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Mapping accounting literature on climate finance: Identifying research gaps and reflections on future research

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ABSTRACT

Purpose: This study investigates climate finance literature to understand whether and how research in this area is explored from an accounting perspective.

Design/Methodology/Approach: This study conducts a meta-analysis and narrative review of climate finance.

Findings: The issue of climate finance has received increasing attention in recent years because of international negotiations on climate change. The volume of the literature examining climate finance has grown, particularly from a finance perspective. The literature analysed is diverse, employing unique methodological and theoretical differences, providing insights into the effectiveness of policies and impact of climate finance on capital markets, economic growth, and the green economy. However, despite growing concerns regarding the accounting and reporting issues in climate finance, little attention has been paid to this topic from an accounting, accountability, audit, or corporate disclosure perspective.

Originality: This study contributes to climate finance research by integrating insights from a dispersed and emerging body of literature by conducting meta-analysis and narrative review. Meta-analysis enables us to map the development of this specific literature and how it has changed over the years, whereas narrative review serves as a basis for identifying research gaps and developing avenues for future research in accounting, accountability, audit, and corporate disclosure.

KEYWORDS: Climate Change, Climate Finance, Green Finance, Sustainable Finance, Accounting, and Literature Review.

1. Introduction

Global climate finance flows have rapidly grown over the last few years. The 2022 United Nations Framework Convention on Climate Change (UNFCCC) Biennial assessment and overview of climate finance flows reported that global climate finance flows were US\$803 billion per year on average in 2019–2020, representing a 12% increase from 2017–2018. This indicates that climate financing has received increased attentionⁱ. Climate financing is a multifaceted concept. According to the Grantham Research Institute on Climate Change and the Environment (2023), whilst the term climate finance refers to financing activities aimed at mitigating or adapting to the impacts of climate change, it is often conflated with green finance, which refers to financial products or services that have been developed to provide a better environmental outcome or sustainable finance, which refers to decisions regarding Environmental, Social and Governance (ESG) factors of a project. Accordingly, this study uses the terms climate finance and climate financing as an umbrella term for climate, green and sustainable finance.

At the 15th Conference of Parties (COP) in Copenhagen, developed countries agreed to provide financing of at least \$100bn per year by 2020 to support the transition and creation of low carbon economies to help developing countries withstand the negative impact of climate change and turn to renewable sources. Since then, climate finance has remained a central issue at COP meetings where developed countries have discussed their plans to fulfil their promiseⁱⁱ. Climate financing can take the form of long-term finance and bilateral or multilateral financing from public or private sources. Financial institutions, including banks, insurers, and investors, also play a key role and committed to deploy \$130 trillion to combat global climate change and achieve net zero emissions targetⁱⁱⁱ.

With increasing global concern over the issue of climate change, climate finance appears to be gaining attention for mitigating climate change (Hoque and Khan, 2023; Khan *et al.*, 2021; Bose *et al.*, 2018) and achieving the net zero emissions target. It is timely to analyse and reflect on extant academic research to gain greater insight into the issue of climate finance. This study explores this topic through a meta-analysis and narrative review of the literature to identify, synthesise, and examine the accounting and business literature to understand

whether and how research has paid attention to climate finance from an accounting, accountability, audit, and corporate disclosure perspective.

Using the Scopus database, a total of 94 related articles published in 30 business management and accounting journals were identified. We find that as the issue of climate finance has received increasing attention, the quantity of literature examining climate financing and its characteristics has also grown, especially within the finance literature. However, despite the growth in accounting and reporting issues related to climate finance (Charnock and Thomson, 2022), little attention has been paid to the accounting, accountability, audit and corporate disclosure literature on climate finance. Consequently, this study serves as the basis for developing future research in this area. This study adopts a comprehensive approach by considering the complementary perspectives of climate, green, and sustainable finance where relevant. We use the term climate finance as an umbrella term to capture climate, green, and sustainable finance in our literature review considering that these terms have often been used interchangeably in the literature.

The results of our literature review add to the Accounting Research Journal special issue on Sustainable Finance in 2010, in which the guest editorial predicted significant changes driven by COP 15, leading to a more sustainable pathway to finance and economics (Bianchi, 2010). The contributions of this special issue highlighted several topics that continue to be relevant today in establishing a pathway for sustainable development, particularly in the context of climate finance. For example, (i) the lack of accurate measurements for financial mechanisms implemented to address sustainability (Drew and Drew, 2010), (ii) the relaxed approach by the government in addressing policies related to pollution control because of lobbying by businesses (Wilson, 2010) and (iii) the need to improve the disclosure of sustainable finance (Bianchi *et al.*, 2010). Our study adds to this discussion by providing an overview of the developments in climate negotiations related to climate finance and related literature from 2015 (when the Paris Agreement was established). We also contribute to the literature on disclosure related to climate change issues (Datt *et al.*, 2019; Elsayih *et al.*, 2018; Galeone *et al.*, 2023; Luo *et al.*, 2013; Kumarasiri and Jubb, 2016). Finally, we suggest potential avenues for future research in the field of accounting because we strongly believe that there is

significant untapped potential for reviving this area of research given its critical relevance to the progress of the sustainable development agenda.

