Mapping Private Sector Engagement in Climate Finance: A Systematic Review and Topic Modelling Analysis

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Abstract
Private sector actors are increasingly recognised as critical contributors to climate finance, particularly as public funding alone remains insufficient to meet global climate goals. While governments and international organisations promote green and sustainable finance frameworks, academic research on private sector climate finance remains fragmented. This article analyses the existing literature on private sector climate finance to identify dominant research themes and uncover gaps for future investigation. A Systematic Literature Review (SLR) was conducted on 27 peer-reviewed journal articles selected from the Scopus database. The review reveals a rapid growth in scholarly interest since 2022, with most studies relying on quantitative secondary data. Topic-modelling using orange software identifies four major themes: corporate and capital-market-based climate finance instruments, private investment mobilisation for climate action, public–private interactions in climate finance, and governance and institutional determinants. The findings show strong emphasis on mitigation-oriented finance and risk–return considerations, while climate adaptation, local-level finance, and distributional outcomes remain underexplored. Future research should focus on adaptation finance, firm-level behavioural drivers, and the role of institutional quality in mobilising private capital. Policymakers are encouraged to strengthen governance frameworks and de-risking mechanisms to enhance private sector participation in climate finance.

Keywords: Climate Finance, Private Sector Engagement, Green Financial Instruments, Mitigation and Adaptation, ESG Performance, Systematic Literature Review, Topic Modelling

1. Introduction

As Robert Swan aptly stated, *"The greatest threat to our planet is the belief that someone else will save it,"* emphasizing that environmental protection requires individual and institutional accountability rather than passive dependence on others. The industrial revolution enabled unprecedented levels of production and consumption, which improved living standards but also triggered large-scale depletion of natural resources. This expansion created opportunities such as job generation and economic growth, but also led to systemic challenges including pollution, climate change, and social inequality (Panayotou,1993). Although concerns about environmental degradation were recognized as early as the 1940s, it was not until the late 1960s that the United Nations began to integrate these issues into the global policy agenda (Jackson, 2007).

The adoption of the 2015 Paris Agreement marked a historic milestone by binding all nations to pursue climate targets through Nationally Determined Contributions (NDCs). Central to this accord is Article 2.1(c), which calls for aligning financial flows with pathways toward a low-carbon and climate-resilient economy (Bose et al., 2021). Despite this, a significant financing gap continues to undermine the achievement of global climate goals (Buchner et al., 2019; IPCC, 2018; UNCTAD, 2014). Developed countries acknowledged the urgency of addressing this gap in the 2009 Copenhagen Accord, where they committed to mobilizing USD 100 billion annually in climate finance from 2020 onwards (UNFCCC, 2010). Public finance plays a crucial role in establishing enabling conditions, but the private sector is indispensable given its scale, innovative capacity, and ability to mobilize capital. Private investments can accelerate the diffusion of low-carbon technologies, finance sustainable infrastructure, and strengthen adaptive capacities. However, integrating private finance into climate initiatives remains highly challenging (Raman et al., 2025) (Chirambo, 2021). Barriers include perceived high risks of low-carbon projects, the long gestation periods of climate investments relative to short-term return expectations, limited availability of bankable projects, and a lack of reliable data for risk assessment (Chawla & Ghosh, 2019; Jaffe et al., 2005; Mercure et al., 2016; Polzin, 2017).

Existing scholarship on climate finance has expanded considerably over the past two decades. Researchers have employed diverse methodologies including case studies, econometric modeling, and policy analysis to evaluate climate finance instruments and outcomes. Yet, there remains a lack of systematic reviews that map the intellectual structure of this field, synthesize dominant research themes, and assess the evolving role of private sector engagement in mitigation and adaptation finance. In particular, little is known about the comparative effectiveness of policies

across different contexts, and few studies explicitly integrate bibliometric approaches to trace the evolution of knowledge in this domain. In this study, we complement the systematic review with topic modelling and visualization using Orange, an open-source data mining software that enables preprocessing, latent topic identification, and mapping of document similarities. This approach provides a computational layer of analysis that helps validate and enrich the thematic synthesis.

