Impact of Audit Quality and Climate Change Reporting on Corporate Performance: A Review and Future Research Agenda

Abstract

Purpose: The paper aims to review prior literature on the impact of audit quality and climate change reporting on corporate performance. It also aims to offer avenues for future research.

Method: Based on the systematic literature review, bibliometric investigation, and forest plot, we systematized the scientific knowledge from 183 papers.

Findings: Earlier studies either focused on audit quality and corporate performance or discussed the link between climate change and corporate performance. However, the way that audit quality and climate change can together influence corporate performance is yet to be examined. We fill the gap by examining the possible link between audit quality and climate change and establishing the influence of it on corporate performance from the existing literature.

Originality: Because of the immense importance of the company's contribution to climate change, the research findings will open up avenues for future research. In addition, findings will be useful for world policymakers in strengthening or modifying existing corporate responsibility policies.

Keywords: Climate change; Audit Quality; Systematic literature review; Bibliometric Analysis; Meta-analysis; Corporate performance

1. Introduction

The contribution of companies' activities towards climate change is one of the most widely discussed topics in recent academic literature among practitioners and policymakers (Bridge, 2023; Coen et al., 2022). It is evident that corporate performance is accountable for climate change (Busch, 2019). To reduce carbon emissions, the global agreement among companies is to keep the temperature at 1.5^{o}C (United Nations, 2015). To map with the Paris agreement, several countries have already developed their national-level carbon regulation. Regulatory framework and standardized reporting can enhance the quality of carbon reporting (Houqe & Khan, 2022). Thus, companies are aware of the financial benefits of high-quality non-financial reporting about their responsibilities towards the climate (Gitsham et al., 2021). However, the importance of climate reporting is not that prominent in the existing literature. A similar interest from companies is observed when there is a mandate to report about social responsibility (including responsibility towards climate change) (Aswani et al., 2021). Thus, the literature is inconclusive in establishing a direct link between corporate performance and climate change reporting (Gallego-Álvarez et al., 2014; Tang & Demeritt, 2018). Moreover, an efficient audit committee encourages audit firms to produce a quality audited report, which in turn affects corporate reporting quality (Abernathy et al., 2015). For example, better audit quality encourages a company to invest in a green policy (Ambec & De Donar, 2022). From the above-mentioned literature, it is not evident that there is always a strong relationship between audit quality and non-financial disclosure, especially on climate change. In other words, the existing literature finds that there is a possible relationship between the audit quality and climate change reporting. However, the above discussion also indicates that there can be a possible relationship between audit quality, climate change reporting and corporate performance. This significant possible relationship between corporate performance and the impact of their activities on climate change motivates us to critically analyze the relationship between audit quality, climate change and corporate performance. However, to the best of our knowledge, the aforementioned relationship is not yet examined in the literature. Thus, to address the above gap in the literature, in this study, we aim to answer the following question: How does the relationship between audit quality and corporate climate change reporting affect corporate performance?

The relationship between corporate performance and audit quality is well established in extant literature. For example, the size of an audit firm can influence the quality of auditing (Alzeban, 2021). The presence of an independent auditor can enhance the ethical representation of the

business operation (including non-financial factors) that affect corporate performance (Al-ahdal & Hashim, 2022). Consequently, auditors' independence and effectiveness are always connected to high audit quality. So, audit quality has always been important for reporting quality, corporate responsibility, and performance (Salem et al., 2021). Also, the effect of the above-mentioned factors determining audit quality is extended in the context of non-financial reporting (in this study, we focus on climate reporting by companies) (Benlemlih & Girerd-Potin, 2017; Sharma et al., 2022). Thus, from the existing literature, we conclude that audit quality influences corporate financial and non-financial reporting. While producing non-financial reports, companies are cautious about the credibility of the same (Cuomo et al., 2022). Responsibility of the company towards the climate or society can be compared with their peers based on their non-financial reporting (Stolowy &. Paugam, 2018). So, a highly credible and comparable non-financial report allows companies to stand out of the crowd, which determines their performance (Sharma et al., 2022). The above discussion confirms that audit quality is a key instrument in building a strong relationship between corporate non-financial reporting and performance. Through non-financial reporting, companies effectively communicate their green initiatives to their stakeholders (Bannier et al., 2022). On the other hand, the better quality of non-financial reporting has the potential to communicate better with stakeholders. In recent studies, we found a positive relationship between audit quality and a company's green initiatives or social responsibility (Kahia et al., 2022). In addition, a few studies started discussing perceptions of non-financial reporting by auditing professionals and its impact on their auditing activities (Eugénio et al., 2022). Because of rapid changes in climate due to companies' activities, it is important to understand, how companies can stop further damage to the climate. In addition, further research evidence is needed to find out how companies can engage their key stakeholders (e.g., auditors) in addressing this burning issue without compromising their financial performance. Thus, the above argument motivates us to identify the future research agenda after critically examining the inconclusive literature on the impact of the relationship between audit quality and climate change reporting on corporate performance (Meah et al., 2021; Maji & Kalita, 2022).

Because of the rapidly evolving nature of sustainability issues (including climate change) and the limitations of complicated reporting of the impact of company activities on climate change, we conducted an in-depth literature review to develop our understanding of the discussion of the topic in recent academic literature (Gaziulusoy & Boyle, 2013; Dabic et al., 2019). We conducted a systematic literature review, bibliometric analysis and meta-analysis for the

systematization of the transdisciplinary literature (Mustafa et al., 2022). For the systematic literature review and bibliometric analysis, we critically analyzed 183 papers. From the above analysis, we find that earlier studies focused on audit quality and corporate performance ((Al-ahdal & Hashim, 2022) or non-financial reporting and corporate performance (Cuomo et al., 2022). Thus, it is evident that both audit quality and non-financial reporting by companies influence their performance. However, how audit quality and on climate change reporting influence corporate performance is not examined in detail. So, to fill the above gap in the literature, we propose a new future research agenda that is mainly focused on the role of auditors to assist companies in integrating high-quality climate change reports into their financial growth strategy.

The findings of the study derived from an integrated approach will enrich existing literature on audit quality, climate change reporting and the relation between both as a determinant of corporate performance. In recent years, regulators have considered climate change in their business policy (e.g., Maji & Kalita, 2022). There is an increasing need to identify new strategies that companies should follow to lessen the impact of their activities on climate change. Thus, the findings of this study will be useful for the company executive responsible for developing strategies for their accountability towards climate change and for the regulators overseeing the company practices.

There is an urgent call for companies to work on environmental and societal issues collectively so that the materialization of sustainable development goals (SDG) can be attained by 2030, as determined by the United Nations (UN). Furthermore, as per the UN Global agenda, companies should generate and use renewable energy and minimize the emission of carbon dioxide into the environment. Thus, to combat the adverse impact of climate change, companies need to introduce funds to a low-carbon sustainable energy system (Cho & Berry, 2019; Wong & Ngai, 2021). To our best knowledge, our study is the first to fill the gap as indicated by the above-mentioned studies and focuses on the significance of climate change reporting in determining corporate performance by considering the audit quality at the core of it.

In Section 2 we describe the methodology followed by the findings in Section 3. In Section 4, we discuss the main findings of the analysis and put forward the future research agenda. In section 5 we conclude by highlighting the implications and limitations of the study.

2. Methodology

2.1 Sample selection

Following existing research, we adopt a Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) approach to provide evidence of the minimum set of items for systematic review (Moher et al., 2009). Following earlier studies in the field of business and finance, in Figure 1, we report the selection, identification, screening, eligibility, and inclusion of the data in the PRISMA (Gough et al., 2012; Babatunde et al., 2017; Muhmad & Muhamad, 2020).

For a scientific understanding of the topic, we conduct a systematic literature review, bibliometric analysis, and meta-analysis of already available evidence. Many studies emphasized the importance of a systematic literature review (Rahim et al., 2022) and bibliometric analysis simultaneously (Pizzi et al., 2020; Mustafa et al., 2022). However, meta-analysis is another recognized method to analyze existing literature. Thus, we added it in addition to the above two (Iwasaki & Satoshi, 2020). In the following sections, we justify the methodology used in this research.