The remainder of this study is organised as follows. Section 2 provides an overview of climate finance as context for the issues explored in this study. Section 3 describes the methodological approaches used in this literature review. Section 4 presents a meta-analysis showing insights from the climate finance literature by explicitly identifying connections in the extant literature. Section 5 highlights research gaps and future research based on insights emerging from the meta-analysis, followed by concluding remarks in Section 6.

2. Research context

This study aims to analyse the existing accounting and business literature on issues associated with climate finance. However, before proceeding, we summarise the current research context to underline the concept of climate finance and associated accounting and reporting issues, considering the current relevance of this topic and its potential for future research.

2.1 Climate finance: Concept, accounting and reporting issues

Climate finance under the UNFCCC *“refers to local, national or transnational financing—drawn from public, private and alternative sources of financing—that seeks to support mitigation and adaptation actions that will address climate change”*^{iv}. UNFCCC has established financial mechanisms to facilitate climate finance initiatives (see Table 1), including the Global Environment Facility (GEF) (1994) and Green Climate Fund (GCF) (2011)^v. The GEF oversees two funds^{vi}, the Special Climate Change Fund and the Least Developed Countries Fund, to support adaptation in vulnerable nations. The GCF provides finance to developing countries for mitigation and adaptation projects^{vii}, using a mix of financial instruments (e.g. loans, equity, guarantees and grants)^{viii} and can finance both public and private sector projects. As of February 2023, the GCF has allocated US\$7.5bn (66%) to the public sector and US\$3.9bn (34%) to the private sector,^{ix} with loans being the most common type of funding (55%; US\$2.2bn)^x. Another UNFCCC climate finance mechanism established under Kyoto Protocol was the Adaptation Fund (AF)^{xi}, which aims to finance adaptation projects in developing countries using its own governance approach.

However, there are accounting and reporting issues associated with climate financing, mainly because of the lack of clear definition and rules of what counts as climate finance among the different sources of climate finance, namely, 'public and private, bilateral and multilateral, including alternative sources of finance' (WRI, 2021; UNFCCC, 2009). This leads to huge discrepancies in the estimates of climate finance commitments. For example, the Organisation for Economic Cooperation and Development (OECD) estimates an upward trend in providing and mobilising climate finance (OECD, 2021),^{xii} but non-governmental organisations (NGOs) such as Oxfam estimate that only one-fifth of the commitments by developed countries have been delivered on (Roberts *et al.*, 2021). Roberts *et al.* (2021) have identified three key factors contributing to discrepancies in climate finance figures. First, developed countries consider all financial instruments at face value, including loans that may need to be repaid, making it difficult to compare them with grants. Second, no uniform methodology exists for determining which projects qualify for climate funding. Finally, there is the long-standing issue of determining whether climate funds are new, additional, or simply reallocated from other development funds. This has led to criticism of countries such as Japan and Australia for relying too heavily on loans and supporting high-efficiency coal plants (CarbonBrief, 2021).

Concerns also exist over multiple reporting systems for climate finance, as countries and institutions have differing views on the format and ways in which funding providers make their financial information and data available to third parties (OECD, 2021), thereby undermining comparability in climate finance reporting (WRI, 2021). While some countries report grants to developing countries, others report loans that must be repaid as climate finance. Public climate funds provided as loans may increase the burden on developing countries (Ares and Loft, 2021). There is also concern about the purpose of delivering money. Climate finance is needed for both mitigation and adaptation, but over 80% of the funds have been allocated for mitigation, even though the funds for adaptation and mitigation should be fairly distributed under the scope of the GCF (Timilsina, 2021). This may be because returns from mitigation investments can be realised sooner, and the private sector has little incentive to invest in climate change adaptation unless it is directly impacted (Timilsina, 2021).

Overall, accounting and reporting in climate finance is a complicated process because of the challenges in determining what data to collect and how to present them. This involves identifying relevant data and establishing formats for funding providers to disclose financial information and ensuring the transparency and effectiveness of mobilising climate finance to achieve the net zero emissions target (OECD, 2021). Considering the significance of accounting and reporting issues associated with climate finance, it is therefore expected that existing accounting literature would have addressed these limitations. Consequently, our current study investigates whether and how climate finance and its associated issues have been addressed in the extant literature.

3. Methodology

3.1 Objective

This study aims to review the literature on climate finance in accounting and business. Several typologies of reviews exist. For example, Grant and Booth (2009) have presented 14 review types in the field of health, all of which varied depending on the methods applied. In accounting, Massaro *et al.* (2016) have stressed that reviews are carried for different purposes, which is why they differ within the boundaries of applying no rules and rigid rules. Considering these boundaries, Massaro *et al.* (2016) have identified the following ordered spectrum of possibilities: rapid reviews, traditional authorship reviews, narrative reviews, research synthesis/meta-analyses, systematic literature reviews and structured literature. This study combines the following two of these approaches: meta-analysis and narrative review. These approaches are appropriate for our study for two reasons. First, they allow us to synthesise existing contributions and explore avenues for future research on climate finance. Second, they also help map and reflect on business and accounting literature. Despite the crossovers, these areas of knowledge demonstrate different methodological and theoretical orientations. Therefore, a more flexible approach to the rules of analysis fits better with the objectives of this study.

