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Review Article

Examining ESG Factors and Theoretical Frameworks Under the Corporate Fraud Context

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Abstract: Stakeholder interest in Environmental, Social, and Governance (ESG) reporting is growing. ESG reporting on climate change, the energy problem, and the rise in the cost of living shows that corporate adoption of ESG will be critical in the coming years. On the other hand, companies need to rapidly adapt ESG components as ESG is linked to their sustainability, corporate social responsibility, and business ethics. This research uses the Scopus database for our bibliometric analysis to collect our sample. We use R-Studio and Biblioshiny, which employs data mining to determine the frequency of co-occurrence of keywords in articles and to facilitate keyword linkage. Our study is limited to the years 2008 to 2022. We considered articles published in the English language. Our sample includes four hundred and seventy-one documents. According to our analysis, the results show that the ESG framework in academic research is associated with the key concepts of sustainability, corporate social responsibility (CSR), ESG disclosure, corporate financial performance (CFP), sustainability reporting (SR), and ESG factors. The findings highlight the increasing importance of ESG reporting in academic research and emphasize the role of ESG in addressing major global issues and its link to corporate sustainability, corporate social responsibility (CSR), and ethics. From our results, we can conclude that the ESG framework in academic research is associated with corporate sustainability and social responsibility, as well as several ESG factors. Moreover, the concepts of fraud triangle and agency theory do not seem to have significant relationships with ESG framework. This information can be valuable for researchers, practitioners, and policymakers interested in understanding the current state of research in the field and identifying potential areas for future investigation. Future research can therefore explore and interpret the components of the fraud triangle with ESG factors. We also conclude that the three components of ESG have not been studied simultaneously. Future research can therefore examine the effects of the three components of ESG reporting in different ways and using different bibliographic techniques.

Keywords: ESG, Fraud Triangle, Agency Theory, Sustainability

1. Introduction

Environmental, social, and governance (ESG) is the most important issue nowadays [56]. With the fourth industrial revolution and the expansion of digital transformation, in which the world is interconnected and information flows rapidly, it is easy for companies to doubt their reputation. Issues such as unfair labor practices or a company's pollution of the environment can spread quickly on social media. Climate change, the energy problem, and the rising cost of living also show that corporate adoption of ESG will be critical in the years ahead. ESG must focus on trust, accountability, and excellence in corporate governance, and then ESG must evolve to encourage corporate action on environmental, social, and governance standards aimed at promoting value and shared prosperity.

Existing literature has examined the motivations associated with corporate fraud from both internal and external governance perspectives. According to Chen et al. and Zaman et al. [13, 54], the internal perspective can influence corporate fraud, such as board characteristics, stock concentration, management compensation program, and complex managerial network. In addition, according to Heese et al., Ren et al. and Zhang [38, 48, 57], factors such as the risk of litigation outside the company, the frequency of regulatory and legal changes, media coverage, external audits, and the market environment can increase corporate fraud.

Corporate fraud depends on managerial behavior in many cases. Hambrick & Mason [35] support the Upper Echelons Theory, which states that the manager's characteristic behaviors, such as personal values and experiences, reflect the company's decisions and operations. Literature has confirmed Gupta et al. [33] that board gender diversity, CFO gender, and CFO experience and ambition are characteristics that affect corporate misconduct [20]. However, managers' motivation for personal growth and their interests may not maximize the value of the company but maximize their interests through illegal insider training. Thus, ESGs are another way to reduce information asymmetries and agency costs and promote more ethical managerial characteristics. In addition, [1] notes that regulatory and reporting frameworks associated with ESG are struggling to keep up with the pace of change. Without consistent standards, the likelihood of fraud increases as CEOs and corporate boards feel pressured to report consistent progress on ESG goals. The same [1] notes that 40% of better-known companies have publicly committed to emissions reductions. Pressure to meet this goal will increase as ESG measures gain traction for investors compared to traditional financial reporting.

Researchers have examined ESG reporting in times of uncertainty [2, 7, 21, 40], the quality of ESG reporting [32, 25] the impact of ESG, and the implications for market performance. Specifically, researchers have examined ESG and firm value [41], stock price [58], green innovation [36], earnings management [31], and cost of capital [28]. Researchers also examine models for evaluating the factors influencing ESG. Alsayegh et al. [5] indicate that companies may be interested in ESG disclosures and sustainability strategies.

The impact of applying ESG on business is discussed in the literature. First, the positive impact of ESG application increases social responsibility and stakeholder interest. In addition, employees' satisfaction increases, they are incentivized to work harder, labor productivity increases, and the company's products gain competitive advantage [42]. In addition, the positive impact of applying ESG creates customer and government trust and a stable relationship — all of which lead to companies increasing their market share and enterprise value, and achieving sustainable development [3]. On the other hand, the negative impact of applying ESG is that shareholders pay for the costs and risks [9]. Moreover, managers invest in ESG to enhance their reputation and career [14]. Finally, managers can use the application of ESG to cover up their misconduct.

This study provides a systematic literature review of ESG quality reporting using the PRISMA protocol. It is an alternative perspective on the quality of non-financial ESG information. We contribute to the literature by providing a more comprehensive understanding by examining ESG factors. When are ESGs of lower quality and when is failure likely due to the fraud triangle and agency theory underlying human behavioral characteristics?

Overall, this research focuses on the following two research questions (RQ).

1) RQ1: Is there evidence that ESG correlates with sustainability, corporate valuation, and fraud disclosure?
2) RQ2: Can ESG be interpreted by fraud triangle theory and agency theory?

2. Literature Review

2.1. ESG Background

The topic of ESG first appeared in the decade of 1950, but in 2010, the ESG topic started to be taken seriously by companies, according to Gao et al., [30]. The term ESG refers formal to a 2004 report that provides "Financial Industry Recommendations to Better Integrate Environmental, Social and Governance Considerations into Analysis, Asset Management and Securities Brokerage." This report forms the basis for the common interpretation of ESG. ESG is a set of criteria used to evaluate a company's performance in these three key areas. ESG factors have become increasingly important to investors, customers, and other stakeholders as they seek to evaluate the long-term sustainability and ethical practices of companies. By considering ESG factors, investors and stakeholders can gain insight into a company's long-term viability, risk management, and commitment to ethical and responsible practices. ESG has become a critical aspect of modern investment and decision-making processes, as companies that prioritize ESG factors are often seen as better equipped to meet emerging challenges and capitalize on new opportunities. The ESG of a company's management thus reflects the overall quality of management and is related to the company's performance, stakeholder value, and reputation.