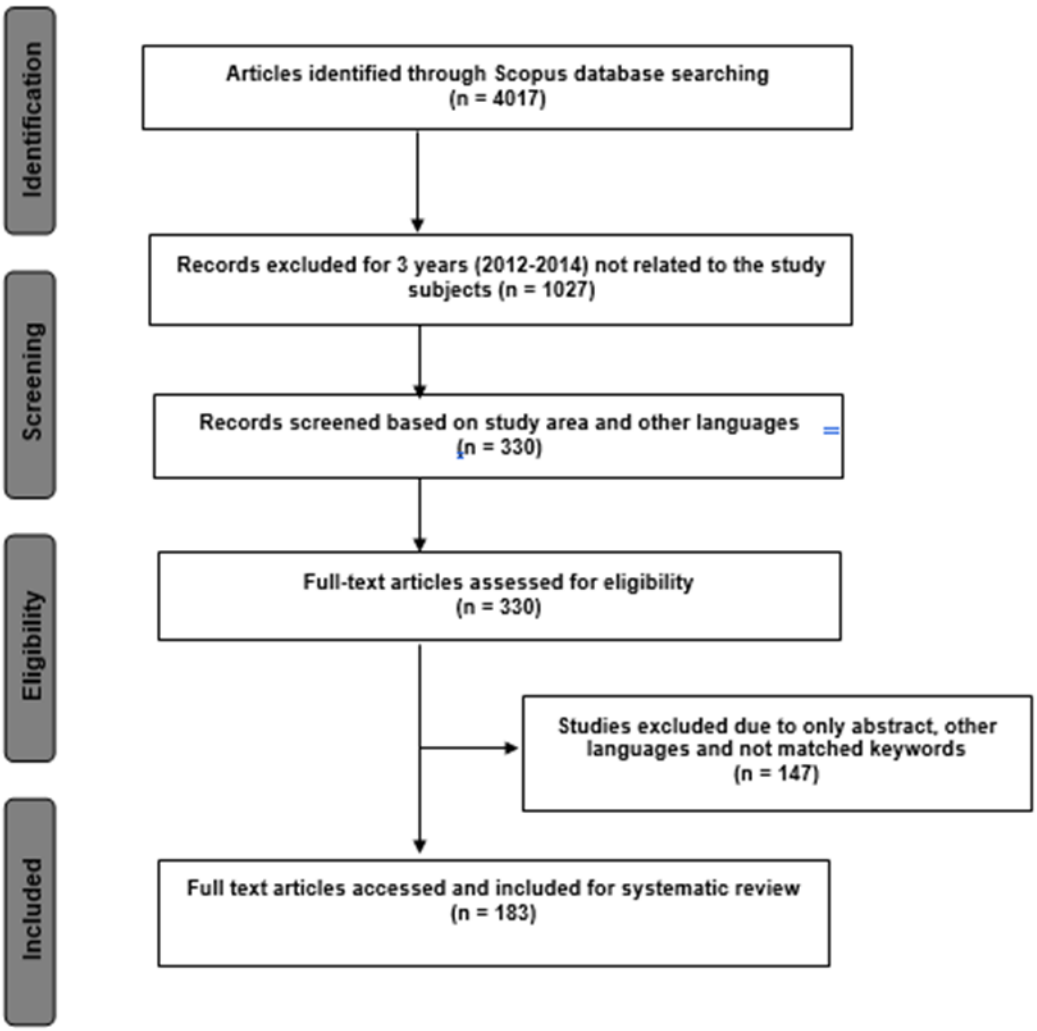

Figure 1. PRISMA flow diagram for the systematic literature review

2.2 Method

2.2.1 Systematic literature review

We perform a systematic search through the Scopus database until 20 February 2023 (more criteria are detailed further in this section). The final sample consists of 183 papers, which is consistent with similar research (Benlemlih & Girerd-Potin, 2017; Alzeban, 2021; Rahim et al., 2022). We allow the maximum time limit available in the database to avoid distortion of the results as well as using specific keywords related to clusters (Table 1). The first relevant article published in the database was in 2012 and the last in 2023, regarding audit quality,

climate change and company performance, which is similar to relevant literature (Benlemlih & Girerd-Potin, 2017). Later, we exclude the years from 2012 to 2014 because of the popularity of discussion about climate change after the Paris agreement (OECD, 2018; Sheppard & Young, 2020; Kim & Kim, 2022). In addition, from 2015, world economies observed the urgency of SDGs more judiciously than before and so, we observe a trend of reporting of climate change by companies in alignment with SDGs 7 and 13 (The UN SDG 7 defines as affordable and clean energy, and the UN SDG 13 defines as climate action)[1] (Ioannou & Serafeim, 2017). Similarly, with the introduction of the limit on carbon emission and declaration of zero carbon by 2045-2050 in COP 21 (OECD-CDSB, 2015), we find more attention to carbon disclosure by companies after 2015 (Derchi et al., 2023). Following the literature, we categorize articles used in the systematic literature review in relevant clusters reported in Table 1 (Al-Shaer et al., 2022; Mustafa et al., 2022).

To answer the proposed research question, the focus of the analysis is around the clusters on audit quality, climate change and company performance. However, in academic literature, it is important to understand the theoretical framework used by researchers to explain the complex relationship between audit quality and disclosure on climate change in the context of company performance (Xu et al., 2022; Sharma et al., 2022). There are several challenges in mitigating carbon emissions. For example, companies need huge investments in green and clean energy to replace their existing use of fossil fuels (Long et al., 2017). The marginal financial benefit of using alternative energy (Bachner et al., 2019) and disclosure requirements (Fu et al., 2015) restrain companies from taking initiatives about climate change. Therefore, disclosure information can reflect on corporate performance. Salem et al. (2021) suggest that the quality of disclosure information given is not directly proportional to the amount of disclosure but rather to how widely it is disseminated and how helpful it is. Sometimes companies are reluctant to carry out social responsibility even at the cost of their performance, which is reflected in audit reports (Kuldasheva & Salahodjaev, 2022). Differences are prominent in some countries, and they vary according to region. As such, we consider the geographical cluster in this study.

Table 1: System of article categorization for cluster

A. Audit quality cluster
Audit quality
Audit
Internal audit
Audit fees
Audit committee
B. Climate change cluster
SDG
SDG7
SDG 13
Clean energy
Renewable energy
Climate action
C. Company performance cluster
Disclosure
Non-financial reporting
Climate disclosure
Firm sustainability policy
Integrated performance
Strategy
Stakeholders
Industry
Regulatory framework
D. Theory cluster
Stakeholder theory
Resource-based view
Network theory
Agency theory
Institutional theory
Other theories
E. Geographical location cluster
OECD
BRIC
Developing/emerging countries
Developed countries

2.2.2 Bibliometric analysis

Bibliometrics analysis is a statistical method to study scientific activity in a field of research and is popular in business and management studies (Zupic & Cater, 2015; Jamwal et al., 2021;

Xu et al., 2022). It combines two main procedures: performance analysis and science mapping. Following the existing literature, for performance analysis, we focus on the keywords relevant to this study and calculate these indicators using the software program VOSViewer (Marzi et al., 2017; Pizzi et al., 2020b). We draw the density diagram to represent a network of large, connected sets of cited keywords used in Table 1, which are presented through circles. The size of the circles varies according to the importance of the element (Maji & Kalita, 2022). We use co-occurrence of keywords as indicators for our science mapping (Mustafa et al., 2021). In the present study, we focus on the maximum use of keywords in audit quality, climate change and company performance.

2.2.3 Meta-analysis

To examine the heterogenicity in different articles and to understand the relationship between audit quality and climate change reporting by companies, we conduct a meta-analysis, also popular in accounting literature (Iwasaki & Satoshi, 2020; Khlif & Chalmers, 2015). Generally, selection bias is a major challenge in research focusing on a new and evolving topic. To find robust evidence, we draw the forest plot of the sample considering papers with citations greater than 50 times. The forest plot is used to determine the Log Odds ratio (OR) on specific citations of journals along with corresponding lower and upper 95% confidence intervals (CI). We follow the protocol of Chattopadhyaya et al. (2021) for the meta-analysis to know the most cited journals regarding the research topic.