Therefore, we divide the study into two parts. The first part follows the methodological stages suggested by Guthrie *et al.* (2012). These stages are as follows: (i) setting core research objectives, including classification system, (ii) journal selection and time period, (iii) examining titles and abstracts of articles selected for review, and (iv) pilot testing of the

classification system. The approach suggested by Guthrie *et al.* (2012) is based on meta-analysis that applies a classification system and descriptive statistics to synthesise the literature. The second part presents a narrative review to discussing articles on accounting, accountability, audit, and corporate disclosure, exploring their main theoretical and methodological contributions and opening opportunities to point towards avenues for future research.

Considering the aforementioned review approaches, this study answers the following research questions: (i) How has research on climate finance progressed in the wider area of accounting and business? (ii) What are the main characteristics of this literature in terms of jurisdiction, focus, research methods, and theories used? (iii) What are the main research gaps identified in the accounting literature? and (iv) What type of future research would be beneficial in developing climate finance in accounting?

3.2 Sample selection

The Scopus database is used to identify articles for our analysis. We searched the Scopus database for both published scholarly articles and press articles published between 1 January 2015 and 9 September 2022. These articles had to include at least one of the following six keywords: climate finance, green finance, carbon finance^{xiii}, environmental finance, sustainable finance, or green bond within the title, keywords, or abstract. They had to be written in English and exclusively in the area categorised in the Scopus database as Business, Management and Accounting. Given the complementary nature of climate, green and sustainable finance, we include all three search criteria. We chose 2015 as the beginning of our sample period as it was the year in which the Paris Agreement was drafted, representing a relevant global driver for climate financing. This procedure is consistent with Long (2022), who conducted a literature review on climate finance, took a broader approach, and considered several areas of knowledge. Compared with Long (2022), we exclusively focus on the literature on climate finance in the areas of accounting and business.

The search criteria yielded 304 articles for analysis. We first filtered 304 articles and excluded those published in journals in which the aims and objectives were closely related to an economical approach. We then crosschecked the titles, abstracts and keywords (where

present) of the articles to ensure that they were related to the scope of this study. Third, we emphasised scholarly material. For example, we excluded materials published as teaching case studies, calls for papers, and material published in 'The Economist'. Finally, we excluded five articles because they could not be accessed. The filtering process yielded a sample of 91 journal articles.

After the filtering process, we were surprised by the small number of papers published in leading interdisciplinary journals on social and environmental accounting (2011). Therefore, to ensure we did not miss any relevant articles, we manually cross checked the aforementioned keywords across articles published between 1 January 2015 and 9 September 2022 in the following journals: (i) Accounting, Organizations and Society, (ii) Journal of Accounting Literature, (iii) Accounting, Auditing and Accountability Journal, (iv) Critical Perspectives in Accounting, (v) Accounting Forum, (vi) British Accounting Review; (vii) Social and Environmental Accounting Journal and (viii) Accounting Research Journal. This search confirmed the limited number of articles found previously. However, these manual searches added three further contributions, presenting us with a final sample of 94 journal articles across 30 journals. This was because, although not investigating the issue of climate finance per se, these studies conceptualised policies, regulatory reforms and/or governmentality related to green investments and financing.

Table 2 illustrates the distribution of the sample by year and journal. Fifty percent of these studies were published in one journal, The Journal of Cleaner Production, showing that there is scope for broader research on the topic in other types of journals, especially those focused on accounting areas. Publications in this area became more prominent from 2020 to 2022 (82%), reflecting increasing interest.

3.2 Data collection

We applied the classification system adopted by Dumay *et al.* (2018), which is an extended version of that used by Guthrie *et al.* (2012). Dumay *et al.*'s (2018) classification system was augmented to include characteristics applicable to both our sample articles and this research. First, we expanded the countries of research to include Latin America, Africa, and multiple areas as potential geographical areas of research. Second, the focus/topic of the article

included finance and/or topics not directly related to accounting and finance but of interest to researchers in this area (e.g. theoretical analysis of policies on green finance). The classification system is presented in Table 2.

All authors coded the sample articles. To ensure consistency in the coding, a pilot study was undertaken in which all authors coded three randomly selected journal articles and then discussed the coding and identify differences if any. The pilot study identified only minor variations in the coding, and where appropriate, the decision rules were discussed to support analytic consistency. The articles were then equally distributed among the authors, with each author coding 30 or 31 articles. Once all articles had been coded, the authors met to discuss individual cases that emerged within the analysis where the coder was unsure how to categorise a particular element.

4. Meta-analysis

This section aims to provide the meta-analysis, summarised in Table 3. The discussions in this section answer the following two research questions: (i) How has research in climate finance progressed in the wider area of accounting and business? and (ii) What are the main characteristics of this literature in terms of jurisdiction, focus, research methods, and theories used?