This paper addresses these gaps by conducting a comprehensive review of private sector engagement in climate finance, with particular attention to policies, instruments, and intellectual trends. Its focus on:

1. What are the current trends in research on private sector engagement in climate finance?
2. What are the dominant themes in the literature on private sector climate finance?
3. What recent advances have been made in the research of private sector engagement in climate finance?
4. What are the key gaps in the literature on private sector engagement in climate finance?
5. What will future research be focused on?

By addressing these questions, the study seeks to provide a comprehensive foundation for understanding private sector climate finance, highlight unresolved challenges, and identify promising directions for future inquiry.

2. Methodology

Literature reviews can broadly be classified into those embedded within conceptual or empirical studies and those conducted as standalone research. While embedded reviews primarily support hypothesis development and conceptual framing, standalone reviews play a critical role in synthesizing existing knowledge, identifying dominant research trends, and highlighting research gaps in a transparent and replicable manner (Lim et al., 2022). Given the fragmented and evolving nature of research on private sector climate finance, this study adopts a standalone Systematic Literature Review (SLR) approach.

SLRs differ from narrative reviews by employing systematic and transparent procedures for literature identification, screening, and synthesis, thereby minimizing subjectivity and selection bias (Tranfield et al., 2003; Kraus et al., 2020). To ensure methodological rigor and transparent reporting, this study follows the PRISMA 2020 protocol, which provides updated guidelines for identifying, selecting, and synthesizing relevant studies (Page et al., 2021). PRISMA is widely applied across disciplines and enhances clarity and reproducibility in review-based research (Siddaway et al., 2019).

2.1 Data Source and Search Strategy

The Scopus database was selected as the source for literature retrieval due to its extensive coverage of peer-reviewed journals across finance, economics, management, and environmental studies. Scopus is widely recommended for systematic reviews owing to its breadth and data quality (Donthu et al., 2021).

The literature search was conducted using the advanced search option across titles, abstracts, and keywords. To capture studies at the intersection of private sector involvement and climate-related finance, the following search string was used:

("Private sector" OR "Private investment" OR "Corporate finance") AND ("Climate finance" OR "Green finance" OR "Sustainable finance")

This search strategy was designed to ensure comprehensive coverage of studies examining private financial actors, corporate finance mechanisms, and investment behaviour in climate, green, and sustainable finance contexts.

2.2 Study Selection Process

The initial search resulted in 145 documents. No duplicate or non-English records were identified. Following title screening, 47 documents were excluded due to limited relevance to private sector climate finance. The remaining 98 documents underwent full-text screening.

During full-text review, 71 documents were excluded as they did not directly examine private sector participation, corporate finance mechanisms, or investment mobilisation in climate or green finance. This resulted in a final sample of 27 peer-reviewed journal articles, which formed the basis of the review. The complete selection process is illustrated using a PRISMA flow diagram (Figure 1).

2.3 Data Analysis and Thematic Synthesis

The selected studies were analysed using a theme-based analysis approach. To support systematic theme identification and reduce researcher bias, topic modelling using Latent Dirichlet Allocation (LDA) was employed as an auxiliary analytical technique. LDA is an unsupervised probabilistic method commonly used to uncover latent thematic structures in textual data (Blei et al., 2003).

Topic modelling was conducted using Orange data mining software, an open-source Python-based platform that supports text preprocessing and machine-learning-based topic extraction (Demšar et al., 2013). Titles, abstracts, and keywords were preprocessed through tokenization, normalization, stop-word removal, and lemmatization. The LDA model initially generated ten latent topics, which were subsequently interpreted and consolidated based on semantic similarity and alignment with the study objectives. This process resulted in four higher-order themes, which guided the in-depth thematic synthesis.

