

The State of the Art on Corporate Risk Disclosure: A Systematic Literature Review

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Abstract. This article reviews the academic literature on corporate risk disclosure, focusing on non-financial risks in the European regulatory context, particularly considering the Non-Financial Reporting Directive (NFRD) and Corporate Sustainability Reporting Directive (CSRD). Through a systematic review of 144 scientific papers, this study pinpoints key drivers and trends in corporate risk disclosure, such as regulatory compliance, stakeholder pressure, and emerging technologies. Our literature review suggests that while the NFRD has engendered an improvement in the quality and quantity of non-financial risk reporting, firms still tend to focus on past and present risks, with limited forward-looking or negative risk information. Furthermore, this article underscores gaps in current literature, such as the lack of focus on developing countries, financial-sector companies, and the infrequent use of qualitative research methodologies. The paper concludes by recommending a multi-theoretical framework and further investigation into the usefulness of non-financial risk disclosures for investors and other stakeholders.

Keywords: risk disclosure, risk reporting, non-financial risks, Non-Financial Reporting Directive, Corporate Sustainability Reporting Directive

1 Introduction

Since 2013, the European Union (EU) has issued three interconnected Directives aimed at regulating sustainability (or non-financial) information disclosure by European companies: the “2013 Accounting Directive” (Directive 2013/34/EU), the Non-Financial Reporting Directive (NFRD) (Directive 2014/95/EU), and the Corporate Sustainability Reporting Directive (CSRD) (Directive 2022/2464/EU), which came into force in January 2023.

Following the NFRD’s implementation in 2016, large public-interest entities were required to prepare non-financial statements addressing environmental, social, employee-related matters, human rights, and anti-corruption (EU, 2014). They were required to disclose information on policies, outcomes, and risks related to these areas. In 2022, the EU strengthened these requirements, culminating in the CSRD, which extended the scope of entities required to comply and introduced the European Sustainability Reporting Standards (ESRS) to guide sustainability-related disclosures. The CSRD explicitly acknowledged the increasing importance of sustainability risks for European companies, reinforcing disclosure requirements for such risks.

In this context, sustainability and non-financial risks disclosure has become a prominent topic that has recently attracted increasing attention from firms, capital market participants and academic researchers (Tsang *et al.*, 2023). Further, transparent measurement and disclosure of sustainability performance,

including risks, are now considered to be a fundamental part of effective business management, also in the attempt to meet stakeholders' information needs (De Silva Lokuwaduge & De Silva, 2020). The growing complexity and significance of corporate risk disclosure, particularly regarding non-financial risks, suggest that a systematic review of the academic literature is needed for different reasons: to consolidate insights from scholarly studies, identifying trends, gaps, and emerging themes to guide future research and practice; to systematise the fragmented body of knowledge surrounding the impact of the directives; to help identify whether current disclosure practices adequately address risks.

Thus, this paper aims to summarise and systematise the main insights from academic literature on corporate risk disclosure, focusing on non-financial risks and the effects of the NFRD on risk reporting, based on the following research questions: (i) What are the main features and drivers of corporate risk disclosure, and how do emerging technologies impact related practices? (ii) Has the NFRD improved risk reporting practices, particularly regarding non-financial risks?

To address these questions and pursue the study's aim, a systematic literature review was conducted to ensure transparency, completeness, and reproducibility (Tranfield *et al.*, 2003; Littell *et al.*, 2008; Sivarajah *et al.*, 2017). Articles on corporate risk disclosure were retrieved through Scopus and Web of Science (WoS) and filtered to include only the most relevant, high-impact studies. A total of 144 articles were selected and analysed across seven dimensions, detailed in section 3 of this paper.

The literature review highlights that firms' risk disclosure practices are primarily driven by regulatory compliance, with additional influence from stakeholder pressures, particularly in sustainability reporting. However, inconsistencies in disclosure practices among companies remain a challenge. Based on the review, while regulations like the NFRD have enhanced the quality and quantity of non-financial risk disclosures, most disclosures are retrospective, and companies often avoid revealing negative information due to reputational concerns. Further, key drivers of risk reporting can be categorized into corporate governance factors, firm-specific characteristics, and broader contextual and cultural influences. Finally, the literature review emphasizes emerging trends, namely the use of advanced technologies, such as Industry 5.0 innovations and satellite-based climate data, to enhance non-financial risk reporting.

