Academics have argued whether IR comes first and then integrated thinking or vice versa. As a matter of fact, if legitimacy has been threatened, the adoption of IR plays a crucial role as a sign of change from the stakeholders' point of view. Instead, if strategic legitimacy is considered less important than the organisational one, the adoption of integrated thinking by including it within the organisation might be a more successful strategy (Bridges and Yeoman, 2020).

Within this regulatory context, the integrated thinking perspective is at the basis of developing business strategies and addressing governance mechanisms that include financial and sustainability issues at the core of business practices. Integrated thinking refers to transparent and responsible procedures of

managing and reporting both financial and sustainability issues and its scope is to reach a better quality of the disclosed information to promote sustainable business practices (De Villiers *et al.,* 2017; Silvestri *et al.,* 2017). The IIRC also states, *'The more that integrated thinking is embedded into an organisation's activities, the more naturally will the connectivity of information flow into management reporting, analysis and decision-making'* (p. 2). This is connected to reaching a better integration of the information, which is a way to help and support internal and external reporting procedures by including the drawing-up of the integrated report as well. Indeed, IR facilitates integrated thinking by considering it to be a corporate reporting norm (IIRC Framework, 2021), and it supports companies in their communication and creation of value, fostering the integration of processes towards a better allocation of resources and capital (Di Vaio *et al.,* 2020). In other words, integrated reporting is linked to integrated thinking, therefore companies disclose how they can create value with a short, medium and long-term vision, according to its strategy, performance and future perspectives (from both sides, financial and sustainability ones). The first objective of the IR framework is to improve the accounting system with the aim of supervising sustainability performance (IIRC, 2021). Indeed, it is also important to consider that, initially, integrated reporting was introduced with the only scope of responding to external pressures. Nevertheless, awareness of the interconnection between sustainability indicators and performance arose, demonstrating a direct linkage towards stakeholders (McNally and Maroun, 2018). Thus, high-quality reporting to stakeholders that relies on reliable, complete, comparable, balanced and transparent disclosure may be generated by managing corporations, whether they focus on an integrated thinking logic (IIRC, 2021). This integrated thinking logic is narrowly linked to the generation of value (Cerbone and Maroun, 2020) because it depends not only on financial gains for investors and creditors, but also on ESG considerations.

A growing trend of academic research has increasingly investigated the development of companies' ITR practices by identifying their determinants. The first stream of the research highlights the factors that determine companies' approaches to an integrated mindset of practising and reporting ESG issues (e.g., Vaz *et al.,* 2016; Frias-Aceituno *et al.,* 2012; Jensen and Berg, 2012). Previous studies have discovered that IR is useful and adequate for investors' attractions, especially if they are characterised by a long-term perspective rather than a short one (Serafeim, 2015). The listed companies under a mandatory regime of disclosing sustainability information consider integrated reporting as the process through which their corporate reputation can be enhanced. IR is also beneficial for investors' needs and, more generally, for stakeholders and their responsiveness and engagement (Steyn, 2014).

Moreover, the study of Pigatto *et al.,* (2023) addresses the prevalence of form over substance in the IR framework, and identifies that companies do not disclose scenarios and plans with reference to medium and long-term objectives. Furthermore, they provide evidence on a mere disclosure about qualitative or quantitative information without a significant reference to six capitals of the IR framework. For instance, although materiality has been reported in IR, there is no information on actions taken to address these issues, or even if it is reported interactions among companies and stakeholders, there is no information about the method of engagement. Ahmed (2023) studied that corporate governance mechanisms (e.g. board size, board independence, or risk management committee independence) have a positive impact on IR practices, and, as a consequence, they may be framed as a valid tool for improving sustainable development. Indeed, adequate governance mechanisms contribute to responsibility and sustainable consequences, maximising value creation. Maroun *et al.,* (2023) suggest some tools which are helpful to examine the internationalisation of integrated thinking. Instead of providing insights to the measurement of integrated thinking, the study focuses on the main features of

an integrated report that need to be analysed more closely. Moreover, Maroun *et al.,* (2023) provide a set of integrated thinking indicators that rely on the principles of integrated awareness and understanding, integrated leadership commitment and capability, integrated structures, integrated organisation performance management and integrated external communication. This tool may be employed by investors, nongovernmental organisations and other stakeholders who do not manage the meaning of integrated thinking and indicators for applying it.

Another stream of research has examined the main advantages and critiques of IR. Academics have demonstrated that an integrated mindset of practising and reporting ESG issues is beneficial for corporate reputation (Ecim and Maroun, 2022; Lai *et al.,* 2018; Rinaldi *et al.,* 2018; Adams *et al.,* 2016). Rinaldi *et al.* (2018) analysed the evolution of integrated reporting, calling it the 'integrated reporting journey'. The aim of the research was to analyse more in depth the main features of the integrated reporting process by highlighting strengths and weaknesses other than challenges and future chances of development. There is still a great and considerable gap to be filled in the coming years, especially when it comes to deepening the development of integrated thinking in developing economies (Ecim and Maroun, 2022). Another strength is that integrated reporting plays an important role in facilitating the relationship between the company and IR's users. There is a broad consensus on the extension of the range of stakeholders, including not only 'financial stakeholders', but also other stakeholders. Indeed, Lai *et al.* (2018) suggested a potential improvement of sustainability for companies adopting integrated thinking by leading a better dialogue with various stakeholders not only focused on financial concerns. The study of Adams *et al.* (2016) focused on favouring the adoption of the integrated report because entities have been more focused on their investment activities in terms of value creation because of their strict linkage to strategy. The study considered integrated reporting as an essential useful tool to change the mindset on how

companies plan their investments and as a tool that generates benefits in terms of value creation (Burke and Clark, 2016). From an external point of view, the disclosure of information through integrated reports, which previously was not publicly available, is a landmark in reducing the information asymmetry that lies among firms and their shareholders. The reduction of this information asymmetry is replaced by the enabling of accountability for ESG performance thanks to the intertwined relationship, which comes from one side by strategic operating and management activity and from the other side by the timing and extent of the informativeness towards stakeholders (Alrazi *et al.,* 2015).

To guarantee reliable sustainability information, companies may benefit by setting up an efficient and robust management control system for collecting, analysing and reporting data. Here, a management control system may be configured as a valid operational performance control in supporting the preparation of IR (Bezuidenhout *et al.,* 2023). Thus, the management control system frames itself as a day-to-day decision-making tool. Nevertheless, the literature has always focused on the analysis of the management control system as a whole, not the result of many and single controls that may be exploited by the firms (Bui and De Villiers, 2017). A specific analysis of each monitoring process enhances the organisational performance of the effectiveness of the management control system, which, in turn, supports the development of new sustainability practices.

Conversely, several critiques have been highlighted as well. For instance, the findings of Maniora (2017) suggested that stand-alone ESG reporting is more accurate than integrated reporting when considering ESG issues for managers, employees and other stakeholders' interests. McNally *et al.* (2017) did not consider integrated reporting as 'a natural part of the business', despite the fact that a lot of categories of stakeholders are involved and affected by it. Thus, in some cases, the ITR is just framed as a mere reporting tool for embracing the

stakeholders' interests rather than as a critical corporate governance tool (Di Vaio, 2020).

Overall, the development of ITR has increased, and academics have highlighted the reasons why integrated reporting should be considered as the primary source of information for all the stakeholders. However, the journey towards a concrete strategy implementation, governance and reporting aligned with an integrated thinking perspective is still challenging, but the integrated report can be considered an outstanding tool to pursue a better level of stakeholder engagement.

4.3.2. Challenges for SDG disclosure

Agenda 2030 was an urgent call for action by every country and was characterised by the aim of reducing inequality, improving health and education and fostering economic growth in the context of matters related to climate change. Examining the disclosure of the SDGs, Goal 12, Target 12.6 explicitly demanded that member states 'encourage companies, especially large and transnational companies, to adopt sustainable practices and to integrate sustainability information into their reporting cycle' (UNCTAD, 2020). To achieve this aim, governance, strategy, management approach and performance and targets were the four themes that were developed as a way to contribute to an alignment of the SDG disclosure towards long-term value creation (Adams *et al.,* 2020). These four themes are aligned with the process of integrated thinking (Adams, 2017) and in line with the terminology used by the IIRC, GRI and TCFD. Governance refers to the overall structure that considers sustainable development risks and opportunities and the processes to integrate sustainable development into the organisation's processes. Strategy deals with businesses maximising long-term value creation for the organisation and society and enhancing the positive impact on the achievement of SDGs. The management

approach addresses those practices that integrate sustainable development risks and opportunities into all aspects of the organisation. Ultimately, performance and targets include qualitative and quantitative approaches to communicating performance and targets.

There are several academic studies on the SDGs which confirms that SDG disclosure and reporting requires an integrated and systematic approach (Botchway and Bradley, 2023; Fiandrino *et al.,* 2022; Pizzi *et al.,* 2021; Blanc, 2015). In more detail, there is an increase in SDG disclosure since 2018 (Botchway and Bradley, 2023) and business reporting on the SDGs is driven by several organisational factors such as a higher level of intangible assets, a higher commitment to sustainability frameworks and external assurance, a higher share of female directors, and a younger board of directors (Rosati and Faria, 2019). Pizzi *et al.* (2021) reveal how early-adopters of SDG disclosure perform better than late-adopters. However, on the other hand, a high degree of SDG reporting orientation is not necessarily a signal of a real contribution to sustainable development, in fact practices of decoupling, greenwashing and impression management behaviours co-exist with practising and reporting (Tashman *et al.,* 2019). As a matter of fact, considering the implementation of the SDGs by the private sector, companies can adopt a fruitless exercise by cherry-picking the SDGs. This could jeopardise the development of an integrated thinking approach. Furthermore, the SDGs are considered too broad, unfocused and unrealistic because the Agenda 2030 is intended as a statement of aspirations (Pogge and Sengupta, 2015, p. 572).

The SDGs pursue several sustainability objectives which may generate trade-offs between economic dimension and the social and ecological spheres (Gupta and Vegelin, 2016). Therefore, in order to contribute substantially to sustainable development, companies are called to integrate the SDGs into the strategy and the reporting with the aim of improving the IR value creation process (Adams, 2017).

The disclosure of the commitment towards the SDGs could foster a higher level of integration, which is in line with the approach of 'practising and disclosing what reached', namely both 'talk the walk' and 'walk the talk'. According to Izzo (2018), integrated reporting may be seen as a source of business engagement with the aim of providing a response to sustainability challenges, because of its attitude towards innovation and risk management. Thus, there are two opportunities for addressing interdependencies between integrated reporting and SDGs: i) integrated reporting can be helpful for embedding SDGs in the thinking and reporting of organisations because its scope is linked to sustainable development, and ii) integrated reporting may be useful for demonstrating how the value creation generated by firms is impactful on sustainable development. In more detail, value creation does not depend on the mere role of the organisation alone because it is influenced by the external environment and is impacted by the relationships with stakeholders. In addition, the external environment is influenced by issues linked to SDGs. Thus, firms should realise that the achievement of SDGs is a driver of value creation over a long period of time (Izzo, 2018; Busco *et al.,* 2018). The way firms tailor their sustainable strategies or way they respond to stakeholders' needs and interests can explain the pathway in the pursuit of the SDGs, along with the approach towards integrated thinking.

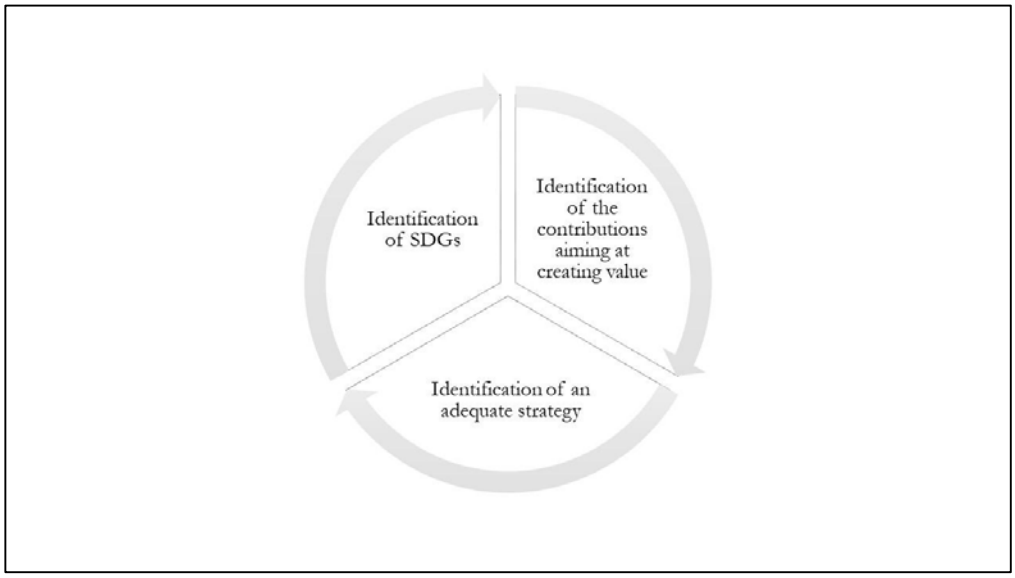
Based on the abovementioned considerations, we address the following hypothesis:

H.1 SDG disclosure has a positive influence on the level of integration of sustainability issues.