Furthermore, after two years of the financial crisis 2008, managers tried to find ways to rebuild investors' trust in capital markets. So, they started to reform corporate governance. Capital markets gradually recovered after the financial crisis and COVID-19, but problems like climate change, the energy problem, the rising cost of living, environmental encumbrance and social issues like gender equality and child labour caused by firms increased rapidly and show that corporate adoption of ESG will be critical in the coming years. As shown in Table 1, ESG refers to non-financial factors that influence investors, stakeholders, and employees in their decisions about how to engage with a company.

ESG score is a ratio that indicates the non-financial performance of the firm. Stakeholders believe that ESG factors increase the sustainable development of firms in the long term. Nowadays, databases like Thomson Reuters (Eikon) and Bloomberg collect information about ESG score environmental, social and governance pillars. With society's increasing interest, research examines the impact of ESG on various aspects of the economy. More specifically, ESG reporting and management focus on a company's tangible and intangible assets. These measures reflect sustainability, business valuation, fraud risk management, ethical management, and shareholder satisfaction.

Sustainability encompasses concepts such as environmental, social, and governance (ESG), corporate social responsibility (CSR), and business ethics [24]. By adopting ESG, companies enhance their reputation and improve their corporate valuation in the long run as they fulfil their social responsibilities and protect the natural environment. ESG is expected to influence the economic performance of the company.

The definition of ESG methodology is: Environmental (E) refers to the environment and, more specifically, to the actions a company takes to protect the natural environment. It includes issues such as sustainability and carbon reduction. Social (S) refers to a company's social efforts, which include equality, diversity, working conditions and social justice - the component of social that relates to people's values. Governance (G) refers to business ethics and includes transparency and management behavior. According to ACFE [1], the ESG factors are listed in Table 1 below. Investors and stakeholders analyze a company's financial performance to invest. However, ESG has a growing interest from investors and stakeholders when deciding on investments.

Table 1. *Factors of ESG.*

Environment	Social	Governance
Habitat preservation & enhancement	Human capital management	Regulatory compliance
Sustainability	Working conditions	Corporate behavior
Energy management	Gender equality	Data privacy
Packaging	Socioeconomic progress	Internal controls
Water efficiency	Employee benefits	Business ethics
Climate change	Community investment	Anti-corruption
Carbon emissions	Human rights	Board & executive oversight
Ecological impact	Employee relations	Responsible marketing
Waste management	Supply chain transparency	Customer & product responsibility
Air quality	Labor standards	Executive compensation
Biodiversity	Customer privacy	Shareholder rights
Pollution	Diversity, equity, inclusion, & belonging	Competitive behavior
Natural resource management	Access & affordability	Systemic risk management
GHG emissions	Product quality & safety	Business model resilience
	Data security	Critical incident risk management
	Materials & sourcing	Board independence
	Health & safety	Management of the legal & regulatory environment

Source: ACFE (2022)

The authors Gao et al.; Jain et al.; and Yadav & Saini [30, 43, 53] study ESG factors with bibliometric analysis. We extend this research by examining ESG quality based on the fraud triangle and agency theory underlying human behavioral characteristics. None of these literature reviews addressed ESG performance and fraud. Therefore, we attempt to interpret ESG through the fraud triangle and agency theory and examine whether ESG is correlated with sustainability, corporate valuation, and fraud disclosure.

2.2. ESG and Fraud

ESG factors and fraud are interconnected in the sense that strong ESG performance can help mitigate fraud risks, while poor ESG performance may signal a higher likelihood of fraudulent activities. Additionally, companies may engage in ESG-related fraud to deceive stakeholders about their commitment to sustainability and ethics. Integrating ESG analysis into investment and decision-making processes can help identify and prevent potential fraud risks. Internal ESG fraud is an intentional act to deceive society by reporting misleading or false ESG information. The factors that can increase internal ESG fraud are poor accountability, weak internal control environment and lack of supervisory created by management and employees. External ESG fraud is the intentional act of deceiving a firm by disclosing misleading or false information related to ESG programs and created by third parties outside the firm.

Also, the empirical researcher He et al. [37] examines the impact of ESG and managers' misconduct behaviour in Chinese firms and Kim et al., [34] examines the relationship between the gender of the CEO, ESG and fraud in South Korea. Both researchers conclude that ESG performance inhibits the misconduct behaviour of managers characteristics and that the gender of the CEO has a critical role in avoiding fraud in ESG.

The fraud triangle theory was developed by Cressey [16] to explain the factors that lead people to commit fraud. By integrating ESG factors into business practices, companies can potentially reduce fraud risks. The three components of the Opportunity-Pressure-Rationalization fraud triangle "can be interpreted in terms of ESG fraud as follows: The first element of the fraud triangle is "opportunity," which describes the environment that enables fraud to develop. “Opportunity” occurs when an individual has access to resources or information that can be exploited for personal gain. ESG factors can impact fraud opportunities by promoting transparency, accountability, and strong internal controls. For example, companies that emphasize sound governance are likely to have better risk management systems, which reduces opportunities for fraud. In addition, the adoption of environmental and social sustainability practices can lead to increased stakeholder scrutiny, which can deter potential fraudsters.

A lack of control environment increases opportunities for fraud. The control environment can include policies and standards that define the ESG metrics that companies adhere to. External controls and users lack understanding of company ESG metrics and cannot compare ESG metrics across companies and sectors to identify intentional misstatements. Without clear standards, the opportunity to manipulate ESG metrics increases.

The second component of the fraud triangle is "pressure." It is the incentive for a company to commit fraud. Pressure refers to the financial or personal stress that motivates individuals to commit fraud. ESG factors can affect pressure in several ways. For example, companies that prioritize social responsibility and employee well-being can create a better work environment, reducing financial stress and personal pressure on employees. In addition, companies with strong environmental and governance practices may be more stable and less likely to get into financial trouble, further reducing the pressure to commit fraud. It may also increase the "pressure" on companies to meet ESG targets. This "pressure" can create the risk that companies will not adopt basic ESG standards. ESG adoption and implementation are sometimes costly. It refers to the financial or personal stress that motivates individuals to commit fraud. ESG factors can affect pressure in several ways. For example, companies that prioritize social responsibility and employee well-being can create a better work environment, reducing financial stress and personal pressure on employees. In addition, companies with strong environmental and governance practices may be more stable and less likely to get into financial trouble, further reducing the pressure to commit fraud. Thus, "pressure" may create an environment that encourages companies to commit fraud.