The structure of this paper is as follows: Section 2 reviews the requirements introduced by the three European Directives and the evolution of disclosure requirements. Section 3 outlines the methodology used to review academic literature and select the sample of articles. Section 4 presents key insights from the review, providing a systematic overview of corporate risk disclosure in academic research. Finally, section 5 summarizes the conclusions and suggests future research directions.

2 The European Regulatory Framework for Non-Financial Risk Reporting

Since 2013, the European Union (EU) has addressed non-financial risk disclosure through three closely related documents: the "2013 Accounting Directive" (Directive 2013/34/EU), the Non-Financial Reporting Directive (NFRD) (Directive 2014/95/EU), and the Corporate Sustainability Reporting Directive (CSRD) (Directive 2022/2464/EU).

In early 2013, the EU recognized the importance of corporate non-financial disclosure for identifying sustainability risks (EU, 2013). The 2013 Accounting Directive was the EU's first effort to regulate non-financial (risk) disclosure, applying to public and private limited liability companies and partnerships with limited liability. Regarding risk disclosure, Article 19 of this Directive states that "the management report shall include a fair review of the development and performance of the undertaking's business, together with a description of the principal risks and uncertainties it faces" (EU, 2013). The analysis must include both financial and, where relevant, non-financial key performance indicators, including environmental and employee-related information. This directive focuses on environmental and social risks, driven by financial materiality, addressing risks businesses face but not those they create for society or the environment.

To strengthen non-financial reporting and improve consistency and comparability across companies, the EU introduced the NFRD in 2014, which took effect in 2016. The NFRD mandates that "large

undertakings prepare a non-financial statement containing information on at least environmental matters, social and employee-related matters, human rights, and anti-corruption and bribery” (EU, 2014). These rules apply to large public-interest entities with over 500 employees. The NFRD emphasises reporting on both companies’ impacts on society and the environment and the impacts they experience, thus introducing the “double materiality” concept, although not explicitly stated. The Directive suggests firms address topics like greenhouse gas emissions, water use, working conditions, and anti-corruption measures. In terms of risk disclosure, companies are required to report on “the principal risks related to those matters linked to the undertaking’s operations, including its business relationships, products, or services likely to cause adverse impacts” and how they manage these risks (EU, 2014). As such, risk management becomes a regulatory priority.

The CSRD, published in 2022 and effective from January 2023, represents the EU’s most recent effort to regulate non-financial risk disclosure. The CSRD aims to modernise and strengthen the rules regarding the social and environmental information companies must report, broadening the scope to include around 49,000 firms, compared to the NFRD’s 11,600. The directive acknowledges the importance of “reliable, comparable, and relevant information on sustainability risks, opportunities, and impacts” (EU, 2022) and the growing recognition of the financial implications of sustainability-related risks by investors. Sustainability reporting, in turn, enhances companies’ ability to identify risks they create for society and those they face from environmental and social factors (EU, 2022). The CSRD explicitly adopts the double materiality approach, requiring firms to “report both on the impacts of their activities on people and the environment, and on how sustainability matters affect the undertaking” (EU, 2022). In terms of risk disclosure, Article 19a of the CSRD mandates that firms include in their management report “a description of the principal risks related to sustainability matters, including the company’s dependencies on those matters and how it manages those risks,” as well as information on “the resilience of its business model and strategy in relation to sustainability risks” (EU, 2022).

The CSRD also groups sustainability reporting topics into three categories: environmental factors (e.g., climate change, water use, and the circular economy), social and human rights factors (e.g., working conditions and human rights), and governance (e.g., internal control systems and corporate culture). The specific information companies must disclose regarding these factors is outlined in the European Sustainability Reporting Standards (ESRS), developed by the European Financial Reporting Advisory Group (EFRAG). One key standard, ESRS 2 (*General Disclosures*), includes a section on the management of impacts, risks, and opportunities (IROs). This section specifies two disclosure requirements (DRs): IRO-1, which requires companies to “disclose their processes for identifying and assessing impacts, risks, and opportunities” (EFRAG, 2022), allowing users to understand how firms identify material issues; and IRO-2, which mandates that companies “report on the DRs included in their sustainability statements” and disclose any topics omitted due to lack of materiality (EFRAG, 2022).