Our hypothesis is also linked to the following theoretical argument. Companies can identify financial, social and environmental objectives with the aim of creating value for stakeholders (Adams and Frost, 2008). Then, companies articulate their strategic planning accordingly. Finally, they identify the SDGs

related to their core business to address coherent managerial practices (Adams *et al.,* 2020). These actions create value for stakeholders in a circular way. This theoretical framing is presented in Figure 1.

Figure 1 – Summary of the theoretical background



4.4 Methodology

The research employed an empirical analysis based on the STOXX Europe 600 Index sample, which includes companies of each dimension, namely small, medium or large, appertaining to 18 European States. The STOXX Europe 600 Index has been derived from the STOXX Europe Total Market Index (TMI), which is a subindex of the STOXX Global 1800 Index. The European landscape has demonstrated that IR has been confirmed as a tool for transparency and accountability. Its disclosure is positively affected by government ownership, external assurance, investor protection and GRI guidelines (Manes-Rossi *et al.,* 2021). Academic literature about financial and sustainability information has revealed the relevance of SDG disclosure for stakeholders that, for European

companies, is mainly associated with socially responsible investors, customers or environment-related public pressure (Hummel and Szekely, 2022). Furthermore, significant progress has been made in corporate governance practices. For instance, boards keep on working harder, confirmed by the increase of the compensations, they are becoming more independent and are ready to manage external pressures (Aureli *et al.,* 2020).

All data have been collected on DataStream Thomson Reuters and were taken from the years 2019 and 2020. Authors have chosen to focus solely on the period 2019-2020 to avoid the impact of Covid-19 which affected the results. Although Covid-19 has started in 2020, its effect is not so deep as well as considering 2021. In addition, implementing SDG disclosure requires time for improving internal processes aiming at addressing such issues, thus focusing on more recent data (e.g. annuals immediately after 2016) would have provided different results. For 2019, 35 units were missing a value because of their unavailability on DataStream, while for 2020, 25 were missing a value. Thus, we excluded these from the analysis. For the regression analysis, looking at the data from 2019, there were 28 outliers, whereas for 2020, there were 23 outliers; therefore, these data have been removed from the sample because they are abnormal observations of the dependent variable that directly impact the model's explanatory power. The outliers were determined by using the Mahalanobis distance. We deleted them because the model's adaptability to the observed data improved. Moreover, the outliers did not just have statistical significance.

Thus, based on the available data of the employed dataset, the final sample was composed of 537 companies for 2019 and 553 companies for 2020. By analysing the sample, there was a progressive increase in companies having an ITR approach. Hence, the companies have had a steady propensity towards the ITR approach. Thus, the authors adopted an unbalanced panel. Table 1 summarises the sample screening.

Table 1 – Sample screening.

Description	Number of observations - 2020	Number of observations - 2019
Initial sample from STOXX Europe 600 Index	600	600
Refined by: *missing values*	25	35
Refined by: *outliers from the regression analysis*	23	28
Sample under investigation	**552**	**537**
of which: pertaining to Non-Financial Sector	458	442
of which: pertaining to Financial Sector	94	95

Source: authors' elaboration

An ordinary least squares (OLS) regression analysis was performed to test the relationship between the level of ITR and SDG disclosure. The OLS model is as follows:

$$\text{ITR\_Score}_{it} = B_0 + B_1\text{SDG\_ Disclosure}_{it} + B_2\text{Ln\_Employees}_{it} + B_3\text{Ln\_Market\_Cap}_{it} + B_4\text{Leverage}_{it} + B_5\text{Country}_{it} + B_6\text{Sector\_Financial}_{it} + \varepsilon_{it}$$

where the dependent variable is 'ITR_Score', which is the weighted average computed by considering the following dummy variables according to Busco *et al.* (2019): *'Integrated Strategy in MDandA', 'GRI Report Guidelines', 'Global Compact', 'Stakeholder Engagement', 'CSR Sustainability Reporting', 'CSR Sustainability External Audit', 'UNPRI Signatory', 'CSR Sustainability Committee' and 'ESG Reporting Scope'.*

The description of these variables is shown in Appendix A. After including these items as characteristics of the level of ITR, the score was calculated by considering the weighted average of the abovementioned components. In more detail, each variable was counted in the ITR_Score with a dichotomous approach: the value '1' was assigned if information was present and otherwise 0.

'Not Applicable' (NA) data were derived from missing information on DataStream and, therefore, were taken into consideration:

$$ITR\_Score_{j\,it} = \frac{\sum_{i=1}^{n} d_{it}}{(\sum_{i=1}^{n} d_{it}) - NA_{it}}$$

where:

- j: the company;
- i_{it}: the item analysed;
- d_{it}: each component of the ITR_Score (assumed '1' if the information has been presented, otherwise '0'); and
- NA_{it}: missing information on the components of the ITR_Score, which were excluded from the analysis and coded with NA (not applicable).

The independent variable SDG_Disclosure was determined by applying Cooke's method (Devalle *et al.,* 2016, Cooke, 1989), which relies on a D_score (SDG_Disclosure $_{wej\ it}$). The SDG_Disclosure was determined by adopting a weighted or unweighted method. For the current study, the main method relied on the weighted one, whereas the unweighted method was used as a robustness check to ensure the reliability of the study.

The formula for the weighted method is as follows:

$$SDG\_Disclosure_{wej\,it} = \frac{\sum_{i=1}^{n} a_{it} d_{it}}{\sum_{i=1}^{n} x_{it}}$$

where:

- i_{it}: the item analysed;
- j: the company analysed;
- a_{it}: the weight attributed to each item i;

- d_{it}: whether the item was disclosed or not: it assumes a value equal to 0 if the information was not disclosed and 1 otherwise; and
- x_{it}: whether the item was relevant or not; it assumes a value equal to 0 if the information was not relevant and 1 otherwise.

The numerator shows the sum of all the items related to SDGs found in the disclosure of the reports to which a weight has been applied. The weight was identified as follows:

$$a = \frac{number\ of\ items\ in\ which\ the\ information\ is\ reported\ by\ the\ companies\ pertaining\ to\ the\ sector}{number\ of\ items\ in\ which\ the\ information\ should\ have\ been\ reported\ (number\ of\ the\ sector's\ companies)}$$

The weight of each piece of information presented a value ranging from 0 to 1. If the information was reported by all the companies in the sector, the value was 1; otherwise, if none of the companies reported that information, it took a value of 0. Consequently, if four companies out of an overall value of five pertaining to the sector presented a disclosure about SDG 1, the weight would be 4/5. The overall number of sectors was 18. The sectors were classified according to the North American Industry Classification System (NAICS) codes, which are based on a production-oriented concept, meaning that it groups establishments into industries according to similarity in the processes used to produce goods or services.

Hence, the weight must be applied to the presence or absence of a disclosure of each SDG. Therefore, the weight identified for SDG 1 must be applied to the presence of the disclosure of this SDG. Thus, if the company disclosed information related to an SDG, the value will be equal to the weight; otherwise, if the company did not disclose that information, the value will be equal to zero. The sum of all of these values is equal to the numerator of the relationship.

The denominator bases its assumption on the relevance of the items. If a company presented information of one SDG, the value of this information

would be equal to one; otherwise, it would be zero. The sum of each information leads to a value that ranges from 0 (if the company did not disclose any SDG) to 17 (if the company disclosed all the SDGs). By comparing all the data derived after the application of this procedure, the highest value identified allowed for the identification of the relevant item of that sector. Moreover, an illustrative example in the appendix has been provided to show the weighted D_score's determination process.

Therefore, the D_score corresponds to the SDG_Disclosure, which can assume a ranging value from 0 to 1. In more detail, if all the companies of the sector presented the information of all the relevant SDGs for that industry, the value would be 1; otherwise, it would depend on the weighted approach.

Ultimately, the controls of the model were Ln_Employees, Ln_Market_Cap, Leverage, Country, Sector_Financial. The explanation of the variables is shown in Table 2.

Table 2 – Independent variables.

Variable	**Meaning**
SDG_Disclosure	Weighted average of the presence of SDG disclosure. The SDG disclosure assumes value equal to 1 if all the relevant SDGs with reference to the sector are present, while, in absence of this disclosure, the value is equal to zero. It has been elaborated by using the D_score elaborated by Cooke.
Ln_Employees	Natural logarithm of the average number of the employees during 2019 (Malafronte and Pereira, 2021; Busco *et al.,* 2019)
Ln_Market_Cap	Natural logarithm of the market capitalization as at 31st December 2019 (Malafronte and Pereira, 2021; Busco *et al.,* 2019)
Leverage	Total debt out of equity (Maroun *et al.,* 2023, Malafronte and Pereira, 2021, Busco *et al.,* 2019)
Country	The sample has been classified in northern European companies (Finland, Sweden, UK, Denmark, Ireland, Norway), southern European companies (Spain, Portugal, Italy, Malta), western European companies

	(France, Germany, Switzerland, Austria, Belgium, the Netherlands) and eastern European companies (Poland). This variable has been considered as categorical variable which assumes a number ranging from 1 to 4 (Vaz *et al.,* 2016)
Sector_Financial	Dummy variable which assumes 1 in case of a company operating in the financial sector, otherwise 0 (Maroun *et al.,* 2022). The overall number of the sectors is equal to 18. The sectors have been classified according to the North American Industry Classification System (NAICS) Codes, based on a production-oriented concept, meaning that it groups establishments into industries according to similarity in the processes used to produce goods or services.

Source: authors' elaboration

4.5 Results

Table 3 shows the descriptive statistics of the model.

Table 3 – Descriptive statistics of the model.

Descriptive Statistics

	N - 2019	N - 2020	Min - 2019	Min - 2020	Max - 2019	Max - 2020	Mean - 2019	Mean - 2020	St. Dev. - 2020	St. Dev. 2019
ITR_Score	537	552	.16667	.33333	1.00000	1.00000	.72075	.74224	.15755	.14033
SDG_Disclosure	537	552	0	0	0.52941	0.66274	.09682	.24063	.10900	.15626
LN_Employees	537	552	0.69314	0.69314	13.42233	13.42233	9.49772	9.48805	1.83075	1.83673
LN_Market_Cap	537	552	19.46802	19.01802	27.30273	27.37397	23.43825	23.47057	1.28869	1.30128
Leverage	537	552	0	0	12.32431	12.62850	1.11927	1.18019	1.27997	1.47001
Country	537	552	1	1	4	4				
Sector_Financial	537	552	0	0	1	1				

Source: authors' elaboration

The ITR_Score and SDG_Disclosure were directly linked to our hypothesis; therefore, their descriptive results are presented in more detail below.

For 2019, the level of ITR, as measured by the ITR_Score, was equal to 72.075%, whereas for 2020 it was 74.224%, suggesting that companies, on average, were above the threshold of 70.00%. This can be considered a great achievement for the level of ITR and that companies have addressed governance

mechanisms (the presence of CSR Committee) and strategic objectives (integrated strategy), have engaged with stakeholders (e.g. stakeholder engagement), have relied on CSR Standards (e.g., GRI Report Guidelines, UNPRI Signatory, Global Compact), have addressed CSR reporting (CSR Sustainability Reporting, ESG Reporting Scope) and have addressed assurance by third parties (CSR Sustainability External Audit). The ITR_Score presented a deviation standard of 15.75% for 2019 and 14.03% for 2020, meaning that the ITR level exhibited a low variability of data and low dispersion of value around the mean.

For 2020, the ITR level was equal to 74.224%. This can be considered a great achievement because there is an increase in the ITR level demonstrating a higher propensity of including financial and sustainability information in an integrated way. The ITR_Score presented a deviation standard of 14.03%; that is, once again, the ITR level exhibited a low variability of data and low dispersion of value around the mean.