3. Findings

3.1 Systematic literature review

In this section, we explain the findings of the systematic literature review related to each cluster mentioned in Table 1.

Audit quality cluster:

Audit quality can be defined and determined by several factors (Christensen et al., 2016). Auditing quality is important in determining the success of corporate governance (Holm & Zaman, 2012). The scholars failed to conclude what audit quality is because of its socially constructed nature (Francis, 2004). However, there is an agreement that the audit report of a company is the only observable feature of the audit quality (Manson & Zaman, 2001). Factors that determine an auditor's competence and independence are considered to be the main determinants of audit quality in the literature (Rajgopal et al., 2021). From our research sample,

we find that the size of an audit committee, audit fees and internal audit are key determinants of audit quality and the overall audit process of a company (Ng et al., 2018). The findings of the first cluster's audit quality and other clusters are reported in Table 2. From the final sample of the research, 26 papers belong to the cluster dedicated to audit quality. The frequency of appearance of relevant keywords are as follows: audit (7.69), audit quality (19.23), audit committee (42.31), audit committee size (7.69), audit fees (7.69), and internal audit (15.39), respectively. According to Cohen et al. (2014), the audit committee plays an important role in determining the company reporting. The effectiveness of the audit committee influences the performance of the company which is reflected to stakeholders through company reports (Komal et.al, 2022). With a higher engagement of audit committees with non-financial disclosure (for example, climate change) the size of the committee gets bigger and there is a high fee involved in conducting quality audits related to the accountability of companies towards society and the environment (Ghafran & O'Sullivan, 2017). Thus, from the analysis of the first cluster, it is evident that over the years, researchers have focused on corporate non-financial disclosure. However, there is very limited knowledge about the accountability of companies towards climate change and related disclosure and the impact of the same on company performance.

Table 2: Focused articles for literature review and related keywords frequency

Cluster	Number of papers (sample size)	Keywords frequency (%)
A. Audit Quality	26	Audit (7.69), Audit quality (19.23), Audit committee (42.31), Audit committee size (7.69), Audit Fees (7.69), and Internal Audit (15.39)
B. Climate Change	30	Sustainable development (46.67), Climate change (26.67), Carbon emission (6.67), SDG (6.67), CO2 emissions (10.00), and Ecological sustainability (3.32)
C. Company performance	101	Corporate Social Responsibility (39.38), Firm Performance (16.58), Performance (10.36), Financial Performance (3.63), Sustainability (3.11), Innovation (4.14), Environmental Sustainability (3.11), Business Performance (1.04), Corporate Performance (1.04), Green Innovation (3.63), Sustainability Reporting

		Corporate Social Responsibility (1.55), CSR Environment, Environmental (1.04), Company Performance (1.85), Green Investment (0.52), Performance Assessment, Accountability (1.55), Stakeholder (1.55), Environmental Management (1.55), Sustainability Performance (1.04), Business Strategy (0.52), Environmental Innovation (0.73), Environmental Management Practices (0.52), Sustainable performance (0.52), and Performance management (1.04).
D. Theory	8	Agency Theory (60.0), Stakeholder Theory (20.0), Institutional Theory (18.0), Other Theories (2.0).
E. Geographical location	18	China (16.66), India (11.11), Malaysia (11.11), Saudi Arabia (11.11), Bangladesh (11.11), South Africa (11.11), Mexico (5.55), Europe (11.11), Developing countries (5.55) and MENA countries (5.55)

Climate change cluster:

From the critical analysis of the sample papers under the climate change cluster (30 papers), we find an extensive discussion about sustainable development goals in general (46.67 per cent). We use the keyword sustainable development goal to not miss any papers discussing the environmentally sustainable goal about other goals. It is common in the literature and practice to use SDG in place of sustainable development goals. So, we searched with SDG and found that 6.67 per cent of papers in the second cluster focus on SDG. In addition, we also observe the attention of literature towards SDG 7 and SDG 13 (Maji, & Kalita, 2022; Mustafa et al., 2022). In the extant literature, both SDG 7 and SDG 13 are widely used as the proxy for climate change. We follow (http://www.unstats.un.org) to define SDG 7 and SDG 13. The UN SDG 7 refers to affordable and clean energy, and the UN SDG 13 refers to climate action. From the final sample, the frequency of appearance of climate change is 26.67 per cent, with carbon emissions at 6.67 per cent and CO_2 emissions at10 per cent. We also find discussions around ecological sustainability (3.32 per cent) in our sample. Thus, the systematic analysis provides evidence that carbon emission and attainment of SDG 7 and SDG 13 are gaining importance in academic literature. However, from the analysis of the papers, we find that researchers are concerned about climate change and its implications on society and the need for extensive involvement of companies to protect the environment. However, we cannot find enough attention in the research about companies claiming their accountability towards climate change

through their company disclosure. Such a gap in the literature raises the question as to whether there is enough pressure from their auditors to claim the impact of their activities on climate change. Thus, we propose that in future studies researchers need to consider audit quality and the impact of company activities on climate change disclosure in the discussion around company performance. Our findings reported in Table 2 support the above argument. The close relation between both of these clusters is presented in Figure 2.

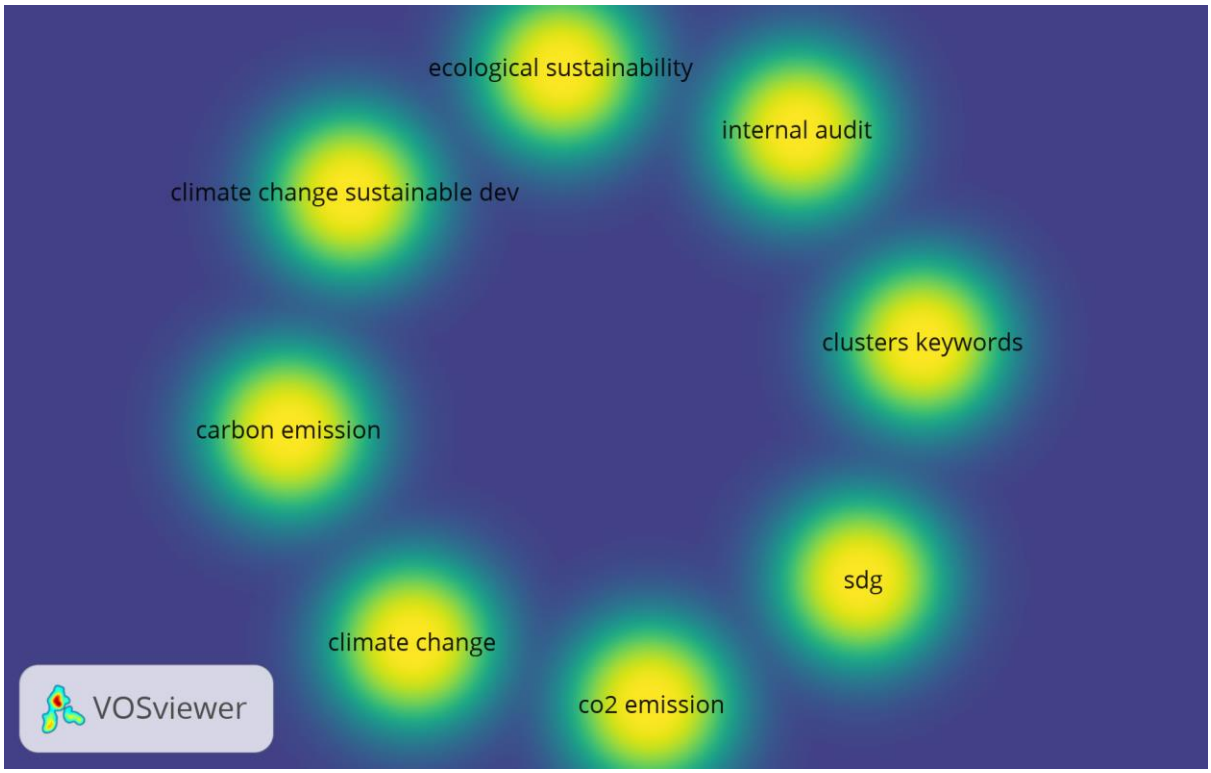

Figure 2: Density diagram for audit quality and climate change clusters

From Figure 2 above, it is evident that the importance of audit quality is growing with the increasing need to have companies involved in climate change disclosure. The similar size of the circles supports our argument that different features of both clusters should be discussed together in future studies. However, as the focus of this research is to examine how the link between audit quality and climate change disclosure can impact company performance, in the next cluster we focus on company performance.