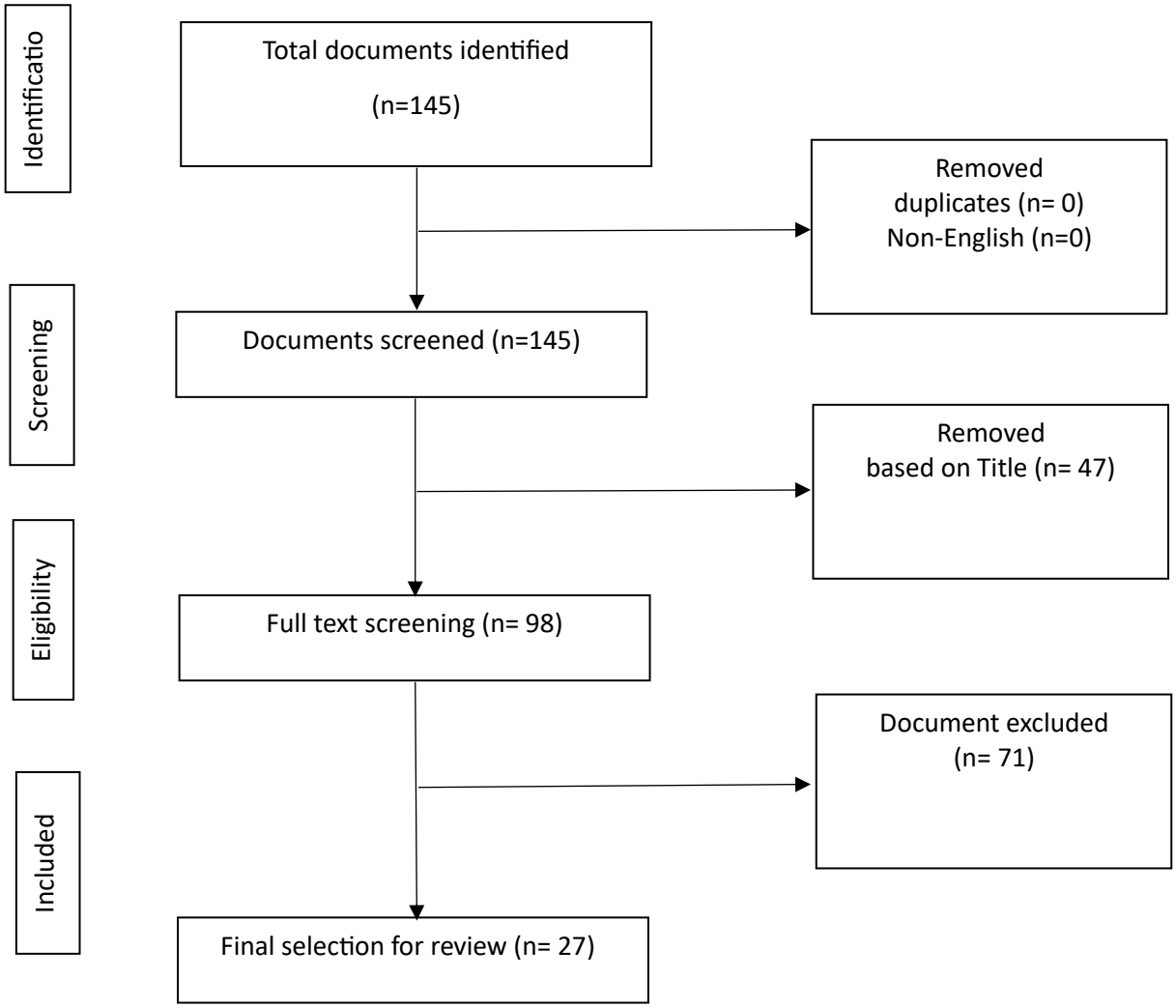

Fig. 1 PRISMA flowchart
Source: Prepared by authors

3. Result and Discussion

1. Citation Analysis

The most influential studies on private sector climate finance were examined using citation analysis (Table 1), a method commonly employed to assess the academic impact and intellectual contribution of research within a field. The quality and influence of a research article can be partially inferred from its citation count (Ding & Cronin, 2011). In the present study, citation analysis considered only publications with relatively high citation counts, leading to the identification of a limited set of highly influential articles, of which the top studies are reported in Table 1.