4.1 Jurisdiction

Most of the analysed studies were supra-national/international/comparative – general (43%) and national – general (32%). This may be related to the recent establishment of international and national policies in this area. The results of policies might be at very early stages, potentially explaining the scarcity of articles in the national industry and organisational contexts, which only account for 10% of the total articles analysed in each category. These results suggest potential avenues for future research. The less-analysed jurisdictions included supra-national/international/comparative – industry (3%), supra-national/international/comparative – organisational (2%) and one organisation (1%). This result reinforces the need for studies focusing on the organisational level.

In terms of supra-national/international/comparative – general, the following research topics were explored: (i) prices of green bonds at global levels, (ii) drivers for issue green bonds and (iii) the impact of green bond to green economy. Regarding the national – general, the following topics were studied: (i) green bonds in the context of different financial markets (e.g. Islamic and Chinese), (ii) implementation of green finance in different countries (e.g. The US, Italy, China and India), and (iii) practices related to green-bond issues in a specific country (e.g. India). The most analysed industries included (i) high-polluting sectors such as coal and (ii) other sectors relevant to the topic, such as banking.

4.2 Organisational focus

Following the results from the aforementioned jurisdiction, the studies have shown an emphasis at the macro level, concentrating at the country level and on capital markets, instead of the organisational level. Consequently, most studies had no organisational focus (35%) or it was undeterminable (27%), meaning that there was an organisational focus but it was not possible to identify a specific type of organisation analysed (e.g. SME, private or not for profit). When the organisational focus was present, most studies concentrated on publicly listed companies (27%). Few studies focused on private/SMEs (4%), private/others (7%), the public sector (6%), and not for profits (2%).

4.3 Country of research

Most analysed studies explored contexts in Asia (44%). China is the most frequently studied country, followed by India, Malaysia, Indonesia, Hong Kong, and Bangladesh. Studies involving multiple areas were also frequent (31%). These studies involved the following areas: (i) European countries, (ii) global indices from capital markets, (iii) different continents, (iv) Small Island Developing States (SIDS) and (v) Islamic regions. Studies that examined Continental Europe accounted for 14% of the total sample. Analyses considering a macro-overview of European countries were common followed by studies in the Italian context. Regions with a low incidence of studies included the following: Australasia (3%), North America (7%), and Africa (1%). No studies have been conducted with a singular emphasis on the UK or Latin America.

4.4 Research focus/topic

Most analysed articles adopted a finance perspective (66%). This is not surprising considering the nature of the topic and its impact on policies, financing mechanisms and capital markets. The focus on issues related to accounting represented 19% and they were distributed as follows: Accounting (6.38%), accountability (4.26%), audit (1.06%), corporate disclosure (7.45%), and other topics related to accounting (1.06%). Finally, some studies did not focus on either accounting or finance (21%), but were published in accounting and finance journals. These studies concentrated on a macro analysis of the green economy, impact of green finance on economic growth and effectiveness of policy instruments.

4.5 Research methods

In terms of the research methods employed, the most prevalent method used was survey/questionnaire/other empirical (68%), majorly representing quantitative methods using statistical analysis and econometric models. Case/field study/interviews/action research were also representative (14%) followed by theoretical/normative/policy (10%). Very few studies used the following research methods: literature review (4%), viewpoint/commentary (3%) and content analysis/historical analysis/other textual analysis (4%).

4.6 Theory applied

Less than one-quarter (23%) of the studies applied a theory to their work, while more than three-quarters (77%) did not apply any theory. This can be explained by the emphasis on quantitative methods, which tend to support hypotheses and numerical models in a broad literature review. Examples of the theories include institutional, legitimacy, stakeholder, media theories and governmentality. There were also some theories more commonly used in quantitative analysis, such as signalling, neoclassical economic, asset and liability management, efficient market, behavioural finance, sustainable finance theories and the theory of the firm (Coase).

5. Narrative review

This section presents the narrative review. It focuses on 17 articles classified under accounting, accountability, audit, and corporate disclosure. This section provides a qualitative

discussion of these articles (see Table 4 for a summary) to answer the following research questions: (iii) What are the main research gaps identified in the accounting literature? and (iv) What type of future research would be beneficial in developing climate finance in accounting?

First, of the six articles classified under accounting, only two pertained to financial accounting, which indicates a potential area of development. Palea (2020) have theoretically explored the negative impact of fair value on encouraging long-term equity investment, whereas Rana et al. (2022) have explored governmentality reforms on green investments and their impact on risk management. The remaining four papers explored issues outside financial statements, such as stakeholder engagement alignment (Cerrato and Ferrando, 2020) and reporting system/metrics with principles of climate/green finance (Pan *et al.*, 2019; Thomä *et al.*, 2019; Ng, 2018). Empirical studies included multiple case studies and quantitative methods. As potential future research, the findings from these papers suggest that there is scope for researchers examining the relevance of developing suitable metrics to report on climate finance, which could help measure the impact and effectiveness of various financial mechanisms and policies aimed at addressing climate change. Therefore, the development of such metrics could be useful for policymakers and investors to make informed decisions in this area. The findings of these studies highlighted the need for researchers to conduct longitudinal case studies. Such studies could provide a comprehensive understanding of the dynamics and complexities of climate finance and help bridge the gap between theory and practice.