Corporate Performance:

There are 101 papers in corporate performance cluster reported in Table 2. From the analysis of the sample research papers we find a growing interest towards corporate social responsibility because of its importance in improving corporate performance (Nandy et al., 2020). Companies' environmental performance, on top of their overall social responsibility, is identified as a major determinant of their financial performance (de Villiers et al., 2011). Even the compensation of the executives is tied up with their environmental performance (Peters et al., 2019). Therefore, stakeholders have the potential to utilize climate change, especially carbon disclosures, as a means to assess the prospects of carbon-intensive firms and further examine their financial reporting quality with the aid of additional supportive information (Tan et al., 2022). Companies adopt global reporting standards and other relevant standards to report on the impact of their operations on climate change (Nandy et al., 2022) as their performance is dependent on their strategic decisions related to the environment. Similar to financial stakeholders, companies consider the environment as an important stakeholder (Arvidsson & Dumay, 2022), which is supported by our analysis. In Table 2, from the frequency (%) of the keywords related to corporate performance, we find the highest percentage of Corporate Social Responsibility (39.38). In addition, we find that less numbers of papers focus only on Corporate Performance (16.58), specifically on Financial Performance (3.63), Performance (4.66), Business Performance (1.04), and Corporate Performance (1.04). The majority of the papers pay attention towards environmental sustainability in their analysis of corporate performance. For example, in Table 2 we report the following frequency in explaining the relation between environmental sustainability and corporate performance: Sustainability (3.11), Innovation (4.14), Environmental Sustainability (3.11), Green Innovation (3.63), Green Investment (0.52), Environmental Management (1.55), Sustainability Performance (1.04), Environmental Innovation (0.52), Environmental Management Practices (0.52), Sustainable performance (0.52), and Performance management (1.04).

In Figure 3, we draw a network diagram to explain the existing link between climate change and synonymous keywords with corporate performance. In literature, climate change appears as sustainability reporting or environmental sustainability or carbon disclosure and is closely linked with the disclosure or reporting approach of companies. From Figure 3, we find there is a discussion about the need for innovation, resource constraints, differences in industry reporting of corporate social responsibility and the relation of these terms with business performance and firm value. However, there is a direct relationship with corporate governance (audit quality is a proxy of corporate governance) and stock market returns, but not with the

environment. Thus, we recommend a need for future studies related to audit quality specifically with climate change instead of sustainability reporting in determining company performance.

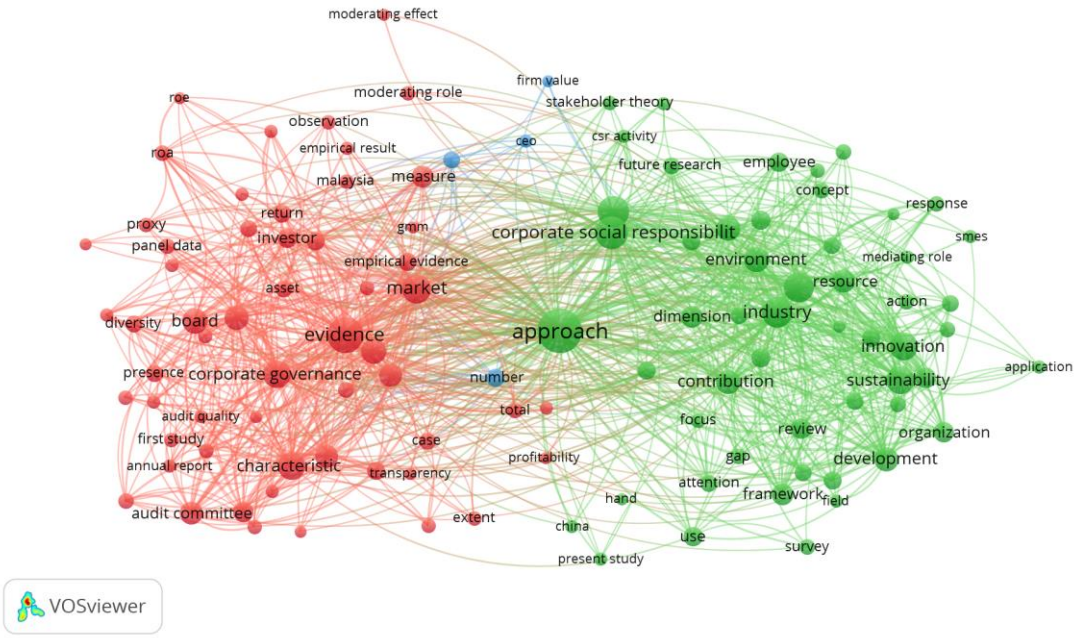

Figure 3: Network diagram for climate change and company performance clusters

Theory Cluster:

To understand the theoretical framework used in existing research in the context of our research, we develop a Theory Cluster. We find very few papers explaining the theoretical models in examining the research question. Among the papers screened, 60 per cent mentioned the importance of Agency Theory, followed by Stakeholder Theory (20.0), Institutional Theory (18.0), and Other Theories (2.0). The findings support the similar research on Agency theory (Ben-Amar & McIlkenny, 2015). In practice, there exists an agency tension as executives prefer to consider their benefits over the shareholders' interests when it comes to the disclosure of company accountability towards non-financial stakeholders like the environment (Busch & Hoffmann, 2011; Nalukenge et al., 2018; Bruce, 2020). However, when companies follow a better governance framework, audit quality improves and the agency issues are mitigated (Egwuonwu et al., 2021). The growing attention of companies towards the environment and the embedment of this in the business model as a stakeholder is well explained by stakeholder theory (Hörisch et al., 2020). In addition, institutional theory explains the importance of mandatory and voluntary rules and regulations in the operation of business activities and the social structure companies operate in (Kostyuchenko et al., 2021). Table 2, Cluster D explains

the frequency of appearance of each of the theories in our sample. The findings indicate that it is difficult for one particular theory or a theory from a subject area to explain the complex relationship between climate change and company activities. Thus, in future studies, researchers should apply an interdisciplinary approach and adopt a multi-theoretical framework which should consist of traditional disclosure-related theories alongside relevant theories beyond the subject area.

Geographical Location Cluster:

From our analysis of the sample papers, we find some are focused on a single country from different geographical regions or concentrate on a particular region. For example, we found several papers in China (16.66) and India (11.11), among other Asian countries. However, the economic condition of these countries cannot be measured on a single scale. So, there is a need for a separate country-specific study. In the literature, we find that developing countries face certain challenges compared to developed countries, so if the focus of the study is on certain common challenges, then it is better to do a comparative study (Parmentola et al., 2021). Because of the growing importance of climate change and national-level regulatory framework to capture the company accountability towards climate change, we find an urgent need for country-level detailed study simultaneously with region-based research. The major countries and regions mentioned in in the extant literature are presented in Figure 4.