For 2019, the average SDG disclosure was equal to 9.68%, while for 2020, it was 24.06%. This result can be considered a great implementation in disclosing the SDGs into their reporting by comparing them to the highest value. These results have highlighted that firms have increased their awareness in the pursuit of Agenda 2030. Therefore, firms have included the SDGs within their sustainability commitments, other than demonstrating their proactivity and willingness to disclose such information. Thus, this improvement can be associated not only with mere compliance behaviour, but also with the intention of providing more reliable information for stakeholders. Moreover, the weighted indicator has ensured a better delineation of the influence of each sector in terms of SGD disclosure. For SDG disclosure, the deviation standard was equal to 10.90% for 2019 and 15.62% for 2020, meaning that there was a low variability

of data. Once again, the positive trend in the attitude towards the disclosure of SDGs was confirmed.

Table 4 shows the descriptive statistics with reference to the disclosure of the SDGs.

Table 4 - Descriptive statistics of the SDG Disclosure

	2020	*2019*
SDG 1	*137*	*86*
SDG 2	*115*	*70*
SDG 3	*336*	*221*
SDG 4	*287*	*197*
SDG 5	*349*	*221*
SDG 6	*196*	*130*
SDG 7	*312*	*188*
SDG 8	*429*	*289*
SDG 9	*308*	*207*
SDG 10	*227*	*133*
SDG 11	*250*	*250*
SDG 12	*403*	*271*
SDG 13	*438*	*295*
SDG 14	*130*	*80*
SDG 15	*191*	*126*
SDG 16	*224*	*143*
SDG 17	*245*	*154*

The disclosure of SDGs improved over the studied two years, demonstrating that organisations were giving much attention to these topics. Indeed, this result is in line with the study of Botchway and Bradley (2023) which describes the increase in reporting SDG disclosure since 2018. In more detail, the study highlights this enhancement of SDG disclosure but in a limited way. The main

reasons are found in considering that such disclosures are intrinsically characterised by complexity (e.g. presence of many frameworks) or incompatibility (e.g. SDGs that are not relevant for the business). Nevertheless, the descriptive statistics of the growing trend of SDG disclosure highlights some important nuances that allows to better delineate the companies' perception towards these issues. In more detail, the most disclosed SDGs were SDG 8 - Decent work and economic growth (429 times for 2020 and 289 times for 2019), SDG 12 - Responsible consumption and production (403 times for 2020 and 271 for 2019) and SDG 13 - Climate action (438 for 2020 and 295 for 2019). These trends can be theoretically linked with legitimacy theory because our results show that companies increased their SDG engagement to meet external pressures. Hence, the companies addressed SDGs as part of sustainability reporting to respond to external pressure (Silva, 2021). Companies disclosed the SDGs directly linked the core business (e.g., SDG 8 - Decent work and economic growth) or, eventually, the SDGs deeply focused on urgent sustainable challenges (e.g., SDG 13 - Climate action). The less disclosed ones were SDG 2 - Zero hunger (115 times for 2020 and 70 for 2019) and SDG 14 - Life below water (130 times for 2020 and 80 for 2019). These SDGs depend on the nature of the industry and, hence, the connection of the SDG to the core business of these companies.

To validate the model, we verified the assumptions of OLS regression. The first was related to the lack of perfect multicollinearity. Here, a considerable correlation between the independent variables was not admitted in the model because doing so would create distortion both in the regression parameters and standard error. Thus, we checked for the presence of multicollinearity between the independent variables in two ways. Pearson correlation was tested, and the results are shown in Table 5. Correlations among the independent variables were

below 0.5 for both years, indicating that there was no multicollinearity among variables.

Table 5 – Pearson correlations.

Correlations - 2019

		ITR_Score	SDG_Disclosure	LN_Market_Cap	LN_Employees	Leverage	Country	Sector_Fin_NF
Pearson correlations	ITR_Score	1.000						
	SDG_Disclosure	0.277	1.000					
	LN_Market_Cap	0.311	0.101	1.000				
	LN_Employee	0.456	0.130	0.363	1.000			
	Leverage	0.186	0.114	0.091	0.125	1.000		
	Country	0.035	0.046	0.174	0.110	-0.031	1.000	
	Sector_Financial	-0.031	-0.058	0.085	-0.055	0.250	-0.029	1.000

Source: authors' elaboration

Correlations - 2020

		ITR_Score	SDG_Disclosure	LN_Employees	LN_Market_Cap	Leverage	Country	Sector_Fin_NF
Pearson correlations	ITR_Score	1.000						
	SDG_Disclosure	0.319	1.000					
	LN_Employees	0.347	0.174	1.000				
	LN_Market_Cap	0.238	0.134	0.315	1.000			
	Leverage	0.218	0.126	0.171	-0.001	1.000		
	Country	0.069	0.058	0.122	0.192	-0.002	1.000	
	Sector_Financial	0.105	-0.64	-0.051	0.033	0.180	-0.031	1.000

Source: authors' elaboration

Furthermore, we verified VIFs, and the results are shown in Table 6, which indicate no relevant multicollinearity issues in the variables within our models because all values were less than 2.

Table 6 – Coefficients and summary of the model.

Coefficients						
	Beta 2019	**Collin. statistics - 2019**		**Beta 2020**	**Collin. statistics - 2020**	
		Significance	**VIF**		**Significance**	**VIF**
SDG_Disclosure	0.201***	<0.001	1.039	0.250***	<0.001	1.058
LN_Market_Cap	0.160***	<0.001	1.198	0.122***	0.003	1.159
LN_Employees	0.360***	<0.001	1.192	0.249***	<0.001	1.178
Leverage	0.113***	0.003	1.107	0.124***	0.002	1.090
Country	-0.039	0.296	1.038	0.004	0.909	1.045
Sector_Financial	-0.042	0.273	1.096	0.108***	0.005	1.053

Summary of the model		
	2019	**2020**
R^2	0.291	0.234
R^2 adjusted	0.283	0.226
Durbin-Watson	1.958	1.912
Observations	537	552

* p-value <0.1.
** p-value <0.05.
*** p-value <0.01.

Source: authors' elaboration

The second was related to heteroskedasticity. The White test confirmed that the ITR_Score's variability was equal across values of the independent variables, meaning that our model was not affected by heteroskedasticity.

The third was related to autocorrelation of residuals and was tested by the Durbin–Watson (DW) test. In statistics, a DW value of around two indicates that there is no autocorrelation. The DW test in our 2019 model was equal to 1.958 (Table 6), whereas, in the 2020 model, it was equal to 1.912; therefore, our models did not have autocorrelation of residuals.

Based on the abovementioned tests, we can conclude that the multivariate regression analysis confirmed the assumptions of the OLS regression; therefore, the Beta coefficients were statistically significant.

The model had an R-squared of 0.291 for 2019 and 0.234 for 2020, meaning that the models were acceptable because of the considerations made by the authors on the variables under investigation other than the originality of the research. A decrease in the R-squared was associated with the increased sample. This result demonstrated that, even if an increase of the companies under analysis occurred, the model was still able to explain its adaptability.

Table 6 presents the multivariate analysis, which exhibits the relationship between the ITR level and SDG disclosure. The aim here was to establish if the ITR level was related to SDG disclosure. SDG disclosure affected the level of ITR. The coefficient was statistically significant and positive. The SDG_Disclosure provided positive (Beta coefficient equalled 0.201 for 2019 and 0.250 for 2020) and significant results (p value < 0.01). Hence, an increase of 1% in SGD_Disclosure affected the ITR_Score by an increase of 0.201 for 2019 and 0.250 for 2020. The results confirmed our hypothesis on the positive relation between the level of ITR and SDG disclosure. In other words, SDG disclosure led to a higher level of ITR. Consequently, a higher level of ITR had implications for the conceptual themes elaborated on by Adams *et al.* (2020) because the ITR enhanced the disclosure of the SDGs. Despite the presence of many frameworks, standards and guidelines are not enough to report the risks and opportunities resulting from sustainable development issues, and companies should consider the implications for value creation and impacts on achievement of the SDGs. Once again, the results have confirmed our hypothesis on the positive relation between the level of ITR and SDG disclosure that has not changed over the years. When looking at the controls of the models, for 2019, if there was an increase of 1% in Ln_Employees, this resulted in an increase of the ITR_Score equal to 0.360, whereas for 2020, the ITR_Score showed an increase of 0.249. This result is not in line with Maniora (2017), who stated that stand-alone ESG reporting is more accurate than integrated reporting when considering ESG issues for employees. For employees, a higher level of ITR allows for a wider overview of their positioning and interests within the company. Similarly, an increase of 1% of the market capitalisation led to an increase of the ITR_Score equal to 0.160 for 2019 and equal to 0.122 for 2020. Hence, companies with higher market capitalisation can be more structurally constructed to implement an integrated thinking approach. This is mainly because of the nature of the listed companies, which are intrinsically more

structured. The presence of stricter standards (e.g., more articulated corporate governance system) or the presence of proper corporate functions (e.g., sophisticated management control systems) may be considered the drivers of the integration of such disclosures. Considering leverage, we again had a positive relation, which increased the ITR level by 0.113 for 2019 and 0.124 for 2020. Similarly, to achieve better integration of financial and sustainability information, organisations may need to implement more sophisticated and structured information systems. As a matter of fact, to make these investments, more funds are necessary, generating a consequential increase in indebtedness. For Sector_Financial, the variable suggested that, moving from 0 (Financial sector) to 1 (Nonfinancial sector), the level of ITR decreased by 0.042 for 2019, while increased by 0.108 for 2020. Ultimately, the variable Country was added to validate the regression results; however, its Beta coefficient did not have an explanatory power in relation to the level of ITR. Overall, the controls we added had prior results in the literature. The present study has confirmed our hypothesis of a positive relationship between SDG disclosure and the level of ITR for both years, suggesting that the implementation of SDG disclosure favoured a higher level of integration for managing sustainability issues.

4.6 Robustness

As done by other authors, to ensure the reliability of the research method, the author and two independent researchers scored 50 randomly selected companies. The findings of the three researchers were then compared. Because the final research instrument was agreed upon by all the investigators, differences in the scores between the investigators were not significant (Devalle *et al.,* 2016). To confirm the results, the authors performed the same analysis by adopting a different way of determining the independent variable: SDG_Disclosure. In this approach, the unweighted method was adopted. In more detail, Cooke's

unweighted method is a D_score unweighted index in which the information in the disclosure is equally important and, thus, of the same weight.

The SDG_Disclosure according to Cooke's unweighted method was calculated as follows:

$$SDGs\_Disclosure_{unwej\ it} = \frac{\sum_{i=1}^{n} d_{it}}{\sum_{i=1}^{n} x_{it}}$$

where:

- i_{it}: the item analysed;
- j: the company analysed;
- d_{it}: 1 if the item was disclosed and 0 if the item was not; and
- x_{it}: 1 if the item was relevant and 0 if the item was not.

The numerator was equal to the sum of all SDGs disclosed. This value ranged from 0 (if no SGD is reported) to 17 (if all SDGs are reported). The denominator assumed that, for each sector, the highest value of the sum of the SDGs disclosed denoted that those SDGs should be applied for that industry. Therefore, the value of the D_score ranged from 0 to 1.

Subsequently, the authors performed the same analysis by once again using the OLS regression to test the relationship between the level of ITR and SDG disclosure, as follows:

$$\text{ITR\_Score}_{it} = B_0 + B_1\text{SDG\_ Disclosure}_{it} + B_2\text{Ln\_Employees}_{it} + B_3\text{Ln\_Market\_Cap}_{it} + B_4\text{Leverage}_{it} + B_5\text{Country}_{it} + B_6\text{Sector\_Financial}_{it} + \varepsilon_{it}$$

Table 7 – Robustness checks

Coefficients						
	Beta - 2019	**Collin. statistics - 2019**		**Beta - 2020**	**Collin. statistics - 2020**	
		Significance	VIF		Significance	VIF
SDG_Disclosure	0.184***	<0.001	1.034	0.228***	<0.001	1.059
LN_Market_Cap	0.163***	<0.001	1.205	0.249***	<0.001	1.183
LN_Employees	0.354***	<0.001	1.196	0.117***	0.004	1.159
Leverage	0.120***	0.002	1.101	0.129***	0.001	1.081
Country	-0.028	0.461	1.041	0.002	0.950	1.047
Sector_Financial	-0.047	0.221	1.093	0.108***	0.006	1.048

Summary of the model		
	2019	**2020**
R^2	0.281	0.222
R^2 adjusted	0.273	0.213
Durbin-Watson	1.949	1.877

* p-value <0.1.
** p-value <0.05.
*** p-value <0.01.