Second, four articles were classified as accountability-related. These studies explored the traceability of green financial instruments with social and environmental benefits related to emission reductions (Raeni *et al.*, 2022) and the importance of green financial instrument characteristics in attracting funds (Noordin *et al.*, 2018). Furthermore, Thomas et al. (2021) and Dremptic *et al.* (2020) have explored the impact of ESG scores on corporate financial performance and their potential impact on decisions on sustainable finance. Research in this area has mainly adopted a quantitative approach, suggesting calls for future qualitative studies to gain a deeper understanding. Future research in this area should also investigate the impact of different ESG variables on financial performance to gain insights into how

companies can create sustainable value while meeting ESG objectives. Another area of future research is the traceability and accountability of different financial instruments such as thematic funds (e.g. clean energy fund that invests in companies involved in renewable energy production). Qualitative research can provide a more nuanced understanding of how these funds operate and impact the broader financial system.

Third, only one study in our analysis focused on the topic of audit (Tian and Pan, 2022). Tian and Pan (2022) have conducted a quantitative study to identify the positive impact of climate policies on the quality of audit in China, reducing the financial risks of firms. This study suggests further research on the design of a system of regulations to shape firms' and auditors' behaviours towards climate finance. Moreover, considering the importance of audit in ensuring the transparency and accountability of firms engaged in climate finance, the limited research in this area highlights the need for further investigation that could provide guidelines for auditing climate finance activities, certification requirements for auditors, and monitoring and enforcement mechanisms to ensure compliance. By investigating the role of audit in climate finance, we can gain a better understanding of the integrity and accountability of the profession for addressing climate change issues.

Finally, the corporate disclosure category included seven articles. Research in this area has investigated the effects of green finance policies on corporate disclosure (Dong *et al.*, 2022; Dong *et al.*, 2020; Cerrato and Ferrando, 2020). One study examined the low readability of disclosures produced by organisations engaged in sustainable finance (Adhariani and du Toit, 2020). Other studies have highlighted the positive impact of ESG disclosure on new media platforms, such as social media, in enhancing green finance (Fan *et al.*, 2020; Ng and Leung, 2020). Future research in this area includes (i) the relationship between green finance disclosures and financial performance, (ii) differences in disclosure practices on green finance between state-owned and non-state-owned financial institutions, (iii) readability of disclosures from the perspective of investors and auditors, and (iv) types of measurements used in corporate disclosure. Most studies have used a quantitative approach, which is why the application of mixed research methods, and ethnographic observations is recommended as potential future research in the area of disclosure.

As discussed before and presented in Table 4, most articles included in our analysis were quantitative in nature. Although some of these studies were underpinned by theoretical perspectives, most of them were not. The dominant theoretical perspective was institutional theory (four papers), whereas other theoretical perspectives, such as agency, legitimacy, stakeholder, asset and liability management, and governmentality were represented within the sample. These findings highlighted the potential for qualitative methodological and theoretical developments in climate finance. According to He *et al.* (2020), this area is at the core of the social and environmental accounting literature, which also includes accounting for climate change. Therefore, to suggest potential theories for future research, we gauged recommendations from other studies that conducted literature reviews in social and environmental accounting. Our searches (see Table 5) revealed a consensus that the field is theoretically underdeveloped (Ascui, 2014; He *et al.*, 2020; Huang and Watson, 2015) and that there is need for a more critical and radical approach (Parker, 2011; Deegan, 2017).

We agree with Gray (2002) and Gray *et al.* (2014) that it would be beneficial to consider, feminist, Marxist, and deep green ecology approaches, along with discourse analysis, Foucault's work, radical feminism, and actor-network theory. The application of these theoretical approaches can enrich the field and stimulate a broader perspective on the literature on climate finance. For instance, a feminist perspective may significantly contribute to addressing the gendered dimensions of climate finance, such as the underrepresentation of women in leadership positions in the field and/or women's limited access to climate finance. Similarly, Marxist perspectives could help us to understand the power dynamics between developed and developing countries that may underlie the issue of climate finance, thereby perpetuating global climate change. Approaches grounded in deep green ecology could provide a more holistic understanding of how ecosystem exploitation occurs and how climate finance can facilitate a shift towards initiatives that prioritise ecosystem conservation and restoration. Discourse analysis and Foucault's work can help us to understand the power relations and discursive practices that shape the discourse surrounding climate finance. Finally, radical feminism and actor-network theory approaches could provide alternative perspectives for comprehending the social and political processes that shape climate finance policies and practices.

6. Final comments

This study aims to explore whether and how the extant accounting and business literature has addressed the issue of climate finance. Using a meta-analysis and narrative review, this study mapped the development of this field of knowledge over the years. First, our study aimed to answer the question ‘How has research in climate finance progressed in the wider area of accounting and business?’ Responding to this question, the findings of this research highlight that knowledge in this area has rapidly developed in recent years, especially since 2020. Our analysis also highlights several avenues and opportunities for researchers to investigate, particularly with an accounting focus.