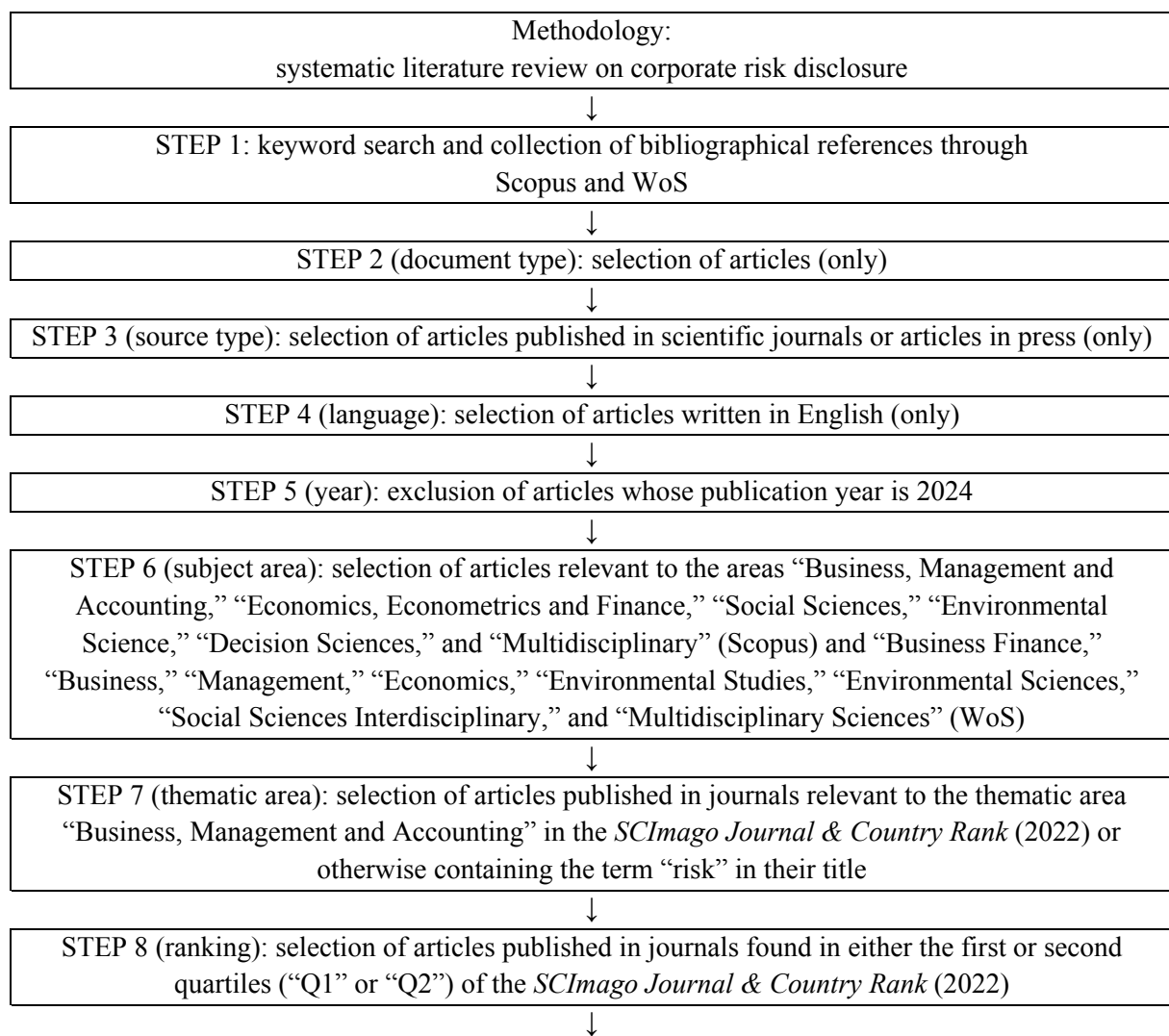
3 Research Methodology

To select, summarise, and systematise the main insights from previous research on corporate risk disclosure, a systematic literature review has been conducted. Such a methodology aims to generate results characterised by transparency, completeness, and reproducibility of analysis (Tranfield *et al.*, 2003; Littell *et al.*, 2008; Sivarajah *et al.*, 2017). An in-depth analysis was performed to map the evolution of the scientific literature on corporate risk reporting and to pinpoint emerging trends using Scopus and WoS, which are considered leading tools for academic literature reviews (Pranckutė, 2021). Relevant bibliographical references were retrieved using a keyword search through the development of a research string. Keywords were selected from past literary works focusing on topics closely related to the core theme of this study. Examples of chosen terms include “nonfinancial risks,” “ESG risks,” “risk disclosure,” and “risk reporting.” Following the collection of all relevant keywords, the research string below was formed and implemented in the selected databases:

nonfinancial OR non-financial OR esg AND information OR report OR disclos* AND risk**