Source: authors' elaboration

The results were in line with those of the previous analysis. In fact, there were no large changes with reference to the general results, as highlighted in paragraph 4. The R-squared again confirmed the reliability of the model, equalling 0.281 for 2019 and 0.222 for 2020. Moreover, there were no issues linked to autocorrelation and multicollinearity, as confirmed again by the results of the Durbin–Watson test and Pearson correlations. When it came to the multivariate analysis, the results further confirmed the significant variables carried out by the general method by applying the weighted D_score.

4.7 Conclusions

The research contributes to enhancing the stream of literature on sustainability accounting, by adding new insights on ITR linked to SDG disclosure. The research drew on the study of Busco *et al.* (2019), which performed a similar analysis with the aim of extending the field of ITR by providing new results and insights on the determinants and measures of the level of integrated thinking implemented by companies. However, existing literature highlighted that there is room for improvements on integrated thinking and SDG disclosure to

enhance stakeholders' awareness (Pigatto *et al.,* 2023). Therefore, the study analyses the level of ITR and investigates the relationship between this integration and SDG disclosure. We tested the relation on a sample based on STOXX Europe 600 for the fiscal year 2019 and 2020. Findings show that SDG disclosure improves the level of ITR by 0.138. SDG disclosure has increased over time in line with Botchway and Bradley (2023) and positively affects ITR level, meaning that SDG disclosure is an important pillar contributing to ITR. In other words, SDG disclosure is a driver for companies' decision-making towards a better level of ITR.

The research contributes to literature in the stream of sustainability accounting, by adding new insights on ITR linked to SDG disclosure. Indeed, the originality of the study lies in the inclusion of the SDG disclosure as a determinant for ITR that has not been analysed by academics.

To our knowledge, the World Business Council addresses the most related SDGs to the core business, just to certain sectors (e.g. electric utilities, chemical sector) (WBCSD, 2021). Our research provides a new measure for the SDG disclosure and suggests that SDG disclosure has been increased over time. This supports the progressive awareness in the pursuit of the Agenda 2030 and demonstrates that companies have primarily focused on SDG 8 and SDG12 which are closer to the business and SDG 13 which addresses the climate urgency.

From a theoretical perspective, the research addressed the link between SDG disclosure and ITR level. The empirical research has suggested that SDG disclosure generates an integrated process of managing and reporting.

From a practical perspective, the research provided an alternative measure of SDG disclosure by addressing Cooke's method. To the best of our knowledge, few prior studies have addressed the coherence in the integration of SDGs in the company's strategic materiality analysis (Junior *et al.,* 2021). In addition, the results shed light on the monitoring processes' implementation to supervise and

verify the practical implementation of sustainability programmes within the core business. Ultimately, investors, nongovernmental organisations and, more generally, other stakeholders may benefit from the analysis of SDG disclosure as determinant of ITR level.

The present research was not without limitations. First of all, the empirical analysis was based on secondary data collected from DataStream Thomson Reuters; thus, the sample was affected by missing values that were not available on DataStream. Linked to this, the gathered data did not provide information about how stakeholder engagement was conducted or how corporate sustainability practices (e.g. biodiversity, climate change) were addressed in relation to the companies' strategy, management and reporting. Moreover, the analysis considered only a couple of years and not a wider range of years. Furthermore, the empirical analysis did not deeply investigate the results of the components of the ITR_Score, and the SDG disclosure index was constructed inductively by analysing companies' disclosure. All these concerns may be implemented in future research, by considering other geographical areas or investigating different company's sizes (e.g., small and medium enterprises). Furthermore, future research can enhance the understanding and relevance of the SDGs by assessing the qualitative trends in SDG disclosure and reporting over time more in depth. However, to the best of our knowledge, this was the first study connecting the ITR approach with SDG disclosure with a quantitative method. Since the growing importance of sustainability issues, disclosing issues linked to SDGs supports an integrated way of thinking and reporting.

4.8 References

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Appendix A

ITR_Score

Variable	Meaning
Integrated Strategy in MDandA	Does the company explicitly integrate financial and extra-financial factors in its management discussion and analysis (MD&A) section in the annual report? - integration of the extra-financial information within the company's business review section - US-based companies, 10-K under the management discussions and analysis section - UK-based companies, Strategic Report within the annual report containing extra-financial data
GRI Report Guidelines	Is the company's CSR report published in accordance with the GRI guidelines? - in focus on CSR report or data published within the framework or guidelines of GRI(global reporting initiative) principles
Global Compact Signatory	Has the company signed the UN Global Compact? - has the company singed the 'United Nations Global Compact' which is a non-binding united nations pact to encourage businesses worldwide to adopt sustainable and socially responsible policies, and to report on their implementation
Stakeholder Engagement	Does the company explain how it engages with its stakeholders? - information on how the company is engaging with its stakeholders, how it is involving the stakeholders in its decision-making process; what procedures are in place for engagement - focus on having established two-way communication between the company and its various stakeholders
CSR Sustainability Reporting	Does the company publish a separate CSR/H&S/Sustainability report or publish a section in its annual report on CSR/H&S/Sustainability? - any separate extra-financial report in which the company reports on the environmental and social impact of its operations - when the company publishes an extra financial report in a foreign language we answer as 'True' with a comment - web-based non-financial reports are also considered if data is updated yearly - integrated annual report with sustainability data is qualified information - CSR section from the annual report must consist of substantial data - exceptionally, if company report quantitative data exclusively in less than 5 pages can also be considered - CSR reports published bi-annually, current year when there is no report then data measure is answered 'False' - data only on community-focused report with community-related activities of the company, answer is 'False

CSR Sustainability External Audit	Does the company have an external auditor of its CSR/H&S/Sustainability report? - in scope are the data on external audit of the company's CSR data or extra financial report is considered - consider an audit in the form of a review done by a university, academic, expert, external panel or a research centre - web-based CSR reports that are externally audited - integrated annual report having external audit statements for its environmental and social data
UNPRI Signatory	Has the company signed the United Nation Principles for Responsible Investment (UNPRI)?
CSR Sustainability Committee	Does the company have a CSR committee or team? - board level or Senior management committee responsible for decision making on CSR strategy
ESG Reporting Scope	The percentage of the company's activities covered in its Environmental and Social reporting. - take scope as reported by the company - data on the percentage of the company's activities covered in its environmental and social reporting - if extra financial reporting covers all of the company's global activities, then the scope is 100% - if the scope is not provided, we need to determine using the priority order as follows: (1) percentage of employees covered; (2) percentage of revenue covered; or (3) percentage of operations covered - when we have 2 different scopes relating to social and environmental coverage, consider the lowest value

5. Paper under review: Integrating intellectual capital disclosure in an integrated thinking perspective

5.1 Abstract

Title – Integrating intellectual capital disclosure in an integrated thinking perspective

Authors – Alberto Tonelli, Fabio Rizzato, Alain Devalle, Donatella Busso

Value creation process is seeking for a new paradigm of reporting that supports the integration of financial and non-financial information. Since intellectual capital and unrecognised intangible assets are drivers of value creation and integrated reporting has provided the definition of several kinds of capital, Integrated Report configures itself as a reliable and valid instrument. Integrated Reporting relies on Integrated Thinking, a mechanism that supports and guides how intellectual capital and unrecognised intangible assets relates in the value creation process. In this regard, intellectual capital exists if integrated report's preparers have defined its contribution to value creation because it is influenced by both financial goals and sustainability matters. Since such disclosure will characterise the evolution of the reporting practices, the article has found that the level of financial and non-financial information is positively associated by the disclosure about intellectual capital. In other words, the more disclosure of intellectual capital is, the more financial and non-financial information are integrated.

Keywords – intangible assets, intellectual capital, integrated reporting, integrated thinking

Paper type – Quantitative analysis

5.2 Introduction

In the last decades a new advent of the archetypical company relying on intangible components has been getting much more ground (Dumay, 2009). Nowadays, it is usual to identify a firm that mainly depends on intangibles. As a consequence, a new visualisation of the economy has been growing, characterised by a virtual component. This on-going progress of the growing-relevance of intangibles has been leading, for some cases, to consider that intangibles are worth (Thum-Thysen *et al.,* 2017). Thus, this addiction towards such intangible components sheds light on their importance and requires a deeper attention to the topic (Garanina *et al.,* 2021). This premise justifies the current era of "capitalism without capital" (Haskel and Westlake, 2017), leading a progress conducting the enterprises to review the business models, mainly influenced by exceeding the value of investments in tangibles with reference to intangible assets (Chiucchi and Dumay, 2015, Corrado and Hulten, 2010, Zambon *et al.,* 2020).

International Accounting Standard Board (IASB) provides the definition of intangible asset by stating it within International Accounting Standard (IAS) 38. Intangible asset is: "an identifiable non-monetary asset without physical substance. Such an asset is identifiable when it is separable, or when it arises from contractual or other legal rights" (par. 8). Moreover, criteria for recognition, measurement and disclosure of intangible assets are included in IAS 38 as well. IAS 38 allows the recognition of specific intangible assets, such as brands, software, patents, among the others, only when strict requirements are met. These requirements are, the control of future economic benefits flowing from the underlying intangible resource and the capability to restrict the access of others to those benefits. However, academia highlights the importance of some intangibles since they actively affect the perception of stakeholders (Mouritsen and Thrane, 2006), the value of the company (Beattie and Smith, 2010; Orens *et al.,* 2009; Swartz *et al.,* 2006) and its performance (Bayraktaroglu

et al., 2019; Sydler, 2014; Swartz *et al.,* 2006; Wang *et al.,* 2014), but, due to the absence of requirements' meeting provided by the standard, they must not be recognised in the statement of financial position. As a consequence, it limits a fair and trustworthy representation of the intrinsic company value, misconducting and misleading the perception of the financial statements' users (Orens *et al.,* 2009). These intangibles are defined as unaccounted intangible assets and IC is one of the most relevant.

Academia has demonstrated that it is not so usual and easy to identify precise and clear boundaries between intangible assets and intellectual capital (IC). In general, IC is mainly preferred by Europeans, whereas the USA prefers referring to intangible assets (Cuozzo *et al.,* 2017; Lev, 2000). These terminologies are interchangeable (Caddy, 2000). Since the on-going development of the investment-attitude towards this virtual economy, it is worth noting that the prominence of intangibles and IC is worth nowadays (Dumay, 2016; Passaro *et al.,* 2018). Thus, according to the literature, it is possible to argue that intangible assets and IC are drivers of value creation as well (Beattie and Smith, 2013; Marr *et al.,* 2004; Nielsen and Montemari, 2012). Value creation is the core process of the IR Framework issued by IIRC and it considers that disclosure about value creation, erosion and preservation will be the next step in enhancing the evolution of the reporting practices. IR Framework relies on several capitals, in addition to the financial one (IR Framework, 2021): natural, manufacturing, human, social and relational and intellectual. Literature has extensively accepted the definition of IC provided by Stewart (1997) and Sveiby (1997) consisting in the combination of three capitals: human, structural (defined "intellectual" by IIRC because it depends on outputs coming from the intellectual property) and relational. All of them are part of the capitals provided by IR Framework. This forward-looking reporting perspective is part of an integrated thinking logic that is becoming one of the main corporate practices. Thus, integrated thinking and integrated reporting allow an efficient capital allocation that acts as a leeway to

foster financial stability and sustainable development. In more detail, the integrated thinking is defined as (IIRC, International IR Framework 2021, p. 3): "the active consideration by an organisation of the relationships between its various operating and functional units and the capital that the organisation uses or affects. Integrated thinking leads to integrated decision-making and actions that consider the creation, preservation or erosion of value over the short, medium and long term". Integrated thinking is an underlying mechanism that occurs during IR drawing-up and supports their preparation by developing a common understanding of the ways in which IC helps and integrates value creation processes (Stacchezzini *et al.,* 2019). Thus, integrated thinking sets up a procedure for the identification of what can be framed as IC in an integrated reporting context. This premise is met, as long as IC is intangible, drives sustainable actions and contributes to financial value creation.

Hence, integrated reporting traces the direction of the corporate reporting development, allowing the integration of financial and non-financial disclosure in a single output: the Integrated Report (IR) (De Villiers *et al.,* 2014, Dumay *et al.,* 2016). Linked to this, prior academics have identified a measure of determining a level of integration of financial and non-financial aspects into the company's strategy, governance and performance (Busco *et al.,* 2019). Such a level has been defined as the level of integrated thinking and reporting (ITR).