The analysis reveals that Clark et al. (2018) ranks first with 254 citations, followed by Sadiq et al. (2022) with 211 citations. These highly cited studies primarily address the role of private finance in bridging climate and sustainable development funding gaps and the importance of green finance in promoting sustainable entrepreneurship and environmental responsibility. Other influential contributions focus on cross-border private investment in renewable energy (Ragosa & Warren, 2019), financing efficiency and green recovery (Yan & Haroon, 2022), and the mobilisation of private adaptation finance (Pauw, 2017).

Overall, the citation analysis confirms the presence of impactful and high-quality research across multiple private climate finance themes. The distribution of citations indicates that the literature is dominated by studies on private investment mobilisation, green finance instruments, and renewable energy, while adaptation finance and local-scale climate action receive comparatively less attention. This pattern suggests that private sector climate finance is a relatively emerging and evolving field of study, with a broad thematic scope that is further elaborated in the subsequent content analysis.

TABLE 1 Highly Cited Papers

Title	Author/s	Journal	Citation
Bridging funding gaps for climate and sustainable development: Pitfalls, progress and potential of private finance	Clark, R.; Reed, J.; Sunderland, T.	Land Use Policy	254
Does green finance matter for sustainable entrepreneurship and environmental corporate social responsibility during COVID-19?	Sadiq, M.; Nonthapot, S.; Mohamad, S.; Keong, O.; Ehsanullah, S.; Iqbal, N.	China Finance Review International	211
Unpacking the determinants of cross-border private investment in renewable energy in developing countries	Ragosa, G.; Warren, P.	Journal of Cleaner Production	94
Financing efficiency in natural resource markets mobilizing private and public capital for a green recovery	Yan, J.; Haroon, M.	Resources Policy	91
Mobilising private adaptation finance: developed country perspectives	Pauw, W.P.	International Environmental Agreements: Politics, Law and Economics	31
The Effect of Monetary Policy and Private Investment on Green Finance: Evidence from Hungary	Desalegn, G.; Fekete-Farkas, M.; Tangl, A.	Journal of Risk and Financial Management	27
Understanding private-sector engagement in sustainable urban development and delivering the climate agenda in northwestern europe—a case study of london and copenhagen	Alkhani, R.	Sustainability (Switzerland)	26
Whether corporate green bonds act as armour during crises? Evidence from a natural experiment	Sisodia, G.; Joseph, A.; Dominic, J.	International Journal of Managerial Finance	22

Source: Prepared by author

2. Publication Trend

The publication trend indicates a clear growth in research on private sector climate finance over recent years (Figure 2). Only one study was published in each of 2020 and 2021, followed by a moderate increase to three studies in both 2022 and 2023. A sharp rise is observed thereafter, with six publications in 2024 and eight in 2025. This pattern provides clear evidence that private sector climate finance is an emerging and rapidly expanding field of scholarly inquiry.