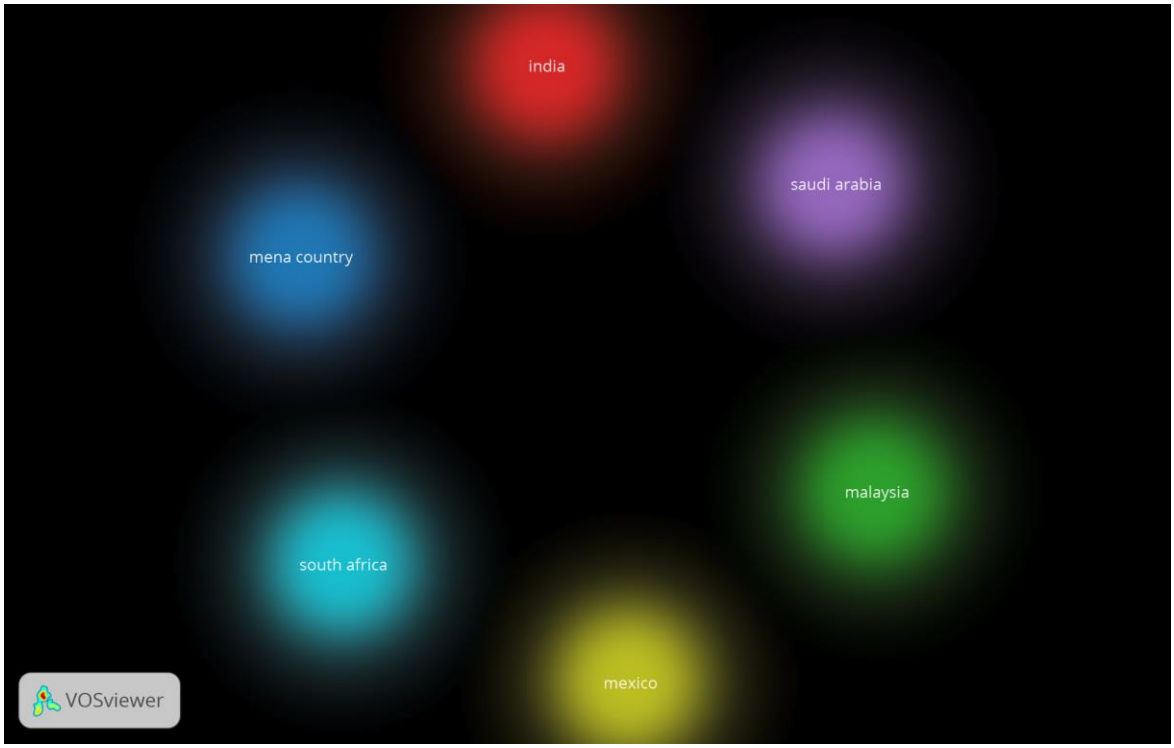

Figure 4: Geographical location cluster

3.2 Bibliometric analysis

The bibliometric analysis strengthens our argument postulated within the systematic literature review research. Table 3 summarizes 5 top-cited journals related to the search keywords (audit quality, climate change disclosure, and company performance). For example, a paper by Brammer and Pavelin (2008), which is cited 1122 times, shows the importance of auditing quality related to environmental disclosure. The other purpose of the co-citation table (Table 3) is to get a better understanding of the importance of climate change disclosure in the literature. The line diagram (Figure 5) shows that over the years, the number of researchers engaging in discussion about audit quality in climate change and audit quality, climate change in company performance is increasing. For example, the article in the Business Strategy and the Environment journal published in 2008 is cited by 1122 other papers and the paper published in 2015 in the same journal is cited by 242.

Table 3: Top 5 most cited journals as per specific keywords related to the study.

ID	Title	Year	Journals	Cited by
1	Factors influencing the quality of corporate environmental disclosure	2008	Business Strategy and the Environment	1122
2	How hot is your bottom line? Linking carbon and financial performance	2011	Business & Society	469
3	HRM practices used to promote pro-environmental behaviour: a UK survey	2015	International Journal of Human Resource Management	295
4	Corporate governance and the rise of integrating corporate social responsibility criteria in executive compensation: Effectiveness and implications for firm outcomes	2019	Strategic Management Journal	268
5.	Board effectiveness and the voluntary disclosure of climate change information.	2015	Business Strategy and the Environment	242

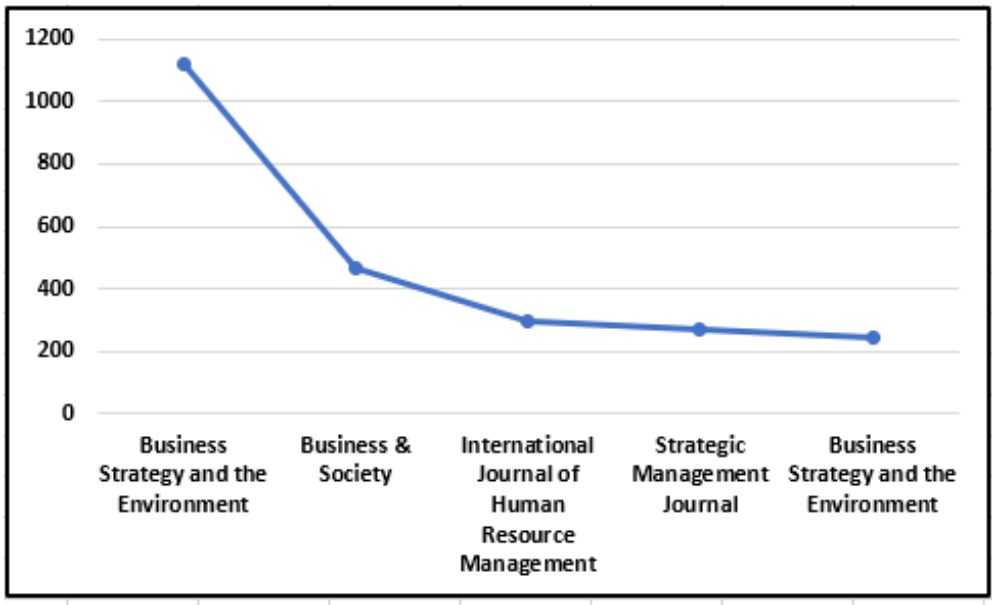

Figure 5: Line diagram for maximum citations in specific studied journals

3.3 Meta-analysis

Figure 6 exhibits the Forest plot of the major citations in journals in which the log Odds ratio, and lower and higher 95% confidence interval (CI) values in each study are obtained. Among seventeen studies (more than 50 times citations) related to keywords such as audit quality, climate change and company performance, Business Strategy and the Environment finds a higher sample size. The big dots represent the point estimate and confidence intervals when we combine and average all the individual studies together. A vertical line through the vertical points of the dots represents the point estimate of the averaged studies. The horizontal points of the dots represent the 95% CI of this combined point estimate. The larger the study, the smaller the horizontal line and the bigger the dots representing the point estimate. The CI ranges are smaller on the forest plot in the present study.