Thus, the research aims at investigating whether the disclosure about IC positively or negatively affects the level of ITR. The research employs an empirical analysis based on a European public company sample. All data have been derived from Datastream Thomson Reuters, by focusing on a multi-year observation, ranging from 2013 to 2021. This gathering data procedure allows development of the ITR_Score and the IC_Score. Both of them rely on disclosure previously studied by the academic literature (Schiemann *et al.,* 2014; Busco *et al.,* 2019; Brüggen *et al.,* 2009; Li *et al.,* 2008; Singh and Mitchell Van der Zahn, 2008; Terblanche and De Villiers, 2019). After framing the research within

the international academic landscape, the authors expect that IC positively affects the level of ITR.

The research has theoretical and practical implications. First of all, from the theoretical side, it is a way for enriching the research about unaccounted intangible assets and IC in a context of integrated reporting. Indeed, it gives relevance to IC in the value creation process acting as a trait d'union of the disciplines, since the academic debate presents several future unexplored avenues. From the practical side, the research may be considered by standard setters, and in particular by IIRC, for introducing some guidelines about disclosing IC within the report. Moreover, it may be framed as a driver for improving the disclosure of IC in the reports by contributing to the value creation process.

The paper is structured as follows: Section 2 provides the literature review on ITR and IC, Section 3 describes the sample, data and research method. Section 4 presents the discussion of the results, finally, Section 6 concludes with implications, limitations, and avenues of future research.

5.3 Literature analysis

5.3.1 Positioning of Intellectual Capital within the academic literature

IC has been investigating and debating for a long time, and, despite this wide scenario of discussion, scholars are still struggling with the definition of its boundaries. This is mainly due to the presence of many definitions that, in several cases, are similar. For instance, the IC has been defined as the possession of the knowledge, applied experience, organisational technology, customer relationships, and professional skills (Edvinsson and Malone, 1997), the economic value of the organisational and the human capital (Organisation for Economic Co-operation and Development, 1999) or is a competitive advantage

that companies and employees possess and it is a whole set of knowledge (Bontis, 2001). According to Edvinsson and Malone (1997) the IC consists of three main components. The first one is the human capital that is the knowledge, skills and expertise owned by individuals. It corresponds to the individual expertise, values, attitudes, motivations, behaviours and skills to transfer knowledge among contexts (Bontis, 1998). It can be considered as a key driver of corporate reputation because of the positive influence with various measures of financial performance (Ginesti *et al.,* 2018). The second component is the organisational capital that allows the human capital to express its effects. Generally, this depends on the owning of patents, licences or databases. The last component is the relational capital is the relational capital that refers to relations with customers and suppliers (Bontis *et al.,* 2000; Edvinsson and Malone, 1997; Stewart, 1997) and more in general with internal and external stakeholders (Hosseini and Owlia, 2016; Martínez-Torres, 2006; Ramezan, 2011).

Literature argued that intangible assets and IC are drivers of value creation (Beattie and Smith, 2013; Marr *et al.,* 2004; Nielsen and Montemari, 2012). IC is found in the processes and resources framed as capabilities and competences that generate competitive advantage and thus create value. Since the intrinsic complex nature of this kind of capital, its measurement in contributing to value creation is challenging. Therefore, in order to overcome this issue, some scholars have argued tools and ways for illustrating the role of IC in the value creation process (Cuganesan, 2005; Dumay, 2009; Giuliani, 2016; Marr *et al.,* 2004; Zakery and Afrazeh, 2017). As a consequence, it is worth noting that IC may be undoubtedly acknowledged as a driver of value creation. Therefore, the concept of IC may be viewed in a managerial perspective, aiming at developing new practices for the value creation by exploiting the overall knowledge. Thus, the objectives that guide the introduction of the IC concept and give its meaning to projects affect the way the firm develops IC (Chaminade and Roberts, 2003). However, if firms are focused on the mere measurement of IC rather than

managing it, this behaviour may be harmful and it leads to reduced potential for change and novel management actions (Chaminade and Roberts, 2003). This is the main reason for not being focused and not trying to deal with the accounting of IC management. Such concept has been defined by Dumay (2009) as "accountingisation of IC", where accountants try to express a value of IC for making the intangible tangible, by applying accounting solutions to managerial challenges. As a matter of fact, new skills and methods adopted by practitioners and researchers are welcomed toward the investigation of IC by employing complexity, narrative, numerical, statistical and visual techniques. So far, literature focused to some elements for reducing the accountingisation, as the use of narratives (Dumay and Rooney, 2011; Dumay and Roslender, 2013; Mouritsen *et al.,* 2001;) and understanding how IC contributes to value creation through visual techniques (Cuganesan and Dumay, 2009; Marr *et al.,* 2004; Montemari and Nielsen, 2013). Nevertheless, even if literature is trying to be focused more on the IC management, rather than IC accounting, the study of Chiucchi and Dumay (2015, p. 325) states "a dominant focus on accounting for IC is necessary, especially to allow newcomers to take stock, and make sense, of IC".

5.3.2 Positioning of Integrated Reporting and Integrated Thinking within the literature

Sustainability risks have been generally ignored by managers even if they are becoming priorities for companies because they have several significant financial consequences in the long term (Adams, 2015). Since these matters have exponentially grown, regulators and policymakers set up regulatory frameworks with the aim of disciplining the disclosure of non-financial information (NFI), for reaching more accountability and responsiveness towards sustainable development (Kinderman, 2020, Howitt, 2014). The recent amendment of the Corporate Sustainability Reporting Directive (CSRD) requires information about intangibles due to their intrinsic nature that is linked to sustainability

matters. Hence, such disclosure has to be included in the sustainability reporting. CSRD also presents some insights about which kind of disclosure about intangible resources has to be reported: employee's skills and abilities, their trustworthiness, the quality of the relationships with customers and suppliers, among the others. As a matter of fact, it is highlighted that information about intangible resources cannot be separated from sustainability matters. NFI obliges corporations to present information about business models, risks and opportunities, outcomes in terms of Key Performance Indicators (KPIs), among others. Thanks to this strict intervention, in certain cases the NFI disclosure switched from a voluntary to a mandatory context. These matters are linked to ESG issues, such as respect for human rights, anti-corruption and bribery matters. Academia has studied that, in several cases, NFI has been presented in separate reports from financial statements. Nevertheless, in some cases NFI have been integrated in the same reports (Stubbs and Higgins, 2018, Jebe, 2019). Such a process allows companies to provide information about several kinds of capital (e.g., social, human) and their interconnections with business models. Furthermore, it helps both companies and stakeholders to visualise in an integrated way financial and non-financial implications of the business activities, with the aim of improving the integration of the informativeness. This improvement allows to help and support internal and external reporting procedures by highlighting the main output: the drawing-up of IR. Therefore, an integrated perspective must be rooted in the companies' mindset, because it lies at the bases for the development of business strategies. The International Integrated Reporting Council (IIRC) also states (p. 2): "The more that integrated thinking is embedded into an organisation's activities, the more naturally will the connectivity of information flow into management reporting, analysis and decision-making".

In this context, IR is a driver of integrated thinking, by considering it as a corporate reporting norm (IIRC Framework, 2021). Moreover, it supports

companies in communicating and creating value, other than fostering a better allocation of resources and capitals (Di Vaio *et al.,* 2021). The first aim of integrated reporting is to improve the accounting system by disclosing how an organisation can create value with a short, medium and long term vision, according to its strategy, performance and future perspectives by evaluating the magnitude of the matter's effect and its likelihood of occurrence (Fiandrino *et al.,* 2022).

Thus, a reliable, complete, comparable, balanced and transparent disclosure is a proxy for high-quality reporting. This may be generated by managing corporations whether they focus on an integrated thinking logic (IIRC, 2021) that extremely depends on the generation of value (Cerbone and Maroun, 2020), because it depends on not just financial gains for investors and creditors but on ESG considerations as well. Integrated reporting and integrated thinking deserved much attention by academics that they identified their determinants. IR is more adaptable and adequate for investors whether it is drawn-up with a long-term perspective rather than a short one (Serafeim, 2015). A stream of research studied the main and critical factors that determine the companies' willingness to develop IR mind-set of practising and reporting ESG issues (e.g., Vaz *et al.,* 2016; Frías-Aceituno *et al.,* 2013; Jensen and Berg, 2012), that is mainly anchored to an enhancement of their corporate reputation. In addition, IR improves the responsiveness and the engagement of investors, and more in general stakeholders (Steyn, 2014; Devalle *et al.,* 2021). Moreover, it depends on a transparent and responsible set of management and reporting practices, involving financial and non-financial issues, that is defined as "integrated thinking". The scope of the integrated thinking is to get a better quality of the disclosure for fostering sustainable business practices encompassing all the nuances related to stakeholder engagement (De Villiers *et al.,* 2017, Silvestri *et al.,* 2017).

Maroun *et al.,* (2023) has highlighted the main features of IR needs, by deriving a set of integrated thinking indicators relying on principles of integrated awareness and understanding, integrated leadership commitment and capability, integrated structures, integrated organisation performance management and integrated external communication.

There is a large debate about critiques and advantages of IR. Rinaldi *et al.,* (2018) studied the "integrated reporting journey" by analysing the main characteristics of the integrated reporting process in terms of strengths, weaknesses, other challenges and future development. One of the main strengths of IR is a driver of facilitating the relationship between the company and the users of the reports. Indeed, IR allows dialogue with several stakeholders without a mere financial perspective (Lai *et al.,* 2018).

Since companies have been focusing more on investments' implication in terms of value creation (Adams *et al.,* 2016), integrated reporting has been categorised as a useful tool for changing the companies' mentality about the planning of their investments, since their implications in the value creation process (Burke and Clarke, 2016). Moreover, the disclosure of information through integrated reports reduces the information asymmetry, replacing it by enabling the accountability for ESG performance, thanks to the intertwined relationships among stakeholders (Alrazi *et al.,* 2015).

When it comes to the weaknesses of IR, for what concerns ESG issues for managers, employees and other stakeholder's interest, Maniora (2017) states that integrated reports are less accurate than stand-alone ESG reports. Generally, it depends on the framing of IR as a mere reporting tool for embracing stakeholder's interests (Di Vaio *et al.,* 2021).

Thus, the academic debate on integrated thinking is largely-diffused and it has been highlighted the importance of integrated reporting as the primary source of information for stakeholders that could enhance their engagement.

5.3.3 Hypothesis development

The literature review has extensively argued that IC is a driver of value creation. Nevertheless, Abhayawansa, (2014) states that the value creation process needs a new paradigm of reporting with the mere aim of helping financial accounting and reporting to provide adequate information about unaccounted intangible assets and IC. To meet these expectations, integrated reporting is visualised as a valid instrument for overcoming these shortcomings (Owen, 2013; Rowbottom and Locke, 2016). In relation to this, IR has provided the definition of several kinds of capital as well (IR Framework, 2021) and several academics have defined it as a valuable source to express its predominance (Dumay, 2016; Dumay *et al.,* 2016; de Villiers and Sharma, 2020). As highlighted before, integrated thinking plays an important role as underlying mechanisms of IR, in supporting their drawing-up and preparation. Indeed, it develops a common understanding about IC influence in the value creation process. In other words, integrated thinking sets up a procedure for the identification of what can be considered IC in an integrated reporting context. Thus, IC exists if IR preparers have defined its contribution to value creation because IC is influenced by both financial goals and sustainability matters.

Therefore, IC exists in an IR context if the following assumptions are encountered (Stacchezzini *et al.,* 2019): a corporate element needs to be intangible, it has to drive sustainable actions and contribute to financial value creation. Therefore, it is configured as an intangible driver to enable sustainable actions with the aim of generating financial outcomes.

Several academics call for further research on integrated thinking (e.g., De Villiers *et al.,* 2014; Dumay *et al.,* 2016, Busco *et al.,* 2019) and IC disclosure (e.g., Brüggen *et al.,* 2009; Terblanche and De Villiers, 2019; Singh and Mitchell Van der Zahn, 2008). Nevertheless, a study that focuses on the effect between IC disclosure and the level of ITR in a quantitative view is lacking.

Therefore, considering the literature analysis about ITR and IC, the authors hypothesised that:

H1: IC disclosure positively affects the level of ITR.

5.4 Methodology

5.4.1 Sample of the analysis, data gathering and research design

The research design develops a quantitative methodology with the aim of testing the extent to which non-financial information is integrated in financial information. In more detail, IC has been considered as the proxy of both kinds of disclosure. Firstly, because IC is an unaccounted intangible asset that has implications on firm value, firm performance, among the others. Due to some limits in the capitalisation and recognition of such intangible, often its disclosure is missing. Secondly, according to the IR Framework, IC is considered as one of the relevant capitals (par. 2.15). Therefore, IC is characterised by an intrinsic value that for integrated reporting is framed as a driver of value creation, erosion and preservation.