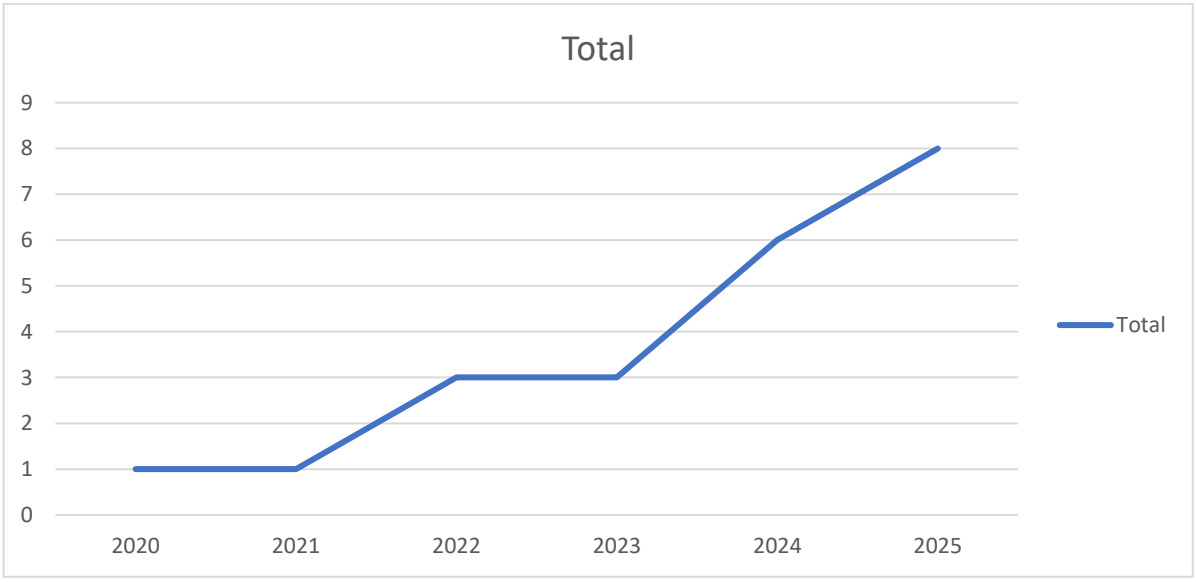

Fig.2 Publication trends

Source: Prepared by author

3. Data Type Distribution of Reviewed Studies

Figure 3 presents the distribution of studies based on data type. The reviewed literature is predominantly quantitative, accounting for 67% of the studies, reflecting a strong reliance on secondary panel, time-series, and firm-level financial data in private sector climate finance research. Qualitative studies constitute 22% of the sample and primarily employ policy document analysis, case studies, and expert interviews to examine institutional and governance dimensions. The remaining 11% of studies adopt a mixed-methods approach, combining quantitative analysis with qualitative insights. This distribution indicates a methodological bias toward quantitative evidence, while in-depth qualitative and mixed-method investigations remain relatively limited.

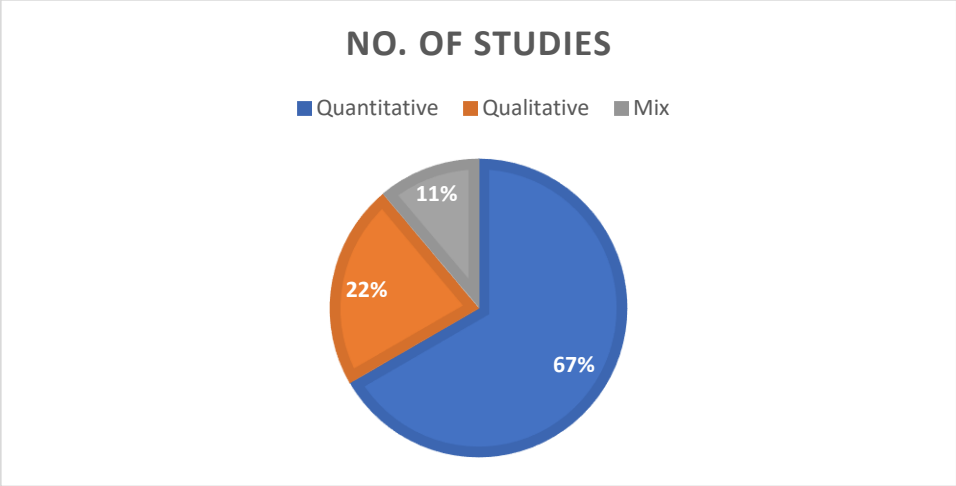

Fig. 3 Study type

Source: Prepared by author

4. Topic Modelling

To identify latent and emerging research themes in the private sector climate finance literature, a topic modelling approach based on Latent Dirichlet Allocation (LDA) was employed. LDA is an unsupervised probabilistic modelling technique that assumes each document is a mixture of multiple topics and each topic is represented as a distribution of words. This method is widely used in bibliometric and text-mining studies to uncover hidden thematic structures in large collections of academic literature.

Bibliographic data were collected from the Scopus database following the systematic screening procedure described earlier. After applying the inclusion and exclusion criteria, a final set of 27 peer-reviewed journal articles was retained for topic modelling. For each article, the title, abstract, and author keywords were extracted and compiled into an Excel file, which served as the input dataset for the analysis.