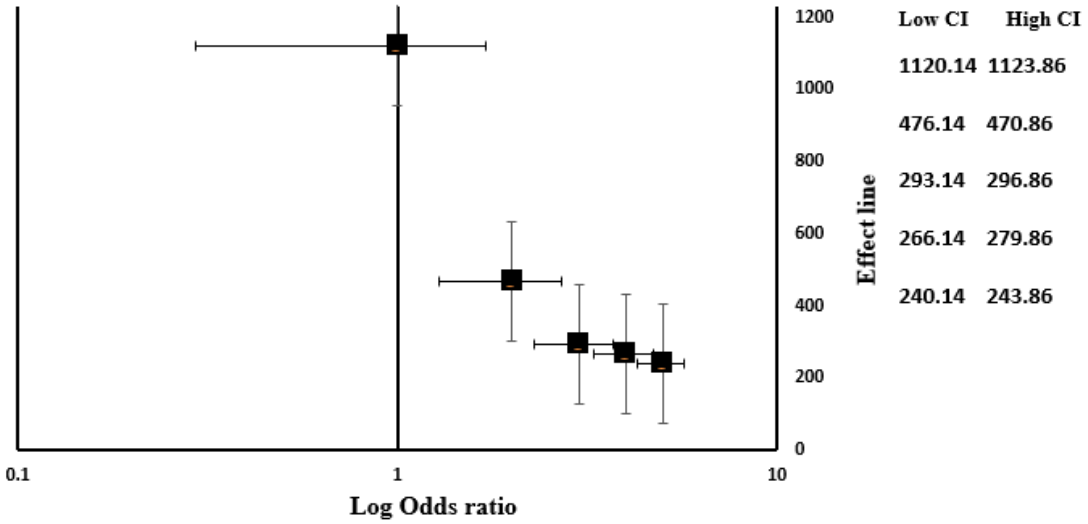

Figure 6: Forest plot of the major citations in the journal

4. Discussion and Future Research Agenda

From the analysis, we find that the audit quality determines company disclosure (Brammer & Pavelin, 2008). Moreover, audit quality influences non-financial disclosure too. For example, Ammar Zahid et al. (2022) postulated that audit quality is related to environmental, social, and governance (ESG) factors and corporate financial performance (CFP) in Western European countries. In line with the literature, we find ESG benefits the firm's revenues/sales, as customers and every stakeholder tend to reward companies with good ESG strategies (Okafor et al., 2021). ESG provide all relevant information to their stakeholders, making the information more valuable to cultivate a trusted relationship with stakeholders (Gerged et. al 2023). Similar to the existing studies, in our research, we find an increased interest in research related to ESG in general and climate-related disclosure in particular. In the recent literature, we found several research papers explaining the positive relationship between the quality of carbon disclosure and corporate performance (Brammer and Pavelin, 2008 & Busch and Hoffmann, 2011). According to Ammar Zahid et al. (2022), there is a moderating effect of audit quality on the ESG-CFP nexus. Motivated by these research papers discussing a possible positive relationship between audit quality and climate disclosure, we critically examine the validity of the above relationship in the first three clusters in our systematic literature review. In most of the papers in our sample, we find that audit quality is important in company disclosure (e.g., Salem et. al. 2021). From further analysis of the literature, we find that audit quality is one of the most important factors in determining levels of non-financial disclosure, like corporate climate change disclosure. The above findings support the recent literature

focusing on explaining the importance of audit quality in company disclosure (e.g., Salem et.al. 2021). Thus, from the analysis of the first three clusters (Table 2), we conclude that as audit quality determines the non-financial disclosure of companies, so, it is similarly important in the climate change disclosure of a company. However, how the influence of audit quality on climate change disclosure will determine corporate performance is yet to be examined in detail in the literature. In our analysis, we try to address this gap in the literature and extend our study to examine the theoretical underpinning of related research. From our analysis we noted the importance of the agency theory followed by the stakeholder theory. (e.g., Ben-Amar & McIlkenny, 2015; Nalukenge et al., 2018). In addition, we also find the importance of institutional theory in explaining the governance mechanism determining the audit quality in explaining the relationship with stakeholders. Moreover, we try to find out if there is any regional specification that could influence the relationship between corporate performance, audit quality and climate disclosure. We find that OECD, BRIC, developed and emerging countries all are focused on improving climate disclosure to attract the attention of their stakeholders. Additionally, we find evidence of the importance of corporate governance, especially audit quality determining levels of non-financial disclosure including climate change information. The above findings are similar to the existing trend in research (Parmentola et al., 2021). Thus, to explain the complex nature of accountability of the corporate world towards climate change, we propose the following future research agenda. First, how do differences in audit quality influence the climate reporting by companies? Second, how a mature relationship between audit quality and climate reporting can determine the financial performance of a company?

In addition, from the analysis of the papers under the theory cluster, we agree with the majority of the papers claiming that one subject-specific theory might not be suitable for explaining the above critical relations (Orazalin et al., 2023). Thus, our third recommendation for future research is as follows: Which theoretical framework can explain the combined impact of audit quality and carbon reporting on company performance? Moreover, from the analysis of the literature, we find an urgent need for country-level studies in conjunction with geographical region0basis comparative studies (Dong et al., 2022). Especially when there is a need for discussion about any challenge of climate change disclosure by companies, then the focus should be on cross country study (Khan et al., 2021). Thus, the fourth and final proposed research question is: What are the major differences between country and cross-country study when the relationship between audit quality and climate reporting determines corporate performance?

In summary, in future studies on corporate performance, researchers need to consider the strong relationship between audit quality and climate change disclosure in account. The findings of the above questions will open new avenues in the research related to corporate social responsibility and green innovation needed to mitigate the problem associated with CO_2 emissions. Nevertheless, the findings will identify specific indicators of the company's climate movement in the form of operational improvements, which can yield important and verifiable insights that have often been neglected in more general emissions or climate policy auditing. In addition, an increase in attention should prioritize the application of machine learning algorithms for Climate Change Risk Assessment (CCRA) of companies. Big data analysis for CCRA will allow the regulators to get a better understanding of the extent to which the companies are accountable for the damage to the climate. The company board will also benefit from CCRA, as the findings will assist them in developing necessary environmental strategies to match with the environmental policy proposed by the governing bodies. In other words, policymakers and market authorities could identify the level of initiatives by companies in achieving zero carbon and accordingly could make necessary changes in auditing practices to motivate companies to gradually become zero carbon.

5. Conclusion

The main purpose of this research is to examine the existing literature to get a detailed understanding of the relationship between audit quality, climate disclosure and corporate performance. Through systematic literature review, bibliometric analysis and meta-analysis, we find that audit quality is one of the most important factors in explaining company performance (Uyar et al., 2023). In addition, companies are familiar with the consequences of the adverse impact of their activities on climate and the impact of the same on their performance (Ngo et al., 2022). However, the company performance literature is inconclusive if we do not consider the company strategy of non-financial disclosure, mainly focusing on climate reporting. This study pertains a qualitative methodology focused on systematic literature review and bibliometric analysis followed by quantitative assessment through meta-analysis to identify to what extent researchers are confident about the possibility of positively linking the outcome of company performance based on audit quality and climate change perspectives, especially with the attainment of SDG 7 and SDG 13 (Mustafa et al., 2022).

Like other studies, this research is not free from limitations. The research methodology could be improved if we manage to get more papers related to specific industries and countries.

However, as climate disclosure is relatively a new requirement for corporations, the sample used in the analysis does not reach like the studies related to sustainability reporting. In addition, in most countries, the reporting of climate change is voluntary, so our sample of papers was unable to capture some of the challenges in climate change reporting in certain countries. However, we confirm the validity of the sample by checking similar studies where they use systematic literature review to conclude the possible impact of non-financial disclosure on company performance (Komal et. al, 2022; Cohen et. al, 2014). The study can be improved further if we do a detailed studies on recent country specific changes in environmental disclosure policy, which could enrich the study. Widening the scope of the research to capture all theories used in developing similar research could be interesting to examine. However, the systematic literature review allowed us to make a good start to understand the importance of audit quality in corporate accountability towards climate change disclosure in determining corporate performance. Thus, the findings of the study are timely and the future research agenda addressing the gap in the literature will be extremely valuable for auditing, non-financial disclosure, and corporate performance literature.

References

Abernathy, J. L., Beyer B., Masli, A., & Stefaniak., C. M. (2015). How the source of audit committee accounting expertise influences financial reporting timeliness. *Current Issues in Auditing*, *9*(1), 1-9.

Al-ahdal, W. M., & Hashim, H. A. (2022). Impact of audit committee characteristics and external audit quality on firm performance: evidence from India. *Corporate Governance, 22*(2), 424-445.

Al-Shaer, H., Malik, M. F., & Mahbub Zaman, M. (2022). What do audit committees do? Transparency and impression management. *Journal of Management and Governance*, *26*, 1443-1468.

Alzeban, A. (2021). Internal audit findings, audit committees, and firm performance evidence from UK. *Asia-Pacific Journal of Accounting & Economics*. 10.1080/16081625.2021.1908153

Ambec, S., & Philippe De Donder, P. (2022). Environmental policy with green consumerism. *Journal of Environmental Economics and Management*, *111*, 102584.

Ammar Zahid, R. M., Khan, M. K., Anwar, W., & Maqsood, U. S. (2022). The role of audit quality in the ESG-corporate financial performance nexus: Empirical evidence from Western European companies. *Borsa Istanbul Review*. https://doi.org/10.1016/j.bir.2022.08.011

Arvidsson, S., & Dumay, J. (2022). Corporate ESG reporting quantity, quality and performance: Where to now for environmental policy and practice. *Business Strategy and the Environment*, *31*, 1091-1110.