The sample selection is based on European public companies. Data has been derived from Thomson Reuters Datastream, a reporting database that is extensively used in non-financial and financial accounting research (Akbas et al. 2018) for gathering a great amount of data. Thus, the authors utilised secondary data because the research relies on a large sample.

Moreover, since banks and insurance firms are characterised by different accounting policies, they have been not included in the sample. This step allows to ensure a more reliable study since the higher grade of comparison of financial statements.

The sample covers a multi-year period of analysis, ranging from 2013 to 2021 (9 years), developing panel data. The last observation is thus 31st December 2021, due to 2022 data unavailability, whereas 31st December 2013 in order to guarantee a wide panel submitted to analysis. Indeed, in panel data analysis[5], data are collected for several years and for several individuals as well, and they consist of a valid model. First of all, it minimises the estimation biases, secondly, it is a way for managing the impact of the omitted variables and thirdly, it is more accurate from an inferential point of view (Hsiao and Pesaran, 2008).

The next step in defining the sample of the research is the limit according to the market capitalisation. For the research, the authors chose all the firms with a market capitalisation equal or higher than Euro 250,000,000 (Chodorow-Reich et. al, 2022; Lins *et al.,* 2019). This criterion has been chosen since including companies with a lower market capitalisation would have led to more companies with not available data, generating a distortion in the results of the analysis.

Moreover, in order to guarantee a consistent sample for the entire period, the authors have chosen only the companies with available data for all the years under analysis. This led to a strongly balanced panel of 382 companies that, times 9 years of observation, led to the overall observations: 3,439. Table 1 shows the process of determining the final sample.

Table 1 - Final sample of the analysis

European companies (headquarter)	12,352
Market capitalisation greater or equal to 250,000,000	3,159
GICS[6] classification by excluding financial companies	2,110
Available data	382
Number of observations	3,438

[5] The panel data analysis has been performed by using Stata/SE 17.

[6] Sectors according to GICS classification are: energy, materials, industrials, consumer discretionary, consumer staples, health care, information technology.

5.4.2 Equation and variables

The equation of the panel data analysis is the following:

$$\text{ITR\_Score}_{it} = B_0 + B_1\text{IC\_Score}_{it} + B_2\text{Ln\_Total\_Asset}_{it} + B_3\text{Leverage}_{it} + B_4\text{ROE}_{it} + B_5\text{ROA}_{it} + B_6\text{Ln\_Market\_Cap}_{it} + B_7\text{Sector}_{it} + B_8\text{Listed\_Country}_{it} + \mu_t + \omega_i + \varepsilon_{it}$$

The dependent variable is ITR_Score, that is the weighted average computed by considering the following dummy variables: *"Integrated Strategy in MDandA", "GRI Report Guidelines", "Global Compact", "Stakeholder Engagement", "CSR Sustainability Reporting", "CSR Sustainability External Audit", "UNPRI Signatory", "CSR Sustainability Committee" "ESG Reporting Scope", "CSR Strategy Score"*. The structure has been derived from academic literature drawing on such conceptualisation (Busco *et al.,* 2019). Data has been processed by adopting a dichotomous approach: if the information is present, the value of the variable is 1, otherwise 0. "Not Applicable" (NA) data derives from missing information on DataStream Thomson Reuter. Since the occurrence of some NA, the authors adopted the following formula to exclude them from the ratio's computation.

$$ITR\_Score_{j\,it} = \frac{\sum_{i=1}^{n} d_{it}}{(\sum_{i=1}^{n} d_{it}) - NA_{it}}$$

Where:

- j: the company;
- i_{it}: item analysed;
- d_{it}: each component of the ITR_Score (assumed "1" if the information has been presented, otherwise "0");

- NA_{it}: missing information of the components of the ITR_Score, therefore excluded from the analysis and coded with NA (Not Applicable).

In more detail, the following Table 2 shows the meaning of these variables.

Table 2 - ITR_Score's variable

Integrated Strategy in MD&A	Does the company explicitly integrate financial and extra-financial factors in its management discussion and analysis (MD&A) section in the annual report? - integration of the extra-financial information within the company's business review section - US-based companies, 10-K under the management discussions and analysis section - UK-based companies, Strategic Report within the annual report containing extra-financial data
GRI Report Guidelines	Is the company's CSR report published in accordance with the GRI guidelines? - in focus on CSR report or data published within the framework or guidelines of GRI(global reporting initiative) principles
Global Compact Signatory	Has the company signed the UN Global Compact? - has the company signed the 'United Nations Global Compact' which is a non-binding united nations pact to encourage businesses worldwide to adopt sustainable and socially responsible policies, and to report on their implementation
Stakeholder Engagement	Does the company explain how it engages with its stakeholders? - information on how the company is engaging with its stakeholders, how it is involving the stakeholders in its decision-making process; what procedures are in place for engagement - focus on having established two-way communication between the company and its various stakeholders
CSR Sustainability Reporting	Does the company publish a separate CSR/H&S/Sustainability report or publish a section in its annual report on CSR/H&S/Sustainability? - any separate extra-financial report in which the company reports on the environmental and social impact of its operations - when the company publishes an extra financial report in a foreign language we answer as 'True' with a comment - web-based non-financial reports are also considered if data is updated yearly - integrated annual report with sustainability data is qualified information - CSR section from the annual report must consist of substantial data - exceptionally, if company report quantitative data exclusively in less than 5 pages can also be considered - CSR reports published bi-annually, current year when there is no report then data measure is answered 'False' - data only on community-focused report with community-related activities of the company, answer is 'False
CSR Sustainability Committee	Does the company have a CSR committee or team? - board level or Senior management committee responsible for decision making on CSR strategy
UNPRI Signatory	Has the company signed the United Nation Principles for Responsible Investment (UNPRI)?
CSR Sustainability External Audit	Does the company have an external auditor of its CSR/H&S/Sustainability report? - in scope are the data on external audit of the company's CSR data or extra financial report is considered - consider an audit in the form of a review done by a university, academic, expert, external panel or a research centre - web-based CSR reports that are externally audited - integrated annual report having external audit statements for its environmental and social data
ESG Reporting Scope	The percentage of the company's activities covered in its Environmental and Social reporting. - take scope as reported by the company - data on the percentage of the company's activities covered in its environmental and social reporting - if extra financial reporting covers all of the company's global activities, then the scope is 100%- if the scope is not provided, we need to determine using the priority order as follows: (1) percentage of employees covered; (2) percentage of revenue covered; or (3) percentage of operations covered - when we have 2 different scopes relating to social and environmental coverage, consider the lowest value
CSR_Strategy_Score	CSR strategy category score reflects a company's practices to communicate that it integrates the economic (financial), social and environmental dimensions into its day-to-day decision-making processes

The independent variable is IC_Score, a weighted variable consisting of three main under-variables, Relational_Capital_Disclosure, Human_Capital_Disclosure, Structural_Capital_Disclosure, according to the interpretation made by Stewart (1997) and Sveiby (1997). Thus, the variable IC_Score has been set up in accordance with the academic literature on IC disclosure (Brüggen *et al.,* 2009; Li *et al.,* 2008; Singh and Mitchell Van der Zahn, 2008; Terblanche and De Villiers, 2019; Schiemann *et al.,* 2015). These variables have been determined by considering the presence or not of disclosure about the referring data. In more detail, Appendix A presents all the relevant disclosure for determining IC_Score and its components. For the determination of IC_Score and the processing of NA data, the authors followed the same approach as before for ITR_Score.

The first control variable is Ln_Total_Asset (Busco *et al.,* 2019, Brüggen *et al.,* 2009; Terblanche and De Villiers, 2019) for checking the size of the firms. Leverage (Maroun *et al.,* 2023, Malafronte and Pereira, 2021, Busco *et al.,* 2019, Brüggen *et al.,* 2009; Terblanche and De Villiers, 2019; Singh and Mitchell Van der Zahn, 2009; Schiemann *et al.,* 2015) is a proxy of the firms' debtedness. Profitability is checked by Return on Equity (ROE) (Busco *et al.,* 2019, Li *et al.,* 2008). The other control variables are Listed_Country and Sector (Schiemann *et al.,* 2015). Table 3 presents their determination and characteristics.

Table 3 - Control variables

LnTotal Asset	Natural logarithm of total asset
Lev	Total debt out of equity
ROE	Net income/Equity
ListCountry	Whether the company is listed in Europe (value 1) or in other stock exchanges out of Europe (value 0). In more detail, not-European stock exchanges are Australia, Canada, Colombia, Hong-Kong, Iceland, Israel, Republic of Serbia, Russia, South Africa, Switzerland, Ukraine, UK, USA
Sector	Dummy variable ranging from 1 to 10 according to GICS classification - Industry Name. In more detail: - Energy: n. 1; - Materials: n. 2; - Industrials: n. 3; - Consumer discretionary: n. 4; - Consumer staples: n. 5 - Real estate: n. 6; - Health care: n. 7; - Utilities: n. 8 - IT: n. 9 - Communication: n. 10

5.5 Discussion of results

5.5.1 Descriptive statistics

Table 4 shows the descriptive statistics of the model.

Table 4 - Descriptive statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ITR_Score	3,438	.6621165	.2245812	0	.9998671
IC_Score	3,438	.4763151	.1572338	0	.8742085
LnTotAsset	3,438	22.42272	1.471433	17.65339	26.91373
Lev	3,438	3.098705	2.832772	1.008758	67.40549
ROE	3,438	.1965197	1.049387	-2.834351	50.94701
ListCountry	3,438	.611402	.4875025	0	1
Sector	3,438	4.680337	2.708712	1	10

ITR_Score and IC_Score are directly linked to the hypothesis of the study, thus, the authors will analyse the descriptive results in more detail.

The average of the level of ITR, measured by ITR_Score, is equal to 0.66211 suggesting that the variable has a mean value higher than the threshold 0.6. This can be considered as a great value of the level of ITR. Indeed, such results mean that companies have addressed governance mechanisms (the presence of CSR Committee) and strategic objectives (Integrated Strategy), they have engaged with stakeholders (e.g. stakeholder engagement), they have relied on CSR Standards (e.g. GRI Report Guidelines, UNPRI Signatory, Global Compact), they have addressed CSR reporting (CSR Sustainability Reporting, ESG Reporting Scope) and they have addressed assurance by third parties (CSR Sustainability External Audit). ITR_Score presents a deviation standard of 0,22458 meaning that the level of ITR exhibits a low variability of data and a low dispersion of value around the mean. When it comes to IC_Score, the average level of the IC disclosure is around 0.5. This means that the overall value is approximately relevant, highlighting that this kind of disclosure has been improving and deserves to be considered in the reporting practices.

5.5.2 Panel data analysis assumptions

The adjusted-R squared of the model is 0.2721 highlighting the reliability of the analysis (Table 5).

Table 5 – R squared of the model

Number of obs	=	3,438
F(6, 3431)	=	215.18
Prob > F	=	0.0000
R-squared	=	0.2734
Adj R-squared	=	0.2721
Root MSE	=	.1916

Consequently, the assumptions of the data panel analysis have to be addressed. The first one refers to the lack of perfect multicollinearity, meaning that a considerable correlation between the independent variables is lacking. This procedure has to be done for avoiding the creation of distortion in the regression parameters and in the error. The presence of multicollinearity has firstly been checked through Pearson Correlations. Table 6 shows the results.

Table 6 - Pearson correlations

	ITR_Sc~e	IC_Score	LnTotA~t	Lev	ROE	ListCo~y	Sector
ITR_Score	1.0000						
IC_Score	0.4293	1.0000					
LnTotAsset	0.3976	0.3234	1.0000				
Lev	0.0838	0.1064	0.1317	1.0000			
ROE	-0.0494	-0.0060	-0.1270	0.1249	1.0000		
ListCountry	0.2004	0.1951	0.1419	0.0702	-0.0815	1.0000	
Sector	-0.0650	0.0545	-0.0695	-0.0009	0.0722	0.0771	1.0000

Correlations among the independent variables are below 0.5, indicating that there is not multicollinearity among variables.

The presence of multicollinearity has been furtherly checked by using VIFs. The results indicate the absence of multicollinearity issues since all the values are lower than 2.

Table 7 - VIFs

Variable	VIF	1/VIF
LnTotAsset	1.17	0.855982
IC_Score	1.16	0.864349
ListCountry	1.06	0.941161
ROE	1.05	0.952365
Lev	1.05	0.955600
Sector	1.02	0.978258
Mean VIF	1.08	

Another assumption to be checked refers to heteroskedasticity. Breusch-Pagan test and Cook-Weisberg test, furtherly strengthened by adopting robust standard error, ensure the absence of heteroskedasticity as presented in Table 8, confirming that the ITR_Score's variability is equal across values of the independent variables.