The final component, "rationalization," refers to the ability of fraudsters to justify their actions. Rationalization is the process by which individuals justify fraudulent behavior to themselves. ESG factors can influence rationalization by promoting a culture of ethics and integrity in organizations. Companies that place a high value on ESG factors are more likely to have a strong ethical framework, which can make it more difficult for employees to rationalize fraudulent actions. In addition, employees who feel their company is committed to ethical behavior may be more loyal and less likely to engage in fraudulent activity. Thus, ESG fraudsters may justify their actions when a company is close to meeting ESG standards but ultimately fails to meet the target. Then a company may rationalize the misrepresentation.

2.3. ESG and Agency Theory

Arora & Alam, Flammer & Bansal [6, 29] support the idea that the difference in access to information between agents and shareholders is known as the agency problem. Agency theory refers to the conflicts of interest between agents (managers) and principals (shareholders). Agency theory states that agents have different interests and use the power of management to behave opportunistically and exploit information asymmetry [27, 52] considered that the agency problem arises from the separation between ownership and control" This status causes agents to behave opportunistically, and principals cannot control agents' activities and decisions as it would be costly to do so.

The principle of corporate social responsibility (CSR) is attracting increasing interest today. For example, stakeholder expectations are leading to an expansion of traditional agency theory to a more comprehensive analysis, as agents' decisions and activities affect shareholders and general stakeholders [52]. Therefore, according to Barney, and Zolotoy et al. [10, 59] the new approach to agency theory, referred to as stakeholder agency theory and agent claims, is a more transparent framework.

According to traditional agency theory, Hillman & Dalziel, [39] advocate that the board of directors minimizes the gap between the agent's behavior and shareholders. (Hillman & Dalziel, and Liao et al., [39, 44] emphasize that board compensation incentives can minimize monitoring costs between agents and principals. Arora & Alam [6] confirmed the above motivation and emphasized the alignment of interests with the corporate governance system and sustainability goals.

Improving a company's financial performance is closely related to its ability to respect society and the environment. From this perspective, agency theory is fundamental and can facilitate the resolution of conflicts of interest between agents and principals. By focusing on sustainability, the company's performance can overcome the agency theory problem. Corporate sustainability can be achieved through simultaneous economic, environmental, and social development [12, 49].

2.4. ESG and Sustainability

2.4.1. Sustainability and Reporting

According to Daub [18], corporate responsibility, corporate social responsibility, corporate citizen reports, and triple bottom line are some terms used to identify sustainability reports. [18] defines a sustainability report as "must contain qualitative and quantitative information on the extent to which the company has succeeded in improving its economic, environmental, and social effectiveness and efficiency during the reporting period and integrating these aspects into a sustainability management system." Datta et al. [17] support the idea that sustainable business practices alone cannot increase a company's legitimacy and awareness. It is necessary for companies to report on these practices. Lourenço et al., and Comyns et al. [46, 15] have demonstrated the relationship between corporate legitimacy, corporate reputation, and sustainability practices in their research. When a company's reputation improves, it leads to higher profitability. For example, Lourenço et al. [46] conclude that financial and market returns are related to reputational value. On the other hand, if the company's reputation decreases, it thinks about "greenwashing". In contrast to "greenwashing", various frameworks have been developed as guidance to mitigate the risk of misrepresentation.

2.4.2. Quality Disclosure

Comyns et al. and Beck et al. [15, 11] studies point out that the informative value and quality of sustainability reports varies depending on the target audience. Dawkins & Lewis, [19] examine many journals with sustainability reports and conclude that the quality of information on corporate sustainability performance is poor. Companies in Europe are further along than companies in the U.S. in their efforts to improve transparency of ESG performance.

In many sectors, there are inconsistencies in reporting metrics and comparing company performance is difficult [45]. According to Wagner & Seele [51], there is a possibility that companies only publish information on the positive impacts to improve their status and ignore the negative impacts. The study by de Villiers & van Staden; De Villiers & Van Staden [22-23], which investigated stakeholder requirements and attitudes, concluded that stakeholders are optimistic about publishing environmental information and prefer it to be published in the company's annual report.

3. Methods

According to Batra et al [8], literature review is a proven strategy to explore previous studies. In addition, a literature review allows for the assessment of the context and maps of the important topics, as well as the identification of gaps in the previous literature. According to Zainuldin & Lui [55], traditional review techniques do not allow for intellectual structure for each topic. A systematic literature review can overcome this disadvantage compared to traditional review techniques and is therefore widely used. The systematic literature review contains a well-defined procedure for searching large data sets using a predefined search strategy. Systematic literature review leads to better quality of research, and the results are more comprehensive, scientific, and transparent [43]. In addition, the systematic literature review can be used as a bibliometric method and analyse the content quantitatively. It is a new method that is becoming popular for evaluating literature review [26]. Bibliometric analysis is based on a comprehensive review of the existing literature. In addition, bibliometric techniques help to analyse and classify historical data in a specific period. Bibliometric analysis provides a holistic approach to research because it is an organised process that allows for the examination of published studies. There are some tools available for bibliometric analysis, such as bibliometrix and Vos Viewer. In this study, we use bibliometrix, an R tool to investigate widely used mappings. Bibliometrix was programmed in R language, which is widely used in literature search. According to Shi et al. [50], the R package used for bibliometric analysis uses quantitative informetrics and scientometrics. Moreover, meta-analysis and bibliometric analysis based on quantitative techniques reduce bias. On the other hand, Donthu et al. [26] support the idea that systematic literature reviews based on qualitative techniques are more biased than meta-analyses and bibliometric analyses.

In this study, bibliometric analysis was used to develop trends in ESG and examine the relationship between sustainability, fraud triangle, and agency theory-a bibliometric analysis based on quantitative statistical analysis, as mentioned earlier. The goal of bibliometric analysis is transparency. The main points of bibliometric analysis are descriptive and content analysis. Descriptive analysis includes a large number of documents that aim to evaluate the effectiveness of sources and authors. The content analysis captures the intellectual structures based on citations and keywords and shows the thematic development and research trends.

In this research, Scopus database is used for bibliometric analysis to collect our sample. The Scopus database is the most used literature database [4, 47]. We searched articles in the Scopus database by combining keywords such as “Environmental social and governance”, "ESG" AND "Fraud triangle", "ESG" AND "Agency theory", "ESG" AND "Sustainability", "ESG" AND "financial disclosures " ESG" AND "Financial reporting" AND "sustainability" AND "Fraud triangle" AND "Agency theory", and finally we decided to search for other keywords such as "ESG" AND "financial reporting" OR "sustainability" OR "fraud triangle" OR "agency theory" AND "disclosure" OR "non-financial performance" OR "corporate social responsibility" OR "economic growth". Our search includes 471 articles from 231 sources (articles, books, book chapters, conference papers, conference proceedings, and reviews) and 1164 authors. The summary results of our search in the Scopus database are explained in Table 2 below.