The set of literature references collected by applying this string was subsequently refined by exclusively selecting articles published in scientific journals, which are either in their final stage of publication or currently in press. Results were further limited by only considering articles written in English and by excluding those whose publication year is 2024, as the latter was not deemed definitive in Scopus and WoS when the query was performed (November 2023). Subsequently, the set of remaining references was once again refined by only selecting articles pertinent to the Scopus' and WoS' subject areas reported in Table 1. To retain articles published in journals of high scientific impact, the 2022 edition of the *SCImago Journal & Country Rank* (SJR) was downloaded. Only articles published in journals belonging to the thematic area "Business, Management and Accounting" in SJR and ranking in the first or second quartiles were selected for further inspection. In the final step of the selection procedure, the remaining articles were once again skimmed based on their relevance to the core theme of the present study. References were deemed relevant if their research focus (inferred by examining title, abstract, and author keywords) addresses corporate risk disclosure. More specifically, three topics were investigated: (i) the link between frameworks, regulations, and risk reporting practices, with a specific focus on non-financial risks; (ii) the drivers of corporate risk disclosure; and (iii) current challenges and emerging frontiers in corporate risk disclosure. Table 1 summarises the review methodology.

Table 1: Methodology implemented for the systematic literature review on corporate risk disclosure



STEP 9 (title, abstract, keywords): exclusion of articles deemed irrelevant based on their title, abstract, and keywords



Final sample of articles to analyse

Based on the above methodology, 144 articles published across 72 different journals were retained, constituting the final sample of references analysed. Table 2 provides an overview of the number of articles published each year considered within the sample, while Table 3 highlights the most widely represented journals.

Relevant publications were examined according to the following dimensions: (i) *research focus*, i.e., the primary issue(s) investigated in the article; (ii) *theory/paradigm*, which corresponds to the theoretical approach used to conduct the analysis and explain the results (e.g., institutional theory, stakeholder theory, and signalling theory), if any; (iii) *geographical focus* of the study; (iv) *author affiliation*; (v) *method*, which relates to the research methodology used in the study (i.e., qualitative, quantitative, literature review, mixed methods, or discussion/essay); (vi) *key insights*, consisting in the main conclusions drawn from the analyses conducted within the papers; and (vii) *further research*, to collect suggestions for future research endeavours and shape the subsequent phases of this research project around the questions raised by the scientific community concerning corporate risk disclosure.

Table 2: Distribution of the relevant articles across publication years

Publication year	No. of selected articles
2023	43
2022	35
2021	17
2020	15
2019	6
2018	7
2017	4
2016	3
2015	3
2014	4
2013	3
2012	1
2011	1
2009	1
2004	1

Table 3: Distribution of the relevant articles across the most widely represented scientific journals

Journal title	No. of selected articles
<i>Corporate Social Responsibility and Environmental Management</i>	10
<i>Journal of Financial Reporting and Accounting</i>	9
<i>Business Strategy and the Environment</i>	9
<i>Meditari Accountancy Research</i>	8

<i>Risks</i>	5
<i>Australasian Accounting, Business and Finance Journal</i>	4
<i>Journal of Cleaner Production</i>	4
<i>Journal of Applied Accounting Research</i>	4
<i>Journal of Business Ethics</i>	4
<i>Social Responsibility Journal</i>	4
<i>Accounting in Europe</i>	3
<i>Sustainability Accounting, Management and Policy Journal</i>	3
<i>International Journal of Accounting and Information Management</i>	3

Table 4: Representation of geographical regions within the sample

Geographical region	% of selected articles
Europe	28.5%
Not limited	23.6%
Asia	21.5%
North America	16.7%
Africa	5.6%
Australia Pacific	3.5%
Latin America	0.7%

Table 5: Representation of research methods within the sample

Research method	% of selected articles
Quantitative	69.4%
Qualitative	12.5%
Discussion/essay	9.0%
Mixed methods	6.3%
Literature review	2.8%