Table 8 - Heteroskedasticity check

Linear regression

Number of obs	3,438
F(6, 3431)	274.13
Prob > F	0.0000
R-squared	0.2734
Root MSE	.1916

ITR_Score	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
IC_Score	.4632385	.0236724	19.57	0.000	.4168251	.5096519
LnTotAsset	.0415498	.0021843	19.02	0.000	.0372672	.0458325
Lev	.000483	.0010254	0.47	0.638	-.0015275	.0024934
ROE	-4.09e-06	.0015916	-0.00	0.998	-.0031246	.0031165
ListCountry	.0477379	.0071384	6.69	0.000	.033742	.0617338
Sector	-.0059463	.0012322	-4.83	0.000	-.0083621	-.0035305
_cons	-.4930432	.0462941	-10.65	0.000	-.5838099	-.4022764

5.5.3 Fixed effects model

The first step before performing the analysis is to ensure whether the most appropriate model is the fixed effects or the random effects. Hausman test confirmed that for this analysis, the fixed effects model is more accurate than the random effects model (prob>chi2 = 0.0000).

In this case, it has been performed the fixed effects model by considering the temporal effects.

Table 9 presents the fixed effects model which presents the relationship between the level of ITR and the disclosure of IC.

Table 9 - Fixed effects model

ITR	Coefficient	Robust std. err.	t	P>|t|	[95% conf.	interval]
IC	.510467	.036036	14.17	0.000	.4396127	.5813212
LnTotAsset	.0352115	.004668	7.54	0.000	.0260333	.0443898
Lev	.0002613	.0010682	0.24	0.807	-.001839	.0023617
ROE	-.0004024	.0015005	-0.27	0.789	-.0033528	.0025479
year						
14	-.0579264	.0070571	-8.21	0.000	-.0718022	-.0440506
15	-.0759061	.0096889	-7.83	0.000	-.0949566	-.0568556
16	-.2478666	.0114531	-21.64	0.000	-.2703857	-.2253474
17	-.1320385	.0121392	-10.88	0.000	-.1559067	-.1081702
18	-.0749914	.0099296	-7.55	0.000	-.094515	-.0554677
19	-.057395	.0115738	-4.96	0.000	-.0801516	-.0346385
20	-.0911188	.0132935	-6.85	0.000	-.1172566	-.0649809
21	-.0867978	.0168893	-5.14	0.000	-.1200056	-.05359
_cons	-.2797354	.1017169	-2.75	0.006	-.4797322	-.0797386

The objective of the model is to identify if IC disclosure has an implication on the level of ITR for confirming or rejecting the hypothesis. Table 9 shows that IC_Score affects the level of ITR, highlighting that the coefficient is statistically significant and positively correlated, indeed the Beta coefficient is equal to 0.52104 and the p-value is null. This means that an increase of 1% of IC_Score affects the ITR_Score by an increase of 0.51046. This result has to be framed in the context of the value creation. It is in line with prior studies highlighting that intangibles and IC are drivers of value creation. Indeed, according to Abhayawansa (2014), the value creation process has been waiting for a new paradigm of reporting with the objective of supporting financial accounting to foster the disclosure of unaccounted intangible assets. Considering that the value creation process lies at the base of the IR Framework, the underlying concept of integrated thinking, other than supporting the preparation of IR, develops a common understanding about what can be framed as IC in an integrated reporting context. Thus, IC exists if IR preparers have defined its contribution to value creation because IC is influenced by both financial goals and

sustainability matters. Hence, the results of the fixed effects model confirm the hypothesis concerning the positive relationship between the level of ITR and the disclosure of IC.

In the interpretation of the control variable's results, if there is an increase of one percent in LnTotalAsset, the level of ITR increases. This means that the larger the size of the company, the more the level of integration of financial and non-financial information is. It is reasonable to consider this result because more structured companies may get benefits from integrating financial and non-financial information towards its stakeholder's interests.

Moreover, profitability, leverage and sector have not any implication in terms of enhancing the level of non-financial and financial information, since they are not significant in a context of integrating this informativeness.

5.6 Conclusions

In a context where IR calls for providing more accurate and complete disclosure about what affects the value creation, preservation and erosion process with the mere objective of improving the integration of financial and non-financial information, IC finds out a suitable place that deserves to be explored. Indeed, according to the literature, intangibles and IC are drivers of value creation (Beattie and Smith, 2013; Marr *et al.,* 2004; Nielsen and Montemari, 2012). Moreover, in accordance with Abhayawansa (2014), the value creation process is searching for a new paradigm of reporting in support of financial accounting and reporting to disclose much more information about unaccounted intangible assets and IC. To meet these expectations, integrated reporting is visualised as a valid instrument for overcoming these shortcomings (De Villiers and Sharma, 2020; Dumay, 2016; Dumay *et al.,* 2016; Owen, 2013; Rowbottom and Locke, 2016;). Indeed, in this context, integrated thinking aims at developing how IC influences the integration of the value creation process,

and it may be viewed as a mechanism for supporting IR's drawing-up. In other words, integrated thinking identifies what can be considered IC in an integrated reporting context. According to several academic calls for further research on integrated thinking (e.g., De Villiers *et al.,* 2014; Dumay *et al.,* 2016, Busco *et al.,* 2019) and IC disclosure (e.g., Brüggen *et al.,* 2009; Terblanche and De Villiers, 2019; Singh and Mitchell Van der Zahn, 2008), the study investigates whether the disclosure about IC positively or negatively affects the level of ITR. The originality of the study is found in the quantitative methodology as well. Since IC exists if IR preparers have defined its contribution to value creation because IC is influenced by both financial goals and sustainability matters, the results of the fixed effects model confirm the hypothesis.

The research has theoretical and practical implications. Although previous academics have studied the potential future opportunities coming from IR (Dumay, 2016; de Villiers and Sharma, 2018), this current study focuses on how to practically transpose this opportunity. First of all, from the theoretical side, it is a way for enriching the research about the disclosure of unaccounted intangible assets, and, especially on IC in a context of integrated reporting. Indeed, it gives relevance to IC in the value creation process. Since the organisations' success mainly relies on the capital management (IR Framework, 2021) and, since IC is one of the capitals cited by IR Framework, the research strengthens the fundamentals of integrated reporting, by providing some evidence about the integration of financial and non-financial information in a quantitative manner. Furthermore, it acts as a *trait d'union* of the disciplines, since the academic debate presents several future unexplored avenues.

From the practical side, it may be framed as a driver for improving the disclosure of IC in the reports. Indeed, it adopts the most relevant and widely-adopted indicators in a scientific scenario. Furthermore, the study sheds light on how IC contributes to the value creation process. Moreover, the relationship between financial and non-financial information may be seen as a driver of

conducting enterprises and entrepreneurships towards the adoption of the integrated report. Finally, the research may be considered by standard setters, and in particular by IIRC, for introducing some guidelines about disclosing IC within the (integrated) report. These guidelines may be helpful for supporting integrated thinking in relation to the relationships between IC, corporate strategy, business model and performance.

The research is surely not without limitations. First of all, IC_Score has been investigated as the overall capital, without decoupling it within its sub-components (e.g. structural capital, relational capital and human capital). Moreover, the research relies on data collected from DataStream Thomson Reuters. Apart from being secondary data that does not directly come from the original sources, the research is influenced by some missing values that were not available on DataStream. Indeed, the authors employed data that do not present detailed information about their gathering and addressing with reference to organisations' companies strategy, management and reporting (e.g., how stakeholders have been engaged or how corporate sustainability practices have been addressed). In other words, the research does not analyse in depth the components of the ITR_Score. When coming to the future avenues, the study might be decoupled in the components of IC_Score, by analysing the mediator effects of them. Moreover, future research could further enlarge or substitute the sample under analysis, or it might be focused just on a sector that after conducting this research, has revealed the main effect.

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Appendix A – Components of IC_Score

Number of Employees	Number of Employees.	Human Capital
Employee Satisfaction	The percentage of employee satisfaction as reported by the company. - the overall percentage of employees who are satisfied - includes employees satisfaction index - if the base or index is available then employees satisfaction percentage = employees satisfaction unit/base value *100	Human Capital
Employees Health & Safety OHSAS 18001	Does the company have health and safety management systems in place like the OHSAS 18001 (Occupational Health & Safety Management System)? - consider if the company claims to have OHSAS 18001 or any internal management system for one site or more - include environment, health, and safety (EHS) management system - consider if companies complying with OHSA (Occupational Health and Safety Act)	Human Capital
Employees With Disabilities	Percentage of employees with disabilities or special needs. - percentage of disabled employees or special needs to the total employees of the company - percentage of disabled employees=number of disabled employees/total number of employees*100	Human Capital
Training and Development Policy	Does the company have a policy to support the skills training or career development of its employees?	Human Capital
Employee Fatalities	Number of employee fatalities resulting from operational accidents. - consider work-related injury resulting in the death of the employee, even if death did not occur immediately - include fatalities resulting from commuting accidents - if the company reports about fatalities without further details whether its employees or contractors, consider as an employee fatality	Human Capital
Employee Lost Working Days	Number of lost working days of the employees only. - lost working days refer to absences from work as the result of occupational injury or disease only which is commonly termed as severity rate - absenteeism is not considered as it includes days lost due to both sick leaves resulting from common diseases and days lost due to occupational diseases and injuries - when employees lost time injury rates are '0' then employees lost working days has to be '0'	Human Capital
Employee Resource Groups	Does the company have an employee resource group which is voluntarily formed by group of employees with common characteristics like ethnicity, sexual orientation or disability status?	Human Capital
Employee Engagement Voluntary Work	Does the company foster employee engagement in voluntary work? - encourage employees to involve in volunteer service during working hours - information on volunteerism associated with a company's project or an NGO project	Human Capital
Executive Compensation Policy	Does the company have a policy for performance-oriented compensation that attracts and retain the senior executives and board members?	Human Capital
Executive Individual Compensation	Does the company provide information about the total individual compensation of all executives and board members?	Human Capital

Executive Compensation Controversies	Is the company under the spotlight of the media because of a controversy linked to high executive or board compensation?	Human Capital
Executive Members Gender Diversity	Percentage of female executive members.	Human Capital
Executives Cultural Diversity	Percentage of senior executives that have a cultural background different from the location of the corporate headquarters.	Human Capital
Board Background and Skills	Does the company describe the professional experience or skills or the age of every board member?	Human Capital
Management Training	Does the company claim to provide regular staff and business management training for its managers? - consider training to existing managers (how to manage their team and process) - consider training to non-managers to develop leadership skill for future managerial positions	Human Capital
Training Costs Total	Total training costs from all the training performed by all employees. - consider total training costs from all the training performed by all employees - include all types of cost of training given to general employees (such as health & safety, environmental, emergency response, skills & career development training)	Human Capital
Management Departures	Has an important executive management team member or a key team member announced a voluntary departure (other than for retirement) or has been ousted?	Human Capital
Management Score	Management category score measures a company's commitment and effectiveness towards following best practice corporate governance principles.	Human Capital
Environment Management Training	Does the company train its employees on environmental issues? - employee environmental (resource reduction & emission reduction) related training provided by the company or external trainers - in focus include the code of conduct training encompasses environmental aspects	Human Capital
Policy Career Development	Does the company have a policy to improve the career development paths of its employees? - programs or processes that focus on the career progression of staffs - include if the company encourages and supports employee for career development - information to be on career development for the general workforce - consider training to non-managers or leaders to develop leadership skill for future managerial or leadership positions	Human Capital
Workforce Score	Workforce category score measures a company's effectiveness towards job satisfaction, healthy and safe workplace, maintaining diversity and equal opportunities, and development opportunities for its workforce.	Human Capital
Corporate Responsibility Awards Score	Has the company received an award for its social, ethical, community, or environmental activities or performance? - external award for reporting fiscal year for its social, ethical, community, or environmental activities/performance - includes an external award for CSR programs and initiatives relating to health and safety, human rights, training and development, diversity and opportunity, good citizenship/community/philanthropy, environmental, environmental product award, etc.	Human Capital