The second question examined was ‘What are the main characteristics of this literature in terms of jurisdiction, focus, research methods and theories used?’ Our analysis identified unique characteristics in terms of jurisdiction, research methods, and theories, which led us to identify gaps and develop future research in this area. Most existing literature has emphasised a macro level of analysis, leaving industry and organisational contexts as rich areas to be explored. Another area of research is the public, private and not-for-profit sectors where more research could be conducted. This study suggests that there remains a considerable lack of knowledge on how these organisations can contribute to climate finance initiatives. Research on the various strategies and mechanisms that public and private organisations can adopt to promote sustainable development could help to bridge this knowledge gap. There is also a need for research involving specific geographical areas, including the UK, the US, Latin America, and Africa. Although some research exists on climate finance in these regions, there remains a considerable lack of knowledge regarding how different factors impact the adoption of greener financial practices.

Next, we addressed the questions ‘What are the main research gaps identified in accounting literature?’ and ‘What type of future research would be beneficial in developing climate finance in accounting?’ Using a narrative review of the 17 articles classified under accounting, accountability, audit, and corporate disclosure, we found a gap in research related to financial accounting, accountability, audit, and corporate disclosures. The analysis also highlighted that while there has been an increase in quantitative research, there is a lack of qualitative research and the use of theory in this area.

Therefore, to address the final question, this study calls for more research on accounting, accountability, audit, and disclosures, and qualitative research using theoretical frameworks to provide critical insights into climate finance in business literature in general, particularly in accounting. While quantitative studies are useful, qualitative research can help provide a more nuanced understanding of the various issues associated with climate finance, such as inequalities, the impact of norms/regulations, and identification of new ways to account for and report on climate-related issues, thereby improving accountability in this area. This study also recommends that future research on climate finance draw on a range of theoretical approaches to enrich the field and provide a broader perspective on the literature. By adopting a critical and radical approach, researchers can address the underdeveloped theoretical landscape of the field and contribute to more transformative outcomes.

Our study contributes to both theory and practice. This study advances research on climate finance by integrating insights from a comparatively dispersed and emerging body of literature using meta-analysis and narrative review. Accordingly, we adopted and extended the classification scheme developed by Guthrie *et al.* (2012) (and used by Dumay *et al.*, 2018), and propose a more comprehensive framework to synthesise and elicit certain understandings about how the extant literature has brought about the existing methodologies and theories in a particular research area. Thus, this study provides a deeper understanding of climate finance.

This study has several practical implications. Currently, there is a lack of clear standards and transparent procedures regarding the measurement, computations, and climate finance reporting (Roberts *et al.*, 2021). Uncertainties also persist concerning the governance and accountability aspects to be addressed in the process of fundraising and the subsequent fund utilisation. This is a domain in which accounting research is currently lacking, and accounting researchers can contribute by bringing their expertise to help develop practical solutions. The absence of universally accepted international standards may lead to substantial variations in climate financing, a concern which is being taken seriously by those responsible for standard-setting. Accounting researchers can play a crucial role here in comprehending and theorising the standard setting process, the involvement of various agents within the process and the

consequential impacts on other areas of accounting. Consequently, our study suggests the following research questions as areas of future research: (i) How do global climate finance initiatives pose risks, present challenges and impact developed countries, as well as vulnerable regions and marginalised communities, with a focus on financial accountability and transparency? (ii) Whether and how organisations, such as financial institutions, are accountable for their climate finance-related accounting, audit, and reporting practices? (iii) What are the drivers of the accounting and reporting of climate finance initiatives in different industries and organisational contexts?

This study has some limitations. The search criteria were limited to a specific time frame and journals categorised in the Scopus database as Business, Management and Accounting. The study focused only on published academic literature, which may not reflect the full extent of the discussions on this topic. Despite these limitations, this study provides valuable insights into the development of knowledge of climate finance, highlighting areas that require further exploration, and offer directions for future research in this rapidly evolving field. By addressing the identified gaps in knowledge, researchers can contribute developing of more effective strategies and mechanisms for promoting climate finance to achieve net zero emissions target.

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Table 1: Summary of UNFCCC financial mechanisms to facilitate climate finance initiatives

Fund	Main objective	Investment to date
Green Environment Facility	To provide funds to developing countries for environmental projects, including climate change, biodiversity, and pollution. It also supports countries while observing international conventions.	It operates with grants and blended financing. It has provided more than US\$22bn to thousands of projects.
Green Climate Fund	To support developing countries in mitigation and vulnerable nations in adaptation.	It uses a flexible combination of financial instruments. It has committed US\$11.4bn of financing across 209 projects.
Special Climate Change Fund	To support vulnerable nations with climate adaptation.	It invested US\$363m of financing across 88 projects.
Least Developed Countries Fund	To fund adaption projects exclusively to least developed countries .	It provided almost US\$1.7bn of financing across 365 projects.
Adaptation Fund	To provide funding to adaption projects towards climate change in developing countries	It allocated US\$998m of financing across 139 adaptation projects.