Aswani, J., Chidambaran, N. K., & Hasan, I. (2021). Who benefits from mandatory CSR? Evidence from the Indian Companies Act 2013. *Emerging Markets Review*, *46*, 100753.

Babatunde, K. A., Begum, R. A., & Said, F. F. (2017). Application of computable general equilibrium (CGE) to climate change mitigation policy: A systematic review. *Renewable and Sustainable Energy Reviews*, *78*, 61-71.

Bachner, G., Mayer, J., & Steininger, K. (2019). Costs or benefits? Assessing the economy-wide effects of the electricity sector's low-carbon transition – The role of capital costs, divergent risk perceptions and premiums. *Energy Strategy Reviews*, *26*, 100373.

Bannier, C. E., Bofinger, Y., & Rock, B. (2022). Doing safe by doing good: Non-financial reporting and the risk effects of corporate social responsibility. *European Accounting Review*, 1-31.

Ben-Amar, W., & McIlkenny, P. (2015). Board effectiveness and the voluntary disclosure of climate change information. *Business Strategy and the Environment*, *24*(8), 704-719.

Benlemlih, M., & Girerd-Potin, I. (2017). Corporate social responsibility and firm financial risk reduction: on the moderating role of the legal environment. *Journal of Business Finance & Accounting*, *44*(7), 1137-1166.

Brammer, S. and Pavelin, S., 2008. Factors influencing the quality of corporate environmental disclosure. Business strategy and the environment, 17(2), pp.120-136.

Brammer, S., & Pavelin, S. (2008). Factors influencing the quality of corporate environmental disclosure. *Business strategy and the environment*, *17*(2), 120-136.

Bridge, D.J., 2023. The ethics of climate change and the green new deal: a qualitative study. *Journal of Accounting Literature*, 45(1), 48-63.

Bruce, G. (2020). Agency theory, accounting based performance evaluation systems and IFRS: A brief relational overview. *Journal of Economics and Business*, *3*(3), 1158-1164.

Busch, T. (2019). Markets must back climate mitigation. *Nature*, *571*, 36.

Busch, T. and Hoffmann, V.H., 2011. How hot is your bottom line? Linking carbon and financial performance. Business & Society, 50(2), pp.233-265.

Busch, T., & Hoffmann, V. H. (2011). How hot is your bottom line? Linking carbon and financial performance. *Business & Society*, *50*(2), 233-265.

Chattopadhyaya, S., Dinkar, B. K., Mukhopadhyay, A. K., Sharma, S., & Machado, J. (2021). Meta-analysis and forest plots for sustainability of heavy load carrier equipment used in the industrial mining environment. *Sustainability*, *13*, 8672.

Cho, Y. N., & Berry, C. (2019). Understanding the effects of retailer-and manufacturer-provided sustainability labels on product evaluations and purchase-related outcomes. *Journal of Business Research*, *100*, 73- 85.

Christensen, H. B., Nikolaev, V. V., & Wittenberg-Moerman, R. (2016). Accounting information in financial contracting: The incomplete contract theory perspective. *Journal of Accounting Research*, *54*(2), 397–435.

Coen, D., Herman, K., & Pegram, T. (2022). Are corporate climate efforts genuine? An empirical analysis of the climate 'talk–walk' hypothesis. *Business Strategy and the Environment*, *31*(7), 3040-3059.

Cohen, R., Hoitash, U., & Krishnamoorthy, G. (2014). The effect of audit committee industry expertise on monitoring the financial reporting process. *The Accounting Review*, *89*(1), 243–273.

Cuomo, F., Gaia, S., Girardone, C., & Piserà, S. (2022). The effects of the EU non-financial reporting directive on corporate social responsibility. *The European Journal of Finance*, 1-27.

Dabic, M., Maley, J., Dana, L. P., Novak, I., Pellegrini, M. M., & Caputo, A. (2019). Pathways of SME internationalization: a bibliometric and systematic review. *Small Bus Econ*, *55*, 705-725.

De Villiers, C., Naiker, V., & van Staden, C. J. (2011). The effect of board characteristics on firm environmental performance. *Journal of Management*, *37*(6), 1636-1663.

Derchi, G.-B., Davila, A., & Oyon, D. (2023). Green incentives for environmental goals. *Management Accounting Research*, 100830.

Dong, Y., Liang, C., & Wanyin, Z. (2022). Board diversity and firm performance: impact of ESG activities in China. *Economic Research-Ekonomska Istraživanja*,. 10.1080/1331677X.2022.2090406

Egwuonwu, A., Lodh, S., & Nandy, M. (2021). Stock co-movement and governance bundles: Does the quality of national governance moderate this relationship? *International Journal of Finance & Economics.*

Eugénio, T., Gomes, S., Branco, M. C., & Morais, A. I. (2022). Non-Financial Reporting and Assurance: A New Opportunity for Auditors? Evidence from Portugal. *Sustainability*, 14(20), 13469.

Francis, J. R. (2004). What do we know about audit quality? *The British Accounting Review*, *36*, 345-368.

Fu, Y., Carson, E., & Simnett, R. (2015). Transparency report disclosure by Australian audit firms and opportunities for research. *Managerial Auditing Journal*, *30*(8/9), 870-910.

Gallego-Álvarez, I., García-Sánchez, I. M., & da Silva Vieira, C. (2014). Climate change and financial performance in times of crisis. *Business Strategy and the Environment*, *23*(6), 361-374.

Gaziulusoy, A. I., & Boyle, C. (2013). Proposing a heuristic reflective tool for reviewing literature in transdisciplinary research for sustainability. *Journal of Cleaner Production*, *48*, 139-147.

Gerged, A.M., Salem, R. and Beddewela, E., 2023. How does transparency into global sustainability initiatives influence firm value? Insights from Anglo-American countries. Business Strategy and the Environment.

Ghafran, C., & O'Sullivan, N. (2017). The impact of audit committee expertise on audit quality: Evidence from UK audit fees. *The British Accounting Review*, *49*(6), 578-593.

Gitsham, M., Nayak, A., & Gosling, J. (2021). How do business leaders account for what shapes responsible leadership? Lobbying for SDGs. *Academy of Management Proceedings*, *2021*(1), 10510-15816.

Gough, D., Thomas, J., & Oliver, S. (2012). Clarifying differences between review designs and methods, *Systematic Reviews*, *1*(28), 1-9.

Holm, C., & Zaman, M. (2012). Regulating audit quality: Restoring trust and legitimacy. *Accounting Forum*, *36*(1), 51-61.

Hörisch., J., Schaltegger, S., & Edward Freeman, R. (2020). Integrating stakeholder theory and sustainability accounting: A conceptual synthesis. *Journal of Cleaner Production*, *275*, 124097.

Houqe, M. N., & Khan, H. Z. (2022). What determines the quality of carbon reporting? A system-oriented theories and corporate governance perspective. *Business Strategy and the Environment*. https://doi.org/10.1002/bse.3295

Ioannou, I., & Serafeim, G. (2017). The consequences of mandatory corporate sustainability reporting. *Harvard Business School Research Working Paper*, 11-100.

Iwasaki, I., & Satoshi, S. (2020). Ownership concentration and firm performance in European emerging economies: A meta-analysis. *Emerging Markets Finance and Trade*, *56*(1), 32-67.

Jamwal, A., Agrawal, R., Sharma, M., Kumar, A., Kumar, V., & Garza-Reyes, J.A.A. (2022). Machine learning applications for sustainable manufacturing: A bibliometric-based review for future research. *Journal of Enterprise Information Management*, *35*(2), 566-596.

Kahia, M., Jarraya, B., Kahouli, B., & Omri, A. (2022). The Role of environmental innovation and green energy deployment in environmental protection: Evidence from Saudi Arabia. *Journal of the Knowledge Economy*. 10.1007/s13132-022-01093-9

Kahn, M. E., Mohaddes, K., Ng, R. N., Pesaran, M. H., Raissi, M., & Yang, J. C. (2021). Long-term macroeconomic effects of climate change: A cross-country analysis. *Energy Economics*, *104*, 105624.