Board Gender Diversity, Percent	Percentage of females on the board.	Human Capital
DIR Diversity Score	Diversity category measures a company's commitment and effectiveness towards maintaining gender diverse workforce and board member cultural diversity.	Human Capital
DIR Score	Refinitiv Diversity Inclusion Rating is an overall score of a company based on reported workforce information that defines diverse and inclusive workplaces.	Human Capital
DIR People Development Score	People Development category measures a company's commitment and effectiveness towards providing training and development (education) for its workforce.	Human Capital
DIR Inclusion Score	Inclusion category measures a company's commitment and effectiveness towards effective life-work balance, a family friendly environment and disability inclusion.	Human Capital
DIR Controversies Score	Controversies category accounts for the negative impact workforce controversies have on the company.	Human Capital
Targets Diversity and Opportunity	Has the company set targets or objectives to be achieved on diversity and equal opportunity? - any objective/target set to increase or promote diversity in the workplace with a time frame - includes information on the promotion of women, minorities, disabled employees, or employment from any age, ethnicity, race, nationality, and religion	Human Capital
Policy Diversity and Opportunity	Does the company have a policy to drive diversity and equal opportunity? - program or practice to promote diversity and equal opportunities within the workforce - includes information on the promotion of women, minorities, disabled employees, or employment from any age, ethnicity, race, nationality, and religion - consider information from the code of conduct mentioning diversity policy together with the reporting of violations	Human Capital
Licences, Franchises, Copyrights, Contract Based	Licences, Franchises, Copyrights, Property Rights, Prototypes, Contract Based, Models & Designs - Net [SNFN] represents net value of licences, franchises, copyrights, property rights, land use rights if reported within intangible break out. Applicable to Industrial, Bank, Property and Financials companies. Licences, Franchises, Copyrights, Property Rights, Prototypes, Contract Based, Models & Designs - Net [SNFN] Includes: - Licences, Franchises, Copyrights, Property Rights, Prototypes, Contract Based, Models & Designs - Net [ALFN]	Structural Capital
Computer Software - Intangible Assets - Net	Computer Software & Equipment - Accumulated Depreciation & Impairment [SDSE] - Accumulated depreciation and impairment that relates to the reduction in the useful economic life of computer equipment and software. Applicable to Industrial companies. Computer Software & Equipment - Accumulated Depreciation & Impairment [SDSE] Includes: - Computer Software & Equipment - Tangible Assets - Accumulated Depreciation & Impairment [ADSE]	Structural Capital
Goodwill	The statistical average of all broker estimates determined to be on the majority accounting basis. Goodwill is the value of intangible assets such as a strong brand name, good customer relations, good employee relations and any patents or proprietary technology. In the event of an acquisition, the amount paid for the company over book value usually accounts for the target firm's intangible assets.	Structural Capital

Capital Expenditures	A security's Capital Expenditures SmartEstimate divided by its price. Capital Expenditure are the funds used by a company to acquire or upgrade physical assets such as property, industrial buildings, or equipment or the amount used during a particular period to acquire or improve long term assets such as property, plant, or equipment.	Structural Capital
Brands, Patents, Trademarks, Marketing & Artistic - Net	Brands, Patents, Trademarks, Marketing & Artistic Intangibles - Net [SBNN] represents the net value of brand names, patents, trademarks, marketing related intangibles, artistic intangibles. Applicable to Industrial and Banks. Brands, Patents, Trademarks, Marketing & Artistic Intangibles - Net [SBNN] includes: • Brands, Patents, Trademarks, Marketing & Artistic Intangibles - Net [ABNN]	Structural Capital
Research & Development Expense	This ratio is calculated as the Research and Development Expenses divided by Total Revenue for the same period and is expressed as percentage.	Structural Capital
Customer Satisfaction	The percentage of customer satisfaction as reported by the company. - the overall percentage of customers who are satisfied - includes customer engagement rate and customer satisfaction index - if the base or index is available then customer satisfaction percentage = customer satisfaction unit/base value * 100	Relational Capital
Number of Trades	Number of trades today. For indices the number of times the index has been calculated.	Relational Capital
Social Pillar Score	The social pillar measures a company's capacity to generate trust and loyalty with its workforce, customers and society, through its use of best management practices. It is a reflection of the company's reputation and the health of its licence to operate, which are key factors in determining its ability to generate long term shareholder value.	Relational Capital
Selling General & Administrative Expenses	Selling, General & Administrative Expenses - Total [SSGA] represents all costs of operating a business other than the costs of readying a product for sale. Applicable to all Industries.	Relational Capital
Crisis Management Systems	Does the company report on crisis management systems or reputation disaster recovery plans to reduce or minimise the effects of reputation disasters? - any contingency plan in place to resume business with minimum downtime and to ensure that businesses can remain operational through any event or disaster - includes business continuity plan, disaster recovery system, emergency response plans, and crisis management system	Relational Capital
Quality Mgt Systems	Does the company claim to apply quality management systems, such as ISO 9000, Six Sigma, Lean Manufacturing, Lean Sigma, TQM or any other similar quality principles?	Relational Capital
Six Sigma and Quality Mgt Systems	Does the company claim to apply the Six Sigma, Lean Manufacturing, Lean Sigma, TQM or any other similar quality principles? - information to be on quality management systems in place such as six sigma, total quality management (TQM) and lean manufacturing - only an internal quality system or framework is considered - includes information on Good Manufacturing Practice (GMP) - information on quality certifications (like ISO 9000 and EFQMs) is not considered	Relational Capital
Innovation	Does the company support the UN Sustainable Development Goal 9 (SDG 9) Industry, Innovation and Infrastructure? -company is supporting Goal 9 of SDG to Build resilient infrastructure, promote sustainable industrialization and foster innovation -data considered only from SDG Goals	Relational Capital

Stakeholder Engagement	Does the company explain how it engages with its stakeholders? - information on how the company is engaging with its stakeholders, how it is involving the stakeholders in its decision-making process; what procedures are in place for engagement - focus on having established two-way communication between the company and its various stakeholders	Relational Capital
Supplier ESG training	Does the company provide training in environmental, social or governance factors for its suppliers? - consider training, programs or any other collaboration with suppliers to improve their ESG (environmental, social and governance) performance - audits leading to collaboration with suppliers on ESG issues are considered - consider information from industry code such as the Electronic Industry Citizenship Coalition (EICC) code of conduct and Pharmaceutical Industry Principles (PSCI). However, the Company has to describe its own actions/programs and Initiatives related to the specific principles stipulated in the codes	Relational Capital
Supply Chain Health & Safety Training	Does the company conduct surveys of the environmental performance of its suppliers? - any evidence that the company monitors its suppliers on environmental issues through surveys, audits, supplier site visits, and questionnaire	Relational Capital
Supply Chain Health & Safety Improvements	Does the company show through the use of surveys or measurements that it is improving the level of employee health & safety in its supply chain? - consider if the company claims to monitor or assess its suppliers through survey, audit, and questionnaire on health and safety performance while showing progress - consider if both absolute and normalised figures are provided shows progress - information is not qualified if the company claims or shows to study or assess the company's performance during the year under review but does not provide historical data and therefore cannot show to have improved - information is considered from industry code such as the electronic industry citizenship coalition (EICC) code of conduct and pharmaceutical industry principles (PSCI). However, the company has to describe its own actions/programs and initiatives related to the specific principles stipulated in the codes	Relational Capital
Environmental Supply Chain Monitoring	Does the company conduct surveys of the environmental performance of its suppliers? - any evidence that the company monitors its suppliers on environmental issues through surveys, audits, supplier site visits, and questionnaire	Relational Capital

6. Conclusions

Nowadays it is largely acknowledged that sustainability matters and ESG issues are at the core of the organization's processes and mentality. This premise justifies the wide importance given by academia and practice to these topics. The overall aim is to manage a transition towards an economy relying much more on sustainability matters. The effort comes from a higher sense of responsibility that has occurred over the years by the institutions that are obliged to enhance the linked normative (e.g. the improvement of from NFRD to CSRD). In this scenario, the consultation process that led to the amendments of NFRD has been highlighted by the study "*the multi-faceted dimensions for the disclosure of Non-Financial Information in revising Directive 2014/95/EU*" consisting of a literature review about the effect of the quality of NFI by considering the recent developments of NFRD. In more detail, it provides an analysis about the state-of-the-art of NFI disclosure from two sides: the academic perspective and the recent contributions from the annexed documents, to the public consultation of the NFRD. According to Michelon *et al.,* 2021, NFI quality cannot be interpreted with a unique dimension but needs to be analyzed with a multidimensional perspective. As a matter of fact, the study provides eight dimensions of NFI quality to assess the quality of the disclosure. The most important dimensions that find a unanimous consensus from both sides are the need to enhance comparability, to provide specific contents on sustainability issues, to clarify the relevance of NFI, and to embed NFI into the management report in an integrated manner. Moreover, there is a substantial alignment with reference to timeliness in favor of a risk management procedure and a forward looking approach. Thus, quality dimensions require a multidimensional perspective, for providing reliable and accurate sustainability information. However, transparency and credibility of the sustainability information disclosed remains a challenge. In this vein, sustainability materiality analysis helps organizations in assessing the relative importance of various sustainability issues. In more detail,

it supports organizations regarding which practices should be conducted, which indicators should be chosen as measures of performance and which sustainability information should be disclosed, among the others. Moreover, according to the literature (Mio, 2013; Sepúlveda-Alzate *et al.,* 2021), since the presence of many international standard frameworks, sustainability materiality analysis in practice seems to be more difficult in the reporting of sustainability issues than in the reporting of financial matters. Thus, the study "*Sustainability materiality research: a systematic literature review of methods, theories and academic themes*" aims at defining the extent of academic knowledge about this topic. In more detail, it has exponentially increased since the 2010s and thus, it has been subcategorized by 8 academic themes: definitions of materiality, pressures over materiality analysis, materiality determinants and indicators, issues that are material for companies and stakeholders, evaluation of materiality in sustainability information, models of materiality assessment, impact of material information and value relevance of materiality, materiality in sustainability assurance. The study contributes to the academic debate and in more detail it strengthens the current state of knowledge in terms of research methods and theoretical underpinning. From the practical perspective, the study can be useful for companies, regulators and standard setters for addressing materiality in the context of sustainability reporting, by ensuring that this analysis is properly implemented with a stakeholder logic encompassing all of their interests.

Therefore, ESG issues have to be framed as a worldwide priority as well, since they must be considered in sight of the Agenda 2030 for Sustainable Development and the goals that must be achieved. Many studies on SDGs confirm that SDG reporting is calling for an integrated approach (Pizzi *et al.,* 2021; Blanc, 2015) for disclosing relevant information. As a matter of fact, the under-review academic article "*Analysing SDG disclosure and its impact on integrated thinking and reporting*" addresses the relationship between SDGs disclosure, the integration of financial and non-financial information and its

determinants. In more detail, SDGs disclosure enhances the level of ITR, namely the level of integration of managing and reporting sustainability issues. The research addresses societal challenges in light of the SDGs disclosure and the integrated thinking approach. In addition, stakeholders may benefit by setting the guidelines towards the analysis of the integrated reports by highlighting their nuances linked to the disclosure of SDGs. Likewise, the study under review "*Integrating Intellectual Capital disclosure in an Integrated Thinking perspective*" further deepens the level of ITR by identifying that disclosure about intellectual intangible assets, and in more detail IC, is driver of value creation, the process that lies at the core of integrated reporting. Indeed, it is arguable that value creation is the main process of the IR Framework and it considers that disclosure about value creation, erosion and preservation will be the next step in enhancing the evolution of the reporting practices, since IR relies on several capitals.

In summary, the collection of papers aims at further enriching the literature about ESG issues, starting from the amendment of NFRD and the consultation process towards CSRD for subsequently going to highlighting the importance of the issues that are material and need to be disclosed, as SDGs or IC. As it has been mentioned, integrating financial perspective in the non-financial one may be beneficial for organizations since it is a driver for contributing to the value creation, erosion and preservation other than providing more accurate information for stakeholders. Nowadays, it is argued that ESG will be crucial for determining the fate of each organization. The aim of the regulatory plans issued by the European Union is not to mandate the consideration of ESG issues, but to create a state of mind relying on the transition towards sustainability information that will generate positive implications for themselves. Thus, the care for ESG issues must become rooted in the company's mentality because ESG issues have many implications, not just on the mere business but on the entities lying around the adopting company. For instance, banks funding organizations will attribute a different financial rating according to the ESG

issues sensitivity. The underlying logic is not to negatively affect the organization careless ESG concerns but making thinking towards a transition towards a business model more suitable. Addressing it means strengthening the attitude and adaptability to ESG issues of SMEs as well. Moreover, this collection of papers may be useful for practitioners approaching this field because it details a sort of journey about ESG issues ranging from the amendments of NFRD towards the highlighting of relevant and material issues as the disclosure about SDGs and IC. Such disclosures aim at reducing the informativeness gap that may affect the stakeholder's decisions.

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