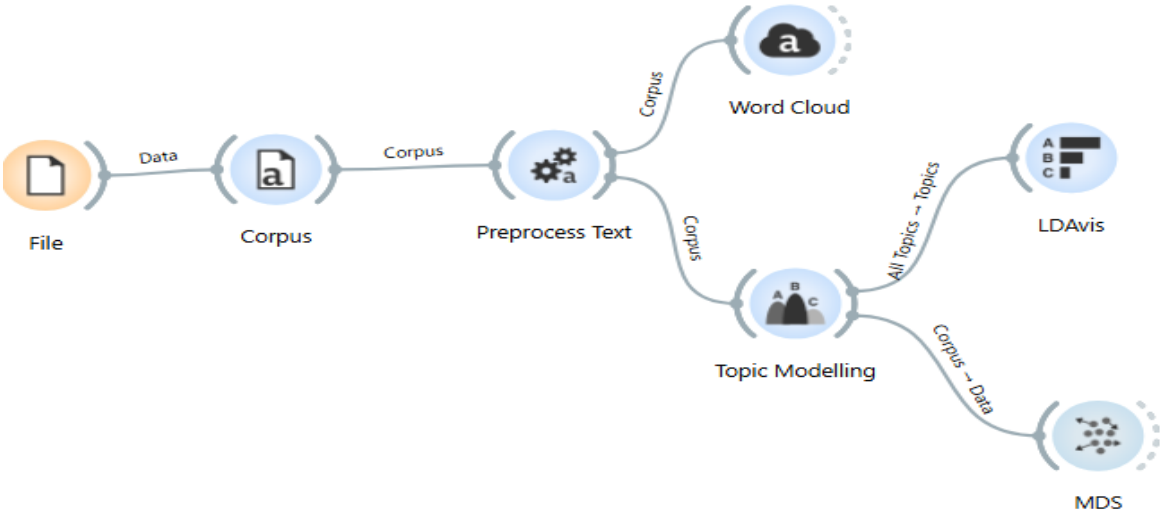

Fig. 4 Topic modelling workflow

Source: Prepared by author

The topic modelling analysis was conducted using Orange data mining software, an open-source

Python-based toolbox that enables integrated text preprocessing, visualization, and machine learning–based topic modelling within a single environment. Orange was selected due to its flexibility in handling bibliographic text data and its support for probabilistic topic modelling techniques.

The LDA-based topic modelling procedure involved four main steps, as illustrated in Figure 4.

First, text preprocessing was performed to clean and standardize the textual data. This included tokenization, transformation to lowercase, normalization, removal of punctuation, URLs, and accents, and elimination of common stop words such as "the," "and," and "of." Lemmatization was applied to reduce words to their root forms, thereby reducing dimensionality and improving computational efficiency. In addition, N-grams were generated to capture meaningful multi-word expressions relevant to private sector climate finance.

Second, the topic modelling widget in Orange was applied to the preprocessed corpus.

Third, the LDA model was used to identify dominant topic words and latent themes within the literature. The model estimates the probability distribution of topics across documents and the probability distribution of words within topics, enabling the extraction of semantically coherent themes.

Finally, the topic–document distribution produced by the LDA model was analysed to examine the prevalence of each topic across the reviewed documents. This facilitated the identification of key documents associated with each topic and informed the subsequent theme-based content analysis, through which the literature was categorised into four major thematic areas.

Table 2 presents the mapping of LDA-generated topics to higher-order themes derived through qualitative interpretation. Topics 1 and 8, characterised by terms related to ESG performance, corporate finance, green bonds, capital markets, and risk pricing, are grouped under Corporate and Capital-Market-Based Climate Finance Instruments, indicating a strong firm-level and market-oriented focus in the literature. Topics 2, 9, and 10 are classified as Private Investment Mobilization for Climate Action, reflecting research emphasis on private green investment behaviour, climate policy influence, and long-term economic impacts of private finance. Topics 3 and 4 are categorised under Public–Private Interactions in Climate Finance, capturing studies that examine the interaction effects between public support mechanisms and private investment, particularly in renewable energy and developing-country contexts. Finally, Topics 5, 6, and 7 fall within Governance and Institutional Determinants, highlighting the role of policy frameworks, governance quality, and institutional coordination in shaping private sector engagement in climate finance.