Table 6: Representation of industry sectors within the sample (NACE classification system)

Industry sector	% of selected articles
Not limited	70.8%
N/A	12.5%
K – Financial and Insurance Activities	3.5%
C – Manufacturing	2.8%
D – Electricity, Gas, Steam and Air Conditioning Supply	2.8%
B – Mining and Quarrying	1.4%
I – Accommodation and Food Service Activities	1.4%
F – Construction	0.7%

H – Transportation and Storage	0.7%
J – Information and Communication	0.7%
M – Professional, Scientific and Technical Activities	0.7%
O – Public Administration and Defence; Compulsory Social Security	0.7%
P – Education	0.7%
Q – Human Health and Social Work Activities	0.7%

4 Literature Review and Discussion

This section reports the key aspects identified by reviewing the literature and discusses them by topic. Specifically, the discussion revolves around three main topics mentioned in section 3: non-financial risk disclosure and the link between frameworks, regulations, and reporting practices; the drivers of corporate risk disclosure; and current challenges and emerging frontiers in non-financial risk disclosure.

4.1 Non-Financial risk disclosure: The link between frameworks, regulations, and reporting practices

Among the frameworks reviewed in prior literature on non-financial risk disclosure, two widely adopted ones are Integrated Reporting (IR) and the framework developed by the Task Force on Climate-related Financial Disclosures (TCFD). Concerning the former, the consensus is that IR currently overemphasises the financial implications of sustainability issues for companies at the expense of a more substantial commitment to the disclosure of a firm's impact on the environment and society, hence complicating the integration of the Global Reporting Initiative Standards and the United Nations' Sustainable Development Goals within such framework (Setia *et al.*, 2022; Tsagas & Villiers, 2020; Camilleri, 2018). Notwithstanding, a moderate rise in both the volume and quality of IR-related disclosures has been reported (Al Amosh & Mansor, 2021; Dilling & Harris, 2018; Kılıç & Kuzey, 2018). The TCFD framework, on the other hand, has engendered an increase in the volume of climate risk information disclosed by companies, although a lack of consistency has been observed between the TCFD recommendations and corporate disclosures and practices (Di Marco *et al.*, 2023; Ngo *et al.*, 2023; Demaria & Rigot, 2021). Compliance with reporting frameworks has been found to be more prominent in the public sector, with European municipalities engaging in higher levels of non-financial disclosure, possibly thanks to the stricter monitoring function performed by the EU (Nistor *et al.*, 2019). Additionally, a lack of comparability among risk disclosures issued by different companies has been lamented due to the absence of a unique and shared reporting framework (Barth, 2022; De Silva Lokuwaduge & De Silva, 2020; Tsagas & Villiers, 2020). Regardless of the chosen framework(s), companies' non-financial risk reporting practices still seem to be underlain by an attempt to merely achieve compliance with applicable regulations (Abhayawansa & Adams, 2022; De Silva Lokuwaduge & De Silva, 2020). However, stakeholder pressures also constitute a driving force underpinning non-financial reporting according to past literature; indeed, stakeholders' ever-evolving demands for higher levels of ESG disclosure are pushing companies to publish more and more information voluntarily, going beyond merely meeting regulatory requirements (De Silva Lokuwaduge *et al.*, 2022). Stakeholder engagement has therefore been pinpointed as a relevant practice for reporting entities (Fiandrino *et al.*, 2022).

Recent regulations on ESG reporting have allegedly had a positive impact on non-financial disclosure; however, regulators have been encouraged to caution against excessive regulatory complexity, which may offset the favourable effects of such regulatory arrangements (Chou *et al.*, 2023; Villiers, 2022; Gray *et al.*, 2019). Specifically concerning the NFRD, previous works have highlighted that it has generally prompted an increase in the level and quality of this form of reporting, although improvements

seem to be concentrated in specific disclosure areas (e.g., “Policies and Due Diligence” and “Principal Risk and Non-Financial Key Performance Indicators”; environmental, health, and safety risks) (Traxler *et al.*, 2023; Arif *et al.*, 2022; Leopizzi *et al.*, 2020; Tarquinio & Posadas, 2020). The NFRD has also kick-started a “disclosure rationalisation” process whereby companies provide higher volumes of quantitative information on sustainability matters (Fiandrino *et al.*, 2022). Efforts to disclose more information of a non-financial nature by firms appear to be rooted in legitimacy and compliance concerns, as companies wish to avoid incurring legal sanctions associated with non-compliance (Radwan *et al.*, 2023; Traxler *et al.*, 2023; Arif *et al.*, 2022). Nonetheless, non-financial risk information mostly addresses past or present events and is characterised by a positive or neutral disclosure tone (Leopizzi *et al.*, 2020; Saggat & Singh, 2017). References to the future implications and negative consequences of these risks are therefore less prominent in corporate reports; this behaviour might arise from managerial attempts to hedge against reputational backlash fuelled by the disclosure of negative risk information (Leopizzi *et al.*, 2020; Saggat & Singh, 2017).