Table 2. *Search keywords from Scopus Database.*

Search - Keywords- Scopus Database	year	Results
Environmental social and governance	2008-2022	1604
ESG AND Fraud triangle	2013-2022	0
ESG AND Agency theory	2019-2022	26
ESG AND Sustainability	2014-2022	1024
ESG AND Financial disclosures	2017-2022	50
ESG AND financial reporting AND sustainability AND Fraud triangle AND Agency theory	2013-2022	0
ESG AND financial reporting OR sustainability OR Fraud triangle OR Agency theory AND disclosures OR non-financial performance OR corporate social responsibility OR economic growth	2008-2022	471

Source: Authors’ results

The final sample of each search of keywords appeared in the column "results". We include papers that have been written in the English language.

Findings in Table 2 point to a trend in academic research in which the focus on environmental, social, and governance (ESG) principles has gained momentum in recent years, particularly in relation to sustainability and financial disclosure. However, the lack of research linking ESG to fraud triangle theory and agency theory (especially in combination) points to potential areas for further investigation in future studies.

Then we extract the CSV file from the Scopus database and install the R package using R-Studio. The Biblioshiny (), enter the R console. Biblioshiny is a web application that provides access to R's bibliometrix package for non-coders. Biblioshiny is a statistical software program that uses data mining to determine the frequency of co-occurrence of keywords in articles and to facilitate keyword linkage.

(1) Indemnification	Title	Examining ESG Factors and Theoretical Frameworks under the Corporate Fraud Context
	Scope & Coverage	Database: Scopus Time Frame:2008-2022 Language: English Source Type: All Document Type: All
	Keywords search	As seen in Table 2
	Date extracted.	1-Apr-23
(2) Screening	Documents identified & screened.	n=471
	Documents removed.	n=0
(3) Results	Documents included in Bibliometric analysis	n=471

Source: Authors' results

Figure 1. *Explanation of our workflow.*

Our study covers the years 2008 to 2022, and we chose to examine the growth of ESG in the last fourteen years because there was little interest in ESG before 2008. According to Gao et al. [30], interest in ESG gradually increased in late 2010 after two years of financial crisis. We only considered articles published in English. More specifically, our sample includes four hundred and seventy-one documents. More specifically, our sample includes three hundred seventy-seven articles, three books, thirty-two book chapters, thirty-four conference papers, three conference proceedings, one note, and twenty-one reviews. Figure 1 explains our workflow in detail.

4. Results

In Table 3, we summarize the preliminary information on our sample collected using the Biblioshiny program. Our bibliometric data include four hundred seventy-one documents from 231 sources and three hundred seventy-seven articles, three books, thirty-two book chapters, thirty-four conference papers, three conference proceedings, one note, and twenty-one reviews. The average citation per document is 19.14.

Table 3. *Main information about data.*

MAIN INFORMATION ABOUT DATA	
Timespan	**2008:2022**
Sources (Journals, Books, etc)	231
Documents	471
Annual Growth Rate %	37,57
Document Average Age	2,78
Average citations per doc	19,14
References	30237
DOCUMENT CONTENTS	
Keywords Plus (ID)	775
Author's Keywords (DE)	1258
AUTHORS	
Authors	1164
Authors of single-authored docs	73
AUTHORS COLLABORATION	
Single-authored docs	88
Co-Authors per Doc	2,79
International co-authorships %	21,87
DOCUMENT TYPES	
article	377
book	3
book chapter	32
conference paper	34
conference review	3
note	1
review	21

Source: Authors' result

Based on Table 3, we summarize the main points and try to gain some insights into the dataset. The dataset covers a time span of 14 years (2008-2022) and consists of 471 documents from 231 different sources, such as journals, books, etc. The dataset has an annual growth rate of 37.57%, indicating that the number of documents in the field has increased significantly. The average age of the documents in the dataset is 2.78 years, suggesting that the field is relatively young and contains recent research results. On average, each document has been cited 19.14 times, suggesting that the research in this dataset is relatively influential or well-reviewed by peers. The dataset contains a total of 30,237 references. The dataset contains 775 Keywords Plus (ID) and 1,258 Author's Keywords (DE), indicating a wide range of topics covered in the research. A total of 1,164 authors contributed to the dataset, with 73 authors authoring documents with only one author. Of the 471 documents, 88 are from single authors, while the average number of co-authors per document is 2.79, indicating that most of the research in the dataset is the result of collaborative efforts. International co-authorships account for 21.87% of the dataset, indicating a high level of global collaboration. The dataset contains several document types, most of which are articles (377). Other document types include books (3), book chapters (32), conference papers (34), conference proceedings (3), notes (1), and reviews (21). In summary, the dataset represents a growing and relatively young area of research with a strong emphasis on collaboration at the national and international levels. The average number of citations per document seems to indicate that the research is influential. Most of the documents in the dataset are articles with a variety of keywords, suggesting a wide range of topics covered.

Based on our description of Figure 2, it seems that there has been a growing interest in the relationship between various topics, including ESG (Environmental, Social, and Governance), financial reporting, sustainability, Fraud Triangle, Agency Theory, disclosures, non-financial performance, corporate social responsibility (CSR), and economic growth. From this description, we can infer the following trends:

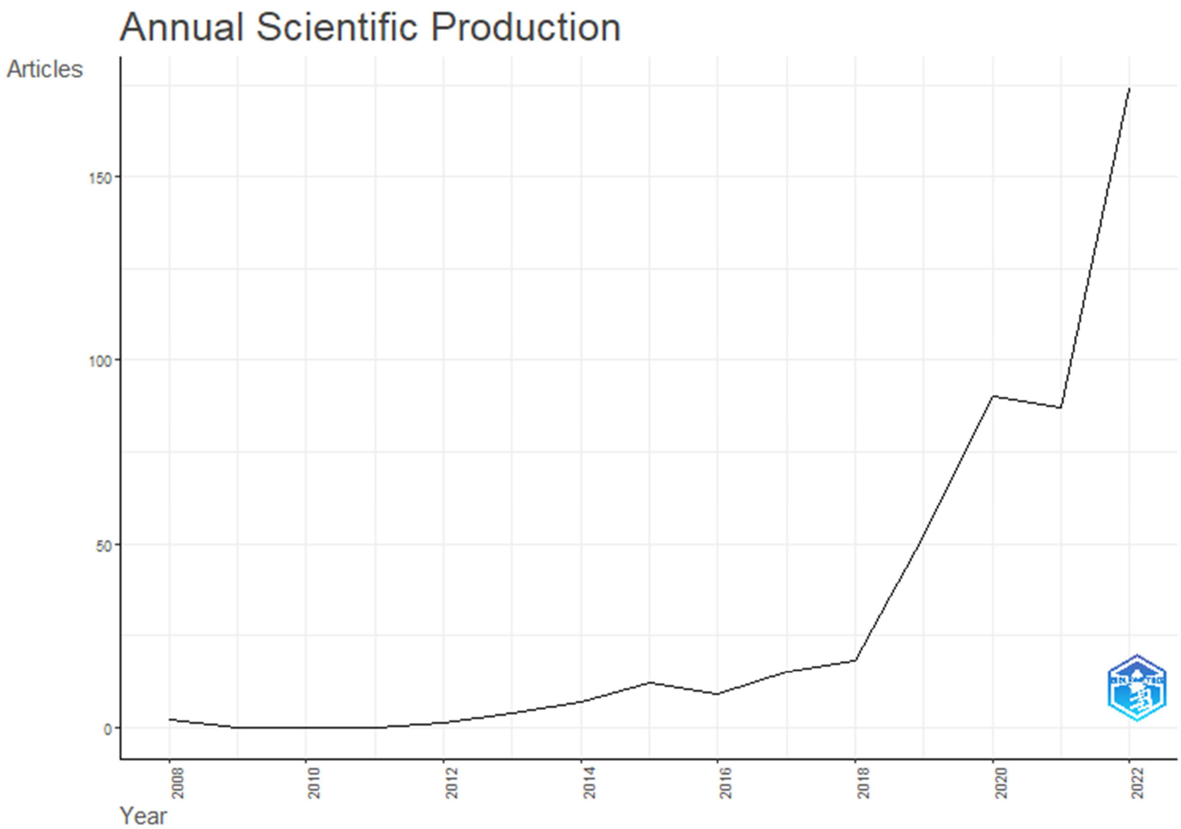
A slow start, where in 2008, the interest in the topic was relatively low, with only two articles published.

Gradual increase, from 2009 to 2016, where, except for 2015, the interest in the subject was moderate. This indicates that the field was still in the early stages of development and recognition.

Rapid growth, from 2017 to 2022, where there has been a significant increase in the number of publications on the topic. This suggests that researchers, practitioners, and policymakers have started to pay more attention to the connections between ESG, financial reporting, sustainability, and other related areas.

The rapid growth in publications from 2017 onwards could be attributed to various factors, such as increased awareness of the importance of sustainable practices, the need for more transparent financial reporting, and the impact of corporate behavior on economic growth. Additionally, increased regulatory pressure and public interest in environmental, social, and governance issues could have contributed to this surge in research activity.

In summary, Figure 2 highlights the growing interest in the interdisciplinary field that links ESG, financial reporting, sustainability, fraud triangle, agency theory, disclosures, nonfinancial performance, CSR, and economic growth. The rapid increase in publications suggests that the field is gaining traction and will likely continue to develop in the coming years.



Source: Authors' results

Figure 2. *Annual publications per year.*

The top nine journals that published ESG, financial reporting, sustainability, fraud triangle, agency theory, disclosure, nonfinancial performance, corporate social responsibility, and economic growth are listed in Table 4.

Table 4. *The nine most influential Journals of the field.*

Journals	No of papers
JOURNAL OF BUSINESS ETHICS	1774
ACCOUNTING	566
BUSINESS STRATEGY AND THE ENVIRONMENT	556
SUSTAINABILITY	503
CORPORATE SOCIAL RESPONSIBILITY AND ENVIRONMENTAL MANAGEMENT	439
STRATEGIC MANAGEMENT JOURNAL	436
JOURNAL OF CLEANER PRODUCTION	360
THE ACCOUNTING REVIEW	335
JOURNAL OF FINANCIAL ECONOMICS	317

Source: Authors' results

These journals represent the leading publications in the interdisciplinary field connecting ESG, financial reporting, sustainability, Fraud Triangle, Agency Theory, disclosures, non-financial performance, CSR, and economic growth. The number of papers published in each journal demonstrates the level of focus and interest in these topics within the respective journals.

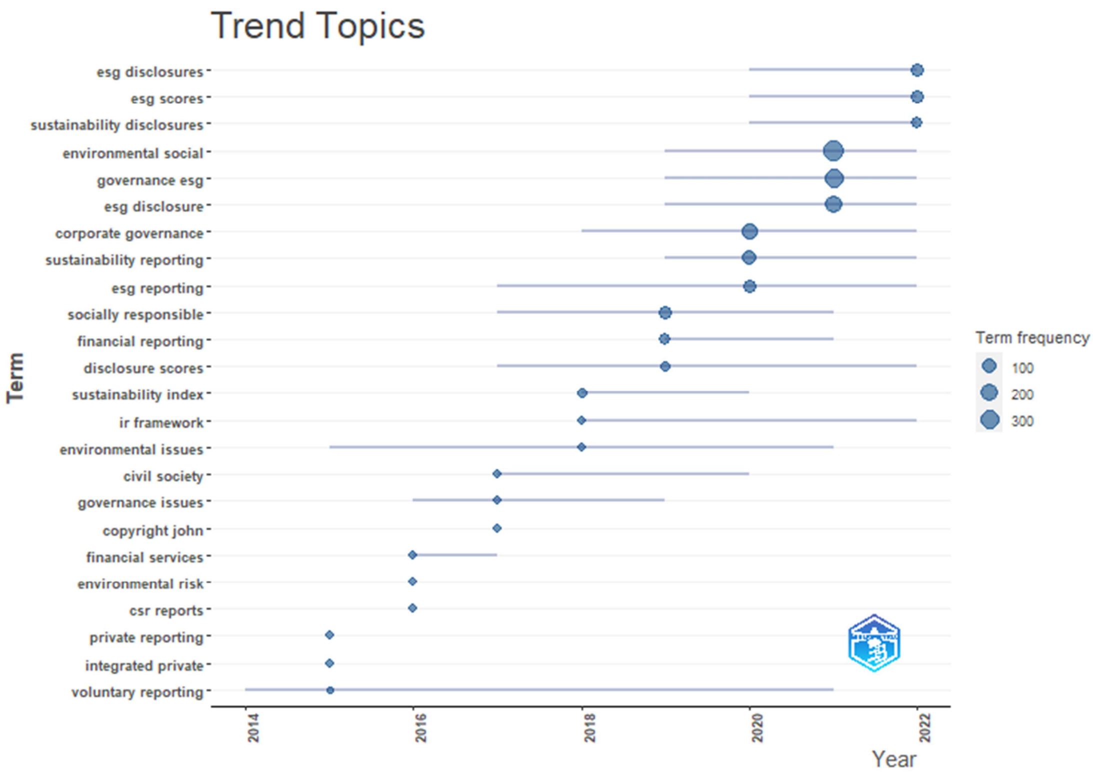
In conclusion, these top nine journals have significantly contributed to the research and understanding of the topics mentioned. Researchers and practitioners interested in these topics should consider reviewing the articles published in these journals to gain insights into the latest developments, trends, and best practices within the field.