Sources:

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<https://www.thegef.org/what-we-do/topics/least-developed-countries-fund-ldcf>

<https://unfccc.int/Adaptation-Fund>

<https://www.adaptation-fund.org/>

Cont. Table 2

<i>Journal</i>	<i>2016</i>	<i>2017</i>	<i>2018</i>	<i>2019</i>	<i>2020</i>	<i>2021</i>	<i>2022</i>	<i>TOTAL</i>
Journal of Corporate Finance					1			1
Journal of Islamic Accounting and Business Research			1					1
Management and Accounting Review						1		1
Review of Quantitative Finance and Accounting							1	1
Vision						1		1
Total	2	0	5	10	20	23	34	94

Source: Adapted from Rinaldi *et al.* (2018).

Note: There were no articles found in 2015.

Table 3: Summary results from 2015 - 2022

Categories of analysis	Sub-categories of analysis	Percentage from the total of articles analysed (n=94)	Number of occurrences (n) *
Jurisdiction	Supra-national/international/comparative – general	43%	40
	Supra-national/international/comparative – industry	3%	3
	Supra-national/international/comparative – organisational	2%	2
	National – general	32%	30
	National – industry	10%	9
	National – organisational	10%	9
	One organisation	1%	1
Organisational focus (*)	Public listed	27%	25
	Private – SMEs	4%	4
	Private – others	7%	7
	Public sector	6%	6
	Not for profit	2%	2
	Undeterminable	27%	25
	Not applicable	35%	33
Country of research	Asia	44%	41
	Australasia	3%	3
	Continental Europe	14%	13
	North America	7%	7
	United Kingdom (**)	0%	0
	Latin America	0%	0
	Africa	1%	1
	Multiple areas	31%	29

Cont. Table 3

Focus/topic (*)	Accountability	4%	4
	Accounting	6%	6
	Audit	1%	1
	Corporate disclosures (reporting)	7%	7
	Other Accounting	0%	0
	Finance	66%	62
	Non-accounting/non-finance	21%	20
Research methods (*)	Case/field study/interviews/action research	14%	13
	Content analysis/historical analysis/other textual analysis	4%	4
	Survey/questionnaire/other empirical	68%	64
	Theoretical/normative/policy	10%	9
	Literature review	4%	4
	Viewpoint/commentary	3%	3
Theory applied	Theory not applied	77%	72
	Theory applied	23%	22
Theory applied (*)	Agency theory	1%	1
	Critical theory	0%	0
	Institutional theory	7%	7
	Legitimacy theory	1%	1
	Other theories	17%	16

Source: Adapted from Dumay *et al.* (2018:1517)

(*) These categories are not mutually exclusive.

(**) This country was considered separately to follow the research instrument suggested by Dumay *et al.* (2018)

Table 4: Summary of the literature on Accounting, Accountability, Audit and Corporate Disclosure

Publications	Theory	Method	Context/Practice	Suggested future research
(Palea, 2020)	Asset and liability management theory and theory of the firm	Conceptual	Accounting rules vs UN SDG	<ul style="list-style-type: none"> • Enhance financial, social, and environmental metrics. • Relation between executive remuneration and UN SDG.
(Tian and Pan, 2022)	N/A	Quantitative	Audit quality	<ul style="list-style-type: none"> • Systems and regulations to shape firms and auditors' behaviour.
(Dong <i>et al.</i>, 2022)	Institutional Theory	Quantitative	Sustainability disclosure	<ul style="list-style-type: none"> • Specific areas of disclosure by Chinese financial institutions. Relation between governance structure and disclosure in China.
(Raeni <i>et al.</i>, 2022)	N/A	Qualitative	Accountability of GHG emissions reductions	<ul style="list-style-type: none"> • Traceability/accountability of a variety of financing instruments.
(Thomas <i>et al.</i>, 2021)	Stakeholder theory and sustainable finance theory	Quantitative	ESG scores vs Financial performance	<ul style="list-style-type: none"> • Similar studies in different countries and industry sector. • Impact of aspects of ESG in corporate financial performance.
(Dong <i>et al.</i>, 2020)	Institutional theory	Quantitative	Impact of regulation on Disclosure	<ul style="list-style-type: none"> • Relation between disclosure on 'green finance' and financial performance. • Comparisons between disclosure on 'green finance' provided by state-owned and non-state-owned financial institutions.

Cont. Table 4

(Fan et al., 2020)	N/A	Quantitative	'New media' and quality of disclosure	<ul style="list-style-type: none">• Analysis of 'new media' beyond listed companies with longitudinal approach.• Explore other methods to manage firms' behaviour different from regulation.
(Adhariani and du Toit, 2020)	N/A	Qualitative	Readability of sustainability report	<ul style="list-style-type: none">• Further studies on disclosure readability, especially its relation to financial performance.• Viewpoint of investors, regulators, and assurance providers.
(Cerrato and Ferrando, 2020)	N/A	Conceptual	Impact of EU regulation on Disclosure	<ul style="list-style-type: none">• N/A
(Amidjaya and Widagdo, 2020)	Agency theory and institutional theory	Quantitative	Impact of ownership structure on sustainability report	<ul style="list-style-type: none">• Measurement of sustainability reporting and corporate governance variables.• Mixed methods approach to analyse disclosure in Indonesia.
(Thomä et al., 2019)	N/A	Conceptual	Accounting principles vs principles of climate finance	<ul style="list-style-type: none">• Application of the proposed model to other corporate credit different form listed equity and corporate bonds portfolio.• Application of the proposed model to other class of assets different from corporate instruments (e.g. sovereign bonds).
(Pan et al., 2019)	N/A	Quantitative	Measurement of inequalities related to carbon emission	<ul style="list-style-type: none">• Extend carbon Palma Ratio to communities, districts, and cities.