4.2 The drivers of corporate risk disclosure

Past literature has underscored several factors which seemingly influence risk disclosure practices. Among corporate governance variables, board size, board independence, audit committee independence, board expertise, and family ownership were all found to affect the extent of risk reporting positively (Elmagrhi & Ntim, 2023; Elsayed & Hassanein, 2023; Gull *et al.*, 2023; Mbithi *et al.*, 2023; Radwan *et al.*, 2023; Jaggi *et al.*, 2021; Alshirah *et al.*, 2020; Khandelwal *et al.*, 2020; Salem *et al.*, 2019; Saggat & Singh, 2017). A higher number of (experienced) directors reportedly leads to stricter monitoring of managers’ behaviour, thus improving the completeness of risk disclosures, and independent directors help to mitigate agency problems by requiring executives to provide a more balanced view of risks through corporate reports (Elsayed & Hassanein, 2023; Radwan *et al.*, 2023; Alshirah *et al.*, 2020; Khandelwal *et al.*, 2020). Corporate governance feature that seemingly associates positively with risk disclosure is board gender diversity (Elmagrhi & Ntim, 2023; Gull *et al.*, 2023; Mbithi *et al.*, 2023; Nasih *et al.*, 2022; Saggat *et al.*, 2022; Jaggi *et al.*, 2021; Khandelwal *et al.*, 2020; Salem *et al.*, 2019; Saggat & Singh, 2017). Female directors’ unique leadership skills and professional expertise intensify the monitoring activity of the board, thus enticing managers to engage in more transparent (risk) reporting (Saggat *et al.*, 2022). Such an outcome also stems from women’s typically longer-term orientation to value creation, which leads them to pay closer attention to sustainability matters and risks (Jaggi *et al.*, 2021). On the other hand, CEO duality has been reported to hamper risk reporting due to CEOs’ interest in reputation improvement and the enhanced decision-making power associated with their dual role within the firm, which may lead to decreased volumes of risk disclosure (Gull *et al.*, 2023; Khandelwal *et al.*, 2023; Radwan *et al.*, 2023; Jaggi *et al.*, 2021; Alshirah *et al.*, 2020).

Firm-level factors constitute a second set of variables whose relationship with risk disclosure has been extensively investigated in literature. Substantial empirical evidence shows that firm size is positively correlated with risk disclosure, thus suggesting that access to a greater amount of resources and assets leads to improved disclosure of (risk) information (Elsayed & Hassanein, 2023; Mbithi *et al.*, 2023; Marzouk, 2016; Elshandidy *et al.*, 2015; Amran *et al.*, 2009). Larger firms tend to be eager to convey their superior ability to identify risks in their corporate disclosures and reduce agency costs through diminished information asymmetries (Saggat & Singh, 2017; Elzahar & Hussainey, 2012). Other factors showing a positive association with risk reporting include liquidity, firm value, and external assurance (Albuquerque *et al.*, 2023; Grishunin *et al.*, 2022; Albitar *et al.*, 2021; Paolone *et al.*, 2021; Gonidakis *et al.*, 2020; Salem *et al.*, 2019; Abdullah *et al.*, 2015). Conversely, and interestingly, an inverse relationship between profitability and risk disclosure has been documented; poorly performing firms may try to divert stakeholders’ attention from their financial results by increasing their (risk) disclosure volume (Saggat *et al.*, 2022; Weber & Müßig, 2022; Albitar *et al.*, 2021; Salem *et al.*, 2019; Saggat & Singh, 2017). Companies may also use risk information instrumentally to ascribe their poor performance to factors beyond management’s control (Saggat & Singh, 2017).