Based on our description, we create a word cloud using the abstracts from 471 documents related to the topics of ESG, financial reporting, sustainability, Fraud Triangle, Agency Theory, disclosures, non-financial performance, corporate social responsibility, and economic growth. Figure 3 displays the most relevant keywords, with the top ten keywords listed in descending order of frequency.

From the word cloud and the top ten keywords, it appears that the focus of the research in this dataset is primarily on the three components of ESG (Environmental, Social, and Governance), but not necessarily on examining these components simultaneously. The keywords emphasize ESG disclosure, financial performance, corporate governance, corporate sustainability, and sustainability reporting.

Source: Authors' results

Figure 3. *Word-cloud from most frequency words.*



Source: Authors' results

Figure 4. *Trend topics.*

It is also noteworthy that the terms "fraud triangle" and "agency theory" do not appear in the word cloud. This suggests that research in this dataset may not be directly focusing on these particular topics, or they might be underrepresented in the current body of research. The word cloud provides a visual representation of the major themes and focus areas within the dataset of 471 documents. While the ESG components seem to be the focus, other topics like Fraud Triangle and Agency Theory are not as prominent. This could indicate potential areas for further research or the need to expand the dataset to include more diverse research related to these topics. Also, the words fraud triangle and agency theory do not appear at all.

Figure 4 provides a comprehensive overview of the most trending topics in the research. Figure 4 presents a summary of these trending topics. They are listed in Table 6.

These trending topics indicate the key areas of interest and focus in research related to ESG, financial reporting, sustainability, corporate governance, and other related areas. The list highlights a strong emphasis on ESG disclosures, reporting, and scores, as well as the broader themes of corporate governance, sustainability, and financial reporting.

Moreover, the presence of topics such as civil society, financial services, environmental risk, and governance issues suggests that the research in this field is expanding beyond traditional themes and exploring the interplay between various stakeholders, sectors, and aspects of ESG.

We continue our bibliometric analysis with a network approach and, more specifically, with the co-occurrence network. We use abstracts for the whole sample with bigrams (two- words appeared) for better comprehension, and we use cluster analysis. The results are shown in the following table 5.

Table 5. *The top ten keywords.*

Words	Occurrences
environmental social	88
corporate social	43
social responsibility	41
corporate sustainability	35
financial performance	33
governance esg	29
esg disclosure	28
corporate governance	27
sustainability reporting	27
esg performance	14

Source: Authors' results

Table 6. *The most trend topics.*

Trend topics	Frequency
environmental social	347
governance esg	280
esg disclosure	194
corporate governance	132
sustainability reporting	109
esg reporting	74
esg disclosures	68
esg scores	66
socially responsible	65
financial reporting	29
sustainability disclosures	29
disclosure scores	23
sustainability index	14
civil society	12
ir framework	11
financial services	10
csr reports	9
environmental risk	9
environmental issues	9
private reporting	8
governance issues	7
integrated private	6
copyright john	6
voluntary reporting	5

Source: Authors' results

Table 7, which contains the results of a cluster analysis using a network approach, specifically a co-occurrence network, in the context of bibliometric analysis. The Table 7 presents information on nodes (keywords), their assigned cluster, betweenness centrality, closeness centrality, and PageRank scores. From this table, we can observe that there are three clusters (1, 2, and 3) with various keywords. Cluster 1 is the largest and contains most of the keywords. This could indicate that Cluster 1 contains the most common themes or topics across the analyzed documents. Betweenness centrality measures the extent to which a node (keyword) lies on paths between other nodes in the network. A higher betweenness score indicates that a keyword connects many other keywords, suggesting its importance in the network. The top three keywords with the highest betweenness centrality scores in this table are "environmental social," "governance esg," and "esg disclosure."

Closeness centrality is a measure of the average length of the shortest paths between a node (keyword) and all other nodes in the network. A higher closeness centrality score indicates that a keyword is more central in the network, meaning it's more closely connected to other keywords. In this table, "environmental social" and "governance esg" have the highest closeness centrality scores.

PageRank is an algorithm that ranks the importance of nodes (keywords) in a network based on the links (co-occurrences) between them. A higher PageRank score indicates a more significant keyword in the network. The top three keywords with the highest PageRank scores in this table are "environmental social," "governance esg," and "corporate social."

More specifically, Cluster 1 contains keywords related to sustainable and responsible development. Corporate social responsibility, sustainability reporting, sustainable finance, responsible investment and sustainability issues are keywords in cluster 1. Responsible investment is the core element of environmental, social and corporate governance. Responsible investment principles control up to $60 trillion in global organisational assets. Cluster 1 demonstrates a growing interest in sustainable development in the global economy. In addition, corporate social responsibility was proposed in the European Union in 2001. Corporate social responsibility is defined as the responsibility that companies have in decision making for the environment and society, which are components of ESG. The main difference between corporate social responsibility and ESG is that ESG includes the interests of shareholders in different groups. The elements of ESG are key in the context of corporate social responsibility. ESG focus on the relationship between shareholder returns and corporate social responsibility in capital markets. In Cluster 1, the keyword climate change also emerges as an emerging issue and is associated with the environmental element of ESG. Furthermore, the authors anticipate that this keyword will play an additional role in ESG reporting.