Khlif, H. and Chalmers, K. (2015). A review of meta-analytic research in accounting. *Journal of Accounting Literature*, 35, 1-27.

Kim, S. J., & Kim, H. (2022). Corporate risk and greenhouse gas emissions: evidence from Korea. *Applied Economics Letters*. 10.1080/13504851.2022.2096852

Komal, B., Ye, C. and Salem, R., 2022. The impact of audit committee effectiveness on firms' outcomes in China: a systematic review. International Journal of Accounting & Information Management, (ahead-ofprint).

Kuldasheva, Z., & Salahodjaev, R. (2022). Renewable energy and CO_2 emissions: Evidence from rapidly urbanizing countries. *Journal of the Knowledge Economy*, *2022*, 1-14.

Long, X., Chen, Y., Du, J., Oh, K., & Han, I. (2017). Environmental innovation and its impact on economic and environmental performance: Evidence from Korean-Owned Firms in China. *Energy Policy*, *107*, 131-137.

Maji, S. J., & Kalita, N. (2022). Climate change financial disclosure and firm performance: empirical evidence from Indian energy sector based on TCFD recommendations. *Society and Business Review*, *17*(4), 594-612(19).

Manson, M., & Zaman, S. (2001). Auditor communication in an evolving environment: Going beyond Sas 600 auditors' reports on financial statements. *British Accounting Review*, *33*, 113-136.

Marzi, G., Dabic, M., Daim, T., & Garces, E. (2017). Product and process innovation in manufacturing firms: A 30-year bibliometric analysis. *Scientometrics*, *113*(2), 673-704.

Meah, M. R., Sen, K. K., & Ali, M. H. (2021). Audit characteristics, gender diversity and firm performance: evidence from a developing economy. *Indian Journal of Corporate Governance*, *14*(1), 48-70.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & Group, P. (2009). Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ*, *339*, 2535.

Muhmad, S. N., & Muhamad, R. (2021). Sustainable business practices and financial performance during pre-and post-SDG adoption periods: A systematic review. *Journal of Sustainable Finance & Investment*, *11*(4), 291-309.

Mustafa, F., Lodh, S., Nandy, M., & Kumar, V. (2022). Coupling of cryptocurrency trading with the sustainable environmental goals: Is it on the cards? *Business Strategy and the Environment*, *31*, 1152-1168.

Nalukenge, I., Korutaro Nkundabanyanga, S., & Mpeera Ntayi, J. (2018). Corporate governance, ethics, internal controls and compliance with IFRS. *Journal of Financial Reporting and Accounting*, *16*(4), 764-786.

Nandy, M., Kuzey, C., Uyar, A., Lodh, S., & Karaman, A. S. (2022). Can CSR mechanisms spur GRI adoption and restore its lost value relevance? *Journal of Applied Accounting Research*, (ahead-of-print).

Nandy, M., Lodh, S., Kaur, J., & Wang, J. (2020). Impact of directors' networks on corporate social responsibility: A cross country study. *International Review of Financial Analysis*, *72*, 101601.

Ng, H.Y., Tronnes, P.C. and Wong, L.(2018). Audit seasonality and pricing of audit services: Theory and evidence from a meta-analysis. *Journal of Accounting Literature*, 40(1), 16-28.

Ngo, T., Le, T., Ullah, S., & Trinh, H. H. (2022). Climate risk disclosures and global sustainability initiatives: A conceptual analysis and agenda for future research. *Business Strategy and the Environment*.

OECD. (2018). *Climate-resilient infrastructure. OECD Environment Policy Papers No. 14*. Paris: OECD Publishing. doi.org/ 10.1787/4fdf9eaf-en

OECD-CDSB. (2015). *Climate change disclosure in G20 countries: Stocktaking of corporate reporting schemes.* http://cdsb.cdnf.net/sites/default/files/report-on-climate-change-disclosure-in-g20-countries.pdf

Orazalin, N. S., Ntim, C. G., & Malagila, J. K. (2023). Board Sustainability Committees, Climate Change Initiatives, Carbon Performance, and Market Value. *British Journal of Management*.

Parmentola, A., Petrillo, A., Tutore, I., & de Felice, F. (2021). Is blockchain able to enhance environmental sustainability? A systematic review and research agenda from the perspective of sustainable development goals (SDGs). *Business Strategy and the Environment*, 1–24.

Peters, J. F., Baumann, M., & Weil, M. (2019). The Importance of Recyclability for the Environmental Performance of Battery Systems. In: Pehlken, A., Kalverkamp, M., & Wittstock, R. (eds.) *Cascade Use in Technologies 2018*. Springer Vieweg, Berlin, Heidelberg. https://doi.org/10.1007/978-3-662-57886-5_13

Pizzi, S., Caputo, A., Corvino, A., & Venturelli, A. (2020b). Management research and the UN sustainable development goals (SDGs): A bibliometric investigation and systematic review. *Journal of Cleaner Production*, *276*, 124033.

Pizzi, S., Caputo, F., & Venturelli, A. (2020a). Accounting to ensure healthy lives: critical perspective from the Italian national healthcare system. *Corporate Governance*, *20*(3), 445-460.

Rahim, N. A. A. A., Muhmad, S. N., Abidin, A. F. Z., Muhmad, S. N., & Omar, K. (2022). A systematic review of corporate governance and sustainability performance: Pre-and post-sustainable development goals adoption period. *Management and Accounting Review*, *21*(3), 33-69.

Rajgopal, S., Srinivasan, S., & Zheng, X. (2021). Measuring audit quality. *Review of Accounting Studies*, *26*(2), 559-619.

Salem, R., Usman, M. and Ezeani, E., 2021. Loan loss provisions and audit quality: Evidence from MENA Islamic and conventional banks. The Quarterly Review of Economics and Finance, 79, pp.345-359.

Salem, R.I.A., Ezeani, E., Gerged, A.M., Usman, M. and Alqatamin, R.M., 2021. Does the quality of voluntary disclosure constrain earnings management in emerging economies? Evidence from Middle Eastern and North African banks. International Journal of Accounting & Information Management, 29(1), pp.91-126.

Sharma, D.S., Singh, M.K., & Patel, A. (2022). Do alma mater ties between the auditor and audit committee affect audit quality? *Contemporary Accounting Research*, *39*(1), 371-403.

Sheppard, J. P., & Young, J. (2020). Addressing sustainable development goals for confronting climate change: Insights and summary solutions in the stress stupidity system. *Journal of Management & Organization*, *26*, 929-951.

Stolowy, H., and L. Paugam. (2018). The Expansion of non-Financial Reporting: An Exploratory Study. *Accounting and Business Research* 48 (5): 525–548.

Tan, D., Komal, B., Ezeani, E., Usman, M. and Salem, R., 2022. Carbon emission disclosures and financial reporting quality: Does ownership structure and economic development matter?. Environmental Science & Policy, 137, pp.109-119.

Tang, S., & Demeritt, D. (2018). Climate change and mandatory carbon reporting: Impacts on business process and performance. *Business Strategy and the Environment*, *27*(4), 437-455.

United Nations. (2015). *Adoption of the Paris agreement. united nations framework convention on climate change. Conference of parties twenty-first session*. Paris, France.

Uyar, A., Elbardan, H., Kuzey, C., & Karaman, A. S. (2023). Audit and CSR committees: are they complements or substitutes in CSR reporting, assurance and GRI framework adoption? *International Journal of Accounting & Information Management*, *31*(1), 1-36.

Wong, D. T., & Ngai, E. W. (2021). Economic, organisational, and environmental capabilities for business sustainability competence: Findings from case studies in the fashion business. *Journal of Business Research*, *126*, 440-471.

Xu, H., Dao, M., & Sun, H. (2022). Accounting firms' employee satisfaction and audit fees. *Accounting and Business Research*. 10.1080/00014788.2022.2049193

Zupic, I., & Čater, T. (2015). Bibliometric Methods in Management and Organization. *Organizational Research Methods*, *18*(3), 429-472.