TABLE 2 Thematic analysis

LDA Topic No.	Top Topic Words	Interpretation of Topic Focus	Assigned Theme
Topic 1	green, esg, financial, finance, sustainable, firm, corporate, bond, environmental	ESG performance, corporate finance, green bonds, firm-level sustainability	Corporate and Capital-Market-Based Climate Finance Instruments
Topic 8	green, bond, resource, efficiency, risk, firm, market, capital, corporate	Green bonds, capital markets, firm efficiency, risk pricing	
Topic 2	private, investment, green, finance, climate, policy, sector	Private investment behaviour under climate policy	Private Investment Mobilization for Climate Action
Topic 9	green, investment, private, energy, policy, transition, long-term	Private green investment in energy transition	
Topic 10	investment, green, private, economic, sustainability, government, impact	Economic impacts of private green investment	
Topic 3	energy, investment, private, renewable, country, developing, public	Public–private investment in renewable energy (developing countries)	Public–Private Interactions in Climate Finance
Topic 4	finance, investment, private, renewable, public, effect	Interaction effects of public and private finance	
Topic 5	climate, private, finance, development, policy, corporate	Climate finance policy and development approach	Governance and Institutional Determinants
Topic 6	green, private, finance, investment, policy, sector	Policy-driven private climate finance	
Topic 7	sector, private, finance, public, governance, china, esg	Governance, public–private coordination, institutional context	

Source: Prepared by author

Figure 5 presents the word cloud generated from the titles, abstracts, and keywords of the selected studies, illustrating the most frequently occurring terms in the private sector climate finance literature. The prominence of words such as finance, investment, green, private, and climate confirms the central focus of the literature on mobilising private capital for climate-related objectives. Frequently appearing terms including energy, policy, sustainability, corporate, ESG, and governance indicate strong links between financial mechanisms, corporate behaviour, and regulatory frameworks. The presence of words such as bond, market, risk, development, and renewable further highlights the emphasis on capital-market instruments, risk–return considerations, and renewable energy investment. Overall, the word cloud visually corroborates the thematic findings of the study by demonstrating the dominance of finance- and investment-oriented narratives, alongside governance and sustainability considerations, in private sector climate finance research.

Fig. 5 Word cloud

Source: Prepared by author

4. Themes of the study

1. Corporate and Capital-Market-Based Climate Finance Instruments

A substantial share of the reviewed studies focuses on corporate and capital-market-based climate finance instruments, reflecting the growing role of financial markets in climate action. These studies primarily examine instruments such as green bonds, ESG-linked finance, sustainability-linked loans, and corporate environmental disclosures. Many studies have found that green bonds and ESG performance are positively associated with firm-level financial outcomes, including lower cost of capital, improved financing efficiency, and higher market valuation (Sisodia et al., 2022; Boccaletti & Gucciardi, 2025; Li et al., 2025). Green bond issuance is often interpreted as a credible signal of environmental commitment that enhances investor confidence, particularly during periods of market stress (Sisodia et al., 2022). However, evidence regarding the translation of these instruments into real green investment outcomes remains mixed. While some studies report that green bonds and sustainable finance instruments promote renewable energy investment and improve investment efficiency (Ma et al., 2026; Lou et al., 2025), others indicate weak, neutral, or sector-dependent effects, especially in heavy-polluting industries (Ishak et al., 2024). A few studies also suggest that private equity participation may dilute the green impact of capital-market instruments when profit maximization dominates allocation decisions (Lou et al., 2025). Overall, the literature reveals

considerable heterogeneity across sectors, regions, and institutional settings.

2. Private Investment Mobilization for Climate Action

Another prominent theme examines private investment mobilisation for climate action, particularly in renewable energy and green economic transitions. These studies investigate whether private capital responds to policy incentives, financial development, and macroeconomic conditions. Many studies find that private investment plays a critical role in expanding green finance and renewable energy capacity, especially when supported by stable regulatory frameworks and access to domestic credit (Desalegn et al., 2022; Dai et al., 2023). Cross-border investment studies further show that policy certainty and financial infrastructure significantly influence private investment decisions in developing countries (Ragosa & Warren, 2019).