Finally, prior research has evaluated the impact of cultural and situational factors on risk disclosure practices. First, according to such literature, institutional features (i.e., cultural and normative factors) are more reliable predictors of risk reporting quality and more effective at engendering higher levels of normativity where regulative influences are low. Specifically, uncertainty avoidance has been found to correlate positively with the latter (Panfilo & Krasodomska, 2022; Elshandidy *et al.*, 2015). Second, and interestingly, firms in code law countries (characterised by high uncertainty avoidance and a longer-term orientation) reportedly disclose more mandatory risk information than those in common law countries to foster investor confidence by lowering information asymmetries (Elshandidy *et al.*, 2015). Third, the role of political connections within the company has been examined, and past literature indicates that politically connected firms divulge less risk information as fewer resources are allocated for monitoring and managing risk disclosure (Alshirah *et al.*, 2021). Financial and political crises and their relationship with risk reporting emerged in previous works. Following such crises, a general increase has been observed in the extent of risk disclosure across countries and industries, with non-financial risks also receiving more coverage (Lajili *et al.*, 2020; Gonidakis *et al.*, 2020; Adelopo, 2017; Marzouk, 2016). Such a change in risk reporting patterns is grounded in managers' attempts to ease investor concerns and reduce the high uncertainty that characterises periods of crisis by disclosing more (risk) information (Lajili *et al.*, 2020; Gonidakis *et al.*, 2020; Marzouk, 2016). However, owing to such uncertainty, companies tend to disclose more backwards-looking than forward-looking risk information after the onset of a crisis (Lajili *et al.*, 2020; Adelopo, 2017). Finally, it has been observed that companies in countries with robust democratic systems, well-established legal frameworks, effective enforcement mechanisms, and a higher degree of freedom of expression, along with distinctive characteristics in accounting regulations, tend to disclose more risk-related information (Serrasqueiro & Oliveira, 2022).

4.3 Current challenges and emerging frontiers in non-financial risk disclosure

The two primary accounting challenges currently looming over regulators and standard-setters are the recognition of digital assets and the effects of climate change (Barth, 2022). Climate change is a topic of growing interest among investors due to increasingly pressing concerns about global warming, and traditional financial statements are no longer suited to meet the ever-evolving information needs of market participants. However, efforts by standard setters and regulators to address this challenge are still in their infancy, which has resulted in firms failing to account for assets and liabilities arising from climate change in their financial statements and the lack of a consistent approach to climate change disclosures across different companies. Another issue discussed in previous research and tied to ESG reporting is the so-called “greenwashing” practice. The latter has been assumed to be underpinned by impression management strategies (De Silva Lokuwaduge & De Silva, 2022). Such a view purports that managers use risk reporting instrumentally to distort investor perceptions and legitimise activities towards stakeholders, suggesting that reputational concerns may be significant drivers of non-financial disclosure practices. The voluntary nature of non-financial reporting in several institutional settings, which provides businesses with extensive discretion in selecting which pieces of non-financial information to disclose, enables this behaviour.

Two studies discussing new technologies implications for non-financial disclosure provided particularly interesting insights. The first one concerns the integration of Industry 5.0 (I5.0) technologies into firms' reporting practices to improve ESG disclosure (Asif *et al.*, 2023). I5.0 is an umbrella term which covers all advanced forms of technology, such as artificial intelligence, which may assist humans in their day-to-day tasks. In the corporate reporting field, the main benefit to companies stemming from I5.0 is the so-called “customisability-standardisation paradox.” Thanks to the tiered structure of I5.0, firms can reach higher levels of disclosure customisation or standardisation according to stakeholder demands and the requirements associated with the regulatory environments in which they operate, thus being enabled to quickly and flexibly adjust the depth of the non-financial information provided. However, I5.0 technologies come with a series of challenges for organisations, such as the environmental impact of I5.0 due to the energy-intensive infrastructure and the trade-offs between the high initial development

costs and future returns from potentially enhanced value creation and disclosure processes. Secondly, past literature delved into the use of satellite-based data for improving and standardising climate-related disclosures (El-Jourbagy & Gura, 2022). Arguments in favour of using satellite greenhouse gas (GHG)-related data include their reasonable availability, the possibility to update them in real time, and their being an objective scientific standard which regulators can use to develop new reporting requirements.