Table 7. *Cluster analysis.*

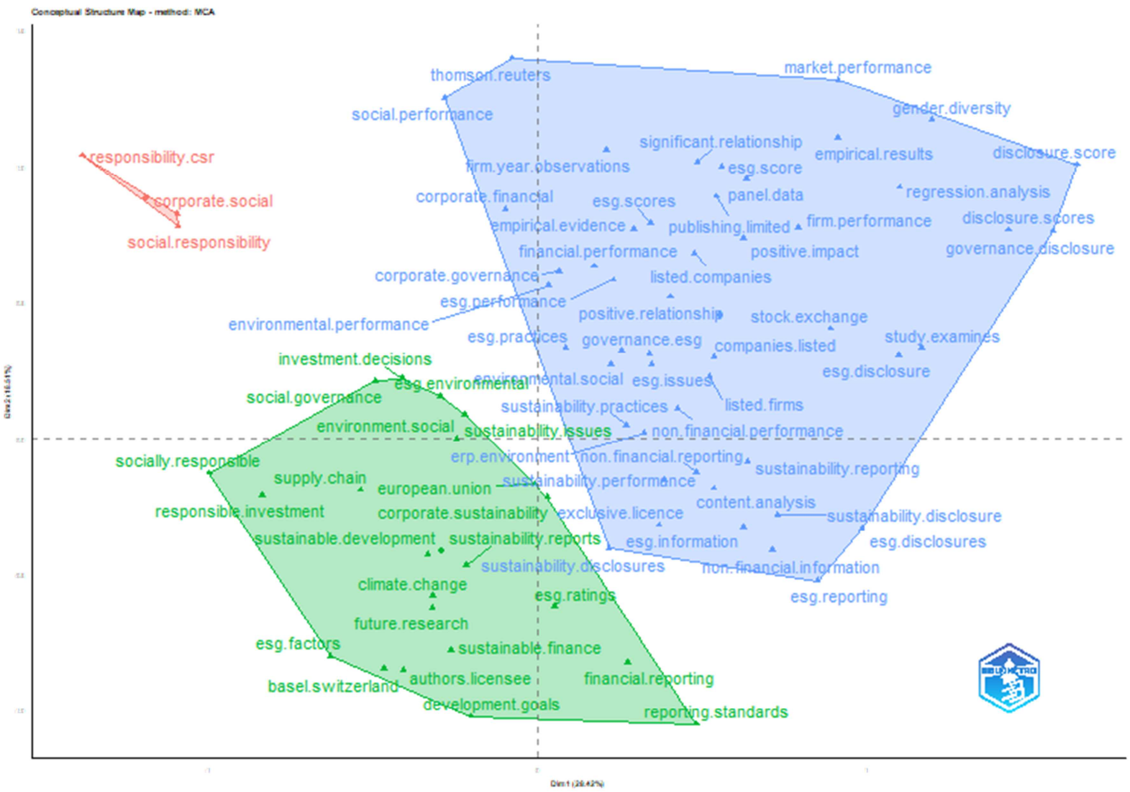
Node	Cluster	Betweenness	Closeness	PageRank
environmental social	1	161,7182084	0,0204082	0,108093
governance esg	1	136,2415641	0,0204082	0,1001238
esg disclosure	1	13,39250106	0,0204082	0,0348066
corporate social	1	21,83845802	0,02	0,0526704
social responsibility	1	19,91913246	0,02	0,0518177
financial performance	1	12,83760231	0,0192308	0,0359753
corporate governance	1	8,022237261	0,0188679	0,0298502
responsibility csr	1	4,191573987	0,0166667	0,0308613
socially responsible	1	1,042607163	0,0138889	0,0134721
climate change	1	1,676419242	0,015873	0,0140226
esg information	1	1,053464544	0,0151515	0,0147916
sustainability reports	1	0,424679368	0,0138889	0,0104179
basel switzerland	1	1,945851432	0,015625	0,0173754
esg practices	1	0,189802638	0,0138889	0,0100361
authors licensee	1	2,272147144	0,015873	0,0175552
esg ratings	1	0,138902542	0,0125	0,007794
supply chain	1	0,032468834	0,0123457	0,0071252
esg factors	1	0,368323079	0,0133333	0,0093365
financial reporting	1	0,046338292	0,0121951	0,0070855
responsible investment	1	0,167327714	0,0123457	0,0085942
sustainable finance	1	0,096287465	0,0119048	0,0062937
non-financial performance	1	0,037709601	0,0125	0,0076505
positive relationship	1	0,374501507	0,0144928	0,0109826
social governance	1	0,366530869	0,0138889	0,0111032
sustainability issues	1	0,147155785	0,0133333	0,0088658
sustainability disclosures	2	0,019947301	0,0121951	0,0062236
esg performance	3	2,566726966	0,0163934	0,0232654
corporate sustainability	3	5,947254532	0,0185185	0,0243907
sustainability reporting	3	6,790181544	0,0185185	0,0248336
sustainable development	3	4,440353733	0,0178571	0,0205139
esg reporting	3	1,217852337	0,0149254	0,0155965
sustainability performance	3	2,181048519	0,0163934	0,0159038
esg disclosures	3	2,219347201	0,016129	0,016327
esg scores	3	3,259084709	0,0172414	0,0195168
publishing limited	3	6,126473514	0,0172414	0,0260036
sustainability disclosure	3	0,339804917	0,0136986	0,0101926
erp environment	3	1,392198872	0,015625	0,0166637
listed companies	3	1,975828756	0,0166667	0,0164575
esg score	3	0,271078645	0,0138889	0,0110572
integrated reporting	3	0,333179845	0,0140845	0,0106436
esg issues	3	0,71686674	0,0147059	0,0132117
non-financial reporting	3	0,601313788	0,0140845	0,0099373
panel data	3	1,071295016	0,0149254	0,014835
non-financial information	3	0,152423692	0,0133333	0,0091014
stock exchange	3	0,465806696	0,0138889	0,0113186
firm performance	3	0,371698867	0,0140845	0,0100272
companies listed	3	0,567835527	0,0144928	0,0120432
study examines	3	0,280592323	0,0140845	0,0108236
thomson reuters	3	0,706740727	0,0147059	0,0138842
gender diversity	3	0,443270409	0,0147059	0,0105281

Source: Authors' results

Cluster 2 contains only the Sustainability Disclosures keyword. ESG disclosures refer to the disclosure of environmental, social, and governance information. The continued growth of capital markets has led to companies recognizing that ESG disclosures are necessary.

Cluster 3 provides keywords for ESG reporting. The main keywords that appear in the context of reporting are sustainability reporting, integrated reporting, non-financial reporting, and non-financial information. This result shows that more transparent ESG reporting is needed. Gender diversity also emerged in this cluster. This is a new topic as there is little research on whether gender diversity affects ESG reporting and decision making. Even in the existing literature, the results are mixed, as some researchers conclude that board gender diversity, which refers to the higher proportion of women in the board composition, has a positive impact on corporate ESG decision making, while some other researchers conclude that it has a harmful or no impact on ESG information. As we can conclude, more research on board gender diversity is needed.