Cont. Table 4

(Ng, 2018)	N/A	Qualitative	Adoption of sustainability accounting, sustainable finance, and regulation	<ul style="list-style-type: none"> • Test the theoretical framework in a larger sample. • Further cases of green bonds issuers. • Assurance control of green bonds issuers. • Longitudinal studies to explore the efficacy of projects financed by green bonds.
(Noordin et al., 2018)	N/A	Conceptual	SRI characteristics and eligibility	<ul style="list-style-type: none"> • N/A
(Drempetic et al., 2020)	Neo-institutional theory and organisational legitimacy	Quantitative	ESG rating, firm size and sustainability performance	<ul style="list-style-type: none"> • Relation between profit and measures of sustainability. • Broaden ESG concept to help investors on decision-making.
(Ng and Leung, 2020)	N/A	Qualitative	Investment risk, stakeholder engagement and ESG disclosure	<ul style="list-style-type: none"> • How Hong Kong will embrace challenges on sustainability and globalisation.
(Rana et al., 2022)	Governmentality	Qualitative	Government reforms vs risk management	<ul style="list-style-type: none"> • Ethnographic observations on green investments to understand climate change risk exposure in different socio-culture contexts.

Source: Authors own creation.

Table 5: Theories suggested by recent literature reviews on social accounting and carbon accounting

Publications	Examples of theories observed	Examples of theories suggested
(Ascui, 2014)	Legitimacy, actor-network, institutional governance systems, and structuration theories.	Calls for contributions with more diverse theoretical approaches.
(Tian and Pan, 2022; He et al., 2020)	Legitimacy, stakeholder, signalling, and institutional theories.	Call for contributions with more diverse theoretical approaches.
(Parker, 2011)	Uses the categorisation of theories suggested by Gray (2002).	Emphasis on Gray (2002) by supporting the idea that a more radical approach would be beneficial using, for example, feminist, Marxist and deep green ecology approaches. This article also envisages a common meta-theory that can drive social and environmental accounting.
(Deegan, 2017)	Legitimacy, structuration, institutional, resource dependency, critical, positive accounting, agency, property rights theories, theory from Habermas, signalling theory perspective and theory of Rawl's.	Critical approach is necessary.
(Dumay et al., 2018)	Agency, critical, institutional, legitimacy theories and others (e.g. stakeholder, discourse, and grounded theories).	Need to translate theory into practice. Interventionist research that makes theoretical and practical contributions.
(Huang and Watson, 2015)	Legitimacy and stakeholder theories.	Stressed on the limitations of these theories to understand corporate social responsibility.

Source: Authors own creation.

NOTES:

ⁱ <https://www.iso.org/files/live/sites/isoorg/files/store/en/PUB100458.pdf>

ⁱⁱ <http://www.wri.org/blog/2015/12/paris-agreement-turning-point-climate-solution>,
<https://www.wri.org/insights/net-zero-ghg-emissions-questions-answers>

<https://www.wri.org/insights/cop27-priorities>

ⁱⁱⁱ <https://www.wri.org/blog/2015/12/paris-agreement-turning-point-climate-solution> and
<http://newsroom.unfccc.int/unfccc-newsroom/finale-cop21/>

^{iv} <https://unfccc.int/topics/introduction-to-climate-finance>

^v <https://unfccc.int/topics/introduction-to-climate-finance>

^{vi} <https://unfccc.int/topics/introduction-to-climate-finance>

^{vii} <https://www.greenclimate.fund/>

^{viii} <https://www.greenclimate.fund/about#key-features>

<https://www.greenclimate.fund/sectors>

^{ix} <https://gcfrod.blob.core.windows.net/public/odl/pdf/private-sector-financing.pdf>

^x <https://gcfrod.blob.core.windows.net/public/odl/pdf/private-sector-financing.pdf>

^{xi} <https://unfccc.int/Adaptation-Fund>

^{xii} <https://ukcop26.org/wp-content/uploads/2021/10/Climate-Finance-Delivery-Plan-1.pdf>

^{xiii} The keyword 'carbon finance' was included as a search term within our study to ensure that our searches provided comprehensive coverage of articles on climate finance. Carbon finance refers to funds generated out of carbon credits commercialisation, which differs from the concept of climate finance explained within the literature review which is the scope of this study (Gupta, 2016). Therefore, our study does not include studies examining carbon finance. The filtering process led to only one article which focused on carbon finance being included within the sample of papers. This paper remained in the sample due to the holistic literature on economic incentives to reduce carbon emissions.