5 Conclusions and avenues for future research

This study systematically reviews the extant body of academic research on corporate risk disclosure, with a specific focus on non-financial (or sustainability) risks in light of the recent regulatory developments in the sustainability reporting field (the “2013 Accounting Directive,” the NFRD and the CSRD). The main goals of this paper are to summarise and synthesise the existing knowledge on corporate risk disclosure practices, identify gaps in the literature, and develop suggestions for future research endeavours. More specifically, this study considers 144 scientific articles published across 72 journals and analysed according to the following dimensions: (i) *research focus*, (ii) *theory/paradigm*, (iii) *geographical focus*, (iv) *author affiliation*, (v) *method*, (vi) *key insights*, and (vii) *further research*. Past literature on non-financial (risk) disclosure reveals that recently issued regulations on non-financial (or sustainability) reporting have had an overall positive impact on corporate disclosure practices, although questions remain concerning the motivations underlying such an improvement in reporting quantity and quality (Chou *et al.*, 2023; Gray *et al.*, 2019; Radwan *et al.*, 2023; Traxler *et al.*, 2023; Arif *et al.*, 2022). Furthermore, companies still seem to prioritise the disclosure of positive risk information focusing on their past or present, at the expense of forward-looking information that also addresses the negative implications of (non-financial) risks (Leopizzi *et al.*, 2020; Saggar & Singh, 2017). Other challenges facing regulators and standard setters include recognising digital assets, climate change’s effects, and the so-called “greenwashing” practice (Barth, 2022; De Silva Lokuwaduge & De Silva, 2022). Concerning the drivers of (risk) disclosure quantity and quality, three main sets of variables have been explored in the academic literature: corporate governance variables, firm-level variables, and cultural/institutional factors. Finally, regarding emerging frontiers in the context of non-financial (risk) reporting, two main issues have been analysed: the implications of “Industry 5.0” technologies and the use of satellite-based data for climate-related disclosures (Asif *et al.*, 2023; El-Jourbagy & Gura, 2022). We have pinpointed different issues which require further investigation by academics. First, our data shows that several different theoretical approaches have been taken to examine non-financial (risk) disclosure in prior literature. These theories include to name a few, agency theory, legitimacy theory, stakeholder theory, and signalling theory. However, no predominant approach can be discerned. As such, a multi-theoretical framework should be developed to study non-financial (risk) disclosure by jointly considering the tenets of the most frequently used theories to interpret research findings. Furthermore, some approaches have yet to receive much representation in the literature, such as the capital needs theory; we encourage researchers to test such approaches in future endeavours. Second, our sample suggests that examining non-financial (risk) disclosure practices has centred on specific geographical regions, namely Europe and Asia. Nonetheless, the case of other regions, specifically developing countries such as Africa and Latin America, still needs to be explored. Consequently, more light must be shed on companies’ (risk) disclosure practices within these regions to pinpoint potential patterns and how they differ from those of developed countries. Third, past research efforts have primarily taken advantage of quantitative methods to investigate (risk) reporting practices (68.7% of our sample) at the expense of qualitative ones (12.2%) based for instance, on interviews and content analyses. Qualitative methods can provide valuable tools for analysing (risk) disclosure given the mixed nature of the latter, which combines qualitative and quantitative characteristics (Linsley & Shrives, 2005). Fourth, research on non-financial (risk) disclosure is seemingly affected by an industry bias, with the vast majority of studies covering non-financial firms. Indeed, only roughly 3% of the articles in our sample considered financial and insurance companies. In the light of the specific regulatory and disclosure context in which these firms operate, it may prove meaningful to inspect further (risk)

reporting practices in the financial sector. Fifth, and in alignment with Ibrahim *et al.* (2022), we spur academics to delve further into the usefulness of non-financial (risk) disclosure for investors and analysts in terms of how the latter may benefit from the disclosed (risk) information. It would also be interesting to understand whether an improvement in the quality and quantity of non-financial (risk) reporting has any implications for the perceived usefulness of the related information for external stakeholders. Sixth, we believe that multi-factor studies focusing on the drivers of risk disclosure could yield particularly interesting results in determining the relative importance of the different drivers considered and how they interact with one another. Seventh, and finally, the impact of gender-related variables on (non-financial) risk reporting should be more deeply examined. The studies reviewed in this paper primarily focus on factors such as the share of female directors on the board; nonetheless, it would be meaningful to understand whether the extent and quality of risk disclosure benefit more from a balanced representation of various genders on the board or specifically from a stronger representation of women.

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