Overall, this cluster analysis reveals the major themes and connections among the keywords in the research area. Cluster 1 shows an increasing interest in sustainable development in the global economy. Cluster 2 is about issues related to sustainability disclosure, and Cluster 3 is about key concepts related to ESG reporting. Gender diversity on the board also appears in Cluster 3 and is a developing topic in the research. In addition, we note that the keywords of the fraud triangle do not appear. Since we have found two empirical studies [37, 34] that examine ESG and fraud, we consider that fraud and ESG are also emerging research topics.



Source: Authors' results

Figure 5. *Factor analysis with MCA method.*

We have performed a Multiple Correspondence Analysis (MCA) on our bibliometric research using biblioshiny software. By analyzing the abstracts from all 471 documents, we have identified three clusters of significant words. This factor analysis aims to understand the underlying dimensions and relationships among these keywords.

Table 8. *Clusters given with the use of Factor analysis with MCA method.*

Cluster 1	1) Environmental and social 2) Governance and ESG 3) ESG and disclosure 4) Financial performance 5) ESG performance 6) Corporate governance 7) Sustainability reporting 8) ESG reporting 9) Sustainability performance 10)ESG scores 11)Publishing limited 12)ESG information 13)ERP and environment 14)ESG practices
Cluster 2	1) Corporate and social 2) Social responsibility 3) Responsibility CSR
Cluster 3	1) Corporate and sustainability 2) Sustainable development 3) Socially responsible 4) Climate change 5) Sustainability reports 6) Supply chain 7) ESG factors

Source: Authors' results

Cluster 1 seems to be focused on environmental, social, and governance (ESG) aspects and their connections with financial performance, reporting, and corporate governance. It also covers sustainability reporting and ESG practices. Cluster 2 appears to concentrate on corporate social responsibility (CSR) and its relationship with social responsibility. This cluster is smaller than the other two and has a narrower focus. Cluster 3 mainly deals with sustainability, its relationship with corporate practices, and the broader aspects of sustainable development. This cluster also includes climate change, supply chain, and ESG factors.

In summary, the MCA results provide a clear picture of the key dimensions and relationships among the keywords in our bibliometric survey. Cluster 1 focuses on ESG aspects, financial performance and corporate governance, while Cluster 2 focuses on CSR and social responsibility. Cluster 3 focuses on sustainability and its broader implications. These insights can help you better understand the structure and issues of the research field and guide future investigations.

5. Discussion

In recent years, the interest in Environmental, Social, and Governance (ESG) research has grown significantly due to increasing concerns from stakeholders and investors. This study explores the relationship between ESG and the fraud triangle, agency theory, and sustainability. The research is based on 471 documents from the Scopus database, including articles, books, book chapters, conference papers, and reviews, published between 2008 and 2022.

Using a word cloud and bibliometric analysis, we discovered that the three components of ESG have not been simultaneously examined in the literature. Furthermore, the fraud triangle and agency theory concepts have not been addressed in the context of ESG research. The most trending topics in ESG research include ESG disclosure, corporate governance, sustainability reporting, ESG scores, and socially responsible investing. Our findings indicate that ESG is connected with sustainability, Corporate Social Responsibility (CSR), ESG disclosure, social responsibility, financial performance, sustainability reports, and ESG factors. However, the fraud triangle and agency theory have not been explored in relation to ESG.

While it is difficult to pinpoint the exact reasons why the fraud triangle and agency theory have not been explored in relation to ESG, there are several potential explanations. ESG research primarily focuses on understanding the environmental, social, and governance factors that affect corporate performance and value, as well as their implications for sustainable development. The fraud triangle and agency theory, on the other hand, are rooted in the analysis of fraud, deception, and principal-agent relationships. Researchers may have not yet considered connecting these seemingly distinct fields.

Furthermore, the field of ESG is relatively young and rapidly evolving. As more organizations and investors adopt ESG practices, the research focus has been on understanding the benefits and best practices for ESG implementation. The potential risks and negative aspects associated with ESG, such as the potential for fraud or misaligned incentives, may have received less attention.

Also, investigating the relationship between ESG, the fraud triangle, and agency theory may require access to detailed data on corporate practices, governance structures, and financial reporting. Such data may be difficult to obtain or analyze, especially considering the complex and multi-dimensional nature of ESG factors. Finally, the overall perception of ESG is that it represents positive corporate behavior and commitment to sustainability. Researchers may be less inclined to explore the negative aspects or potential risks associated with ESG, such as the possibility of fraud or agency conflicts.

Despite these potential reasons, it is important to recognize that the relationship between ESG, the fraud triangle, and agency theory warrants further exploration. As ESG becomes increasingly important in the corporate world and investment decision-making, understanding the potential risks and challenges associated with ESG practices can help create more robust frameworks and contribute to better decision-making.

6. Conclusion – Future Research - Limitations

Like any study, our study has certain limitations. One of these is the fact that we relied exclusively on the Scopus database for our data needs. Future research could expand the scope by including additional databases, allowing for a more thorough exploration of the relationship between ESG and human behavioural traits. From the perspective of fraud theories, the relationship between sustainability, company valuation, and fraud reporting needs to be further explored. Future studies could therefore benefit from exploring these relationships.

Another limitation is the framework for understanding managerial behaviour. We interpreted managers' behavioural characteristics using the fraud triangle and agency theory, which could be limiting. Therefore, to provide a more holistic understanding, future research should consider interpreting human behavioural characteristics using a broader range of updated theories of deception.

Overall, based on these results, we propose two main directions for future research. The first is to examine the relationship between ESG and the fraud triangle and agency theory. Also, newer fraud theories such as the fraud diamond, fraud pentagon, and fraud hexagon interpret human behavioural characteristics and can be examined for their relationship to ESG in future research. This could provide valuable insights into the potential risks and motivations behind ESG-related activities and contribute to better decision-making processes for investors, regulators, and other stakeholders.

In addition, a comprehensive analysis of the interplay between environmental, social, and governance factors could lead to a deeper understanding of their individual and collective impact on company valuation, sustainability, and fraud disclosure. Addressing these research gaps can further improve understanding of the complex relationships between ESG, fraud, agency theory, and sustainability. This will contribute to the development of more robust ESG frameworks and practises, ultimately benefiting companies, investors, and society.

Data Availability

All data underlying the results are available as part of the article and no additional source data are required.

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Competing Interests

No competing interests were disclosed.

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