Nevertheless, several studies report that private capital remains selective and risk-averse, often favouring conventional or fossil-fuel-related investments despite the availability of green finance mechanisms (Nkwaira & Van der Poll, 2024). In some contexts, private investment is found to be weakly aligned with climate objectives or even negatively associated with green investment outcomes (Lou et al., 2025). Studies focusing on small island and climate-vulnerable economies highlight that donor dependence and underdeveloped domestic investment ecosystems constrain sustained private sector participation (Samuwai et al., 2019). Thus, while private investment is widely recognised as essential, its mobilisation for climate action remains uneven.

3. Public–Private Interactions in Climate Finance

A growing body of literature addresses public–private interactions in climate finance, emphasising the complementary roles of public and private actors. Many studies find evidence of crowding-in effects, whereby public investment, international climate finance, and supportive policy frameworks stimulate private investment in green projects (Ragosa & Warren, 2019; Dai et al., 2023). Public finance is frequently shown to reduce investment risk, improve project bankability, and signal long-term policy commitment, particularly in emerging and developing economies.

However, some studies caution that public finance does not always translate into effective private sector engagement. In aid-dependent or institutionally weak contexts, excessive reliance on public or donor funding may crowd out domestic private investment (Samuwai et al., 2019). Policy-oriented analyses further reveal that governance fragmentation, legal uncertainty, and unclear additionality rules hinder private capital from reaching local climate initiatives, despite the rapid growth of ESG-labelled assets (Hilburn & Ronish, 2023). These findings indicate that public–private complementarities are highly context-dependent.

4. Governance and Institutional Determinants of Private Climate Finance

The fourth theme highlights the governance and institutional determinants shaping private climate finance outcomes. Rather than focusing solely on financial instruments, these studies emphasise the role of institutional quality, regulatory frameworks, and governance structures. Many studies find that strong institutions enhance the effectiveness of private climate finance by improving credibility, reducing information asymmetry, and strengthening investor confidence (Boccaletti & Gucciardi, 2025; Alkhani, 2020). Firm-level evidence suggests that ESG performance reduces financing costs primarily in countries with high institutional quality, while similar efforts yield limited benefits in weaker governance environments (Boccaletti & Gucciardi, 2025).

Governance challenges are particularly evident in adaptation finance. Studies highlight fragmented climate finance architectures, ambiguous definitions of private climate finance, and weak measurement frameworks as major barriers to private sector participation, especially in developing countries (Pauw, 2017; Chirambo, 2021). Conceptual frameworks further demonstrate that private actors influence climate outcomes not only through financing but also via governance, engagement, and standard-setting mechanisms (Fichtner et al., 2025). Overall, governance quality emerges as a critical enabling condition for effective private climate finance.

5. Limitations and Future Research Directions

Similar to other academic studies, this research also exhibits certain limitations. First, this study relies on a systematic literature review and theme-based content analysis of peer-reviewed journal articles. While this approach allows for a structured and in-depth synthesis of existing knowledge, it is inherently dependent on the scope and quality of the available literature. Consequently, findings reflect prevailing research trends rather than the full universe of private sector climate finance practices.

Second, the review draws exclusively on articles indexed in the Scopus database. Although Scopus is a widely recognised and comprehensive source, relevant studies indexed in other databases such as Web of Science, Google Scholar may not have been captured. Future research could broaden the database coverage to enhance the robustness and inclusiveness of the evidence base.

Third, this study considers only journal articles, excluding books, book chapters, conference proceedings, working papers, and policy reports. While this decision ensures academic rigour and

quality control, it may overlook emerging debates and practitioner-oriented insights that are particularly relevant in the rapidly evolving field of climate finance. Future studies may include these additional sources to widen the analytical scope.

In terms of substantive limitations, the reviewed literature shows a strong bias toward mitigation-oriented private climate finance, particularly green bonds, ESG-linked instruments, and renewable energy investment. As a result, evidence on private adaptation finance, resilience financing, and nature-based solutions remains limited. This imbalance constrains the ability to draw comprehensive conclusions across all dimensions of climate action.

Despite these limitations, this study makes noteworthy contributions by systematically identifying dominant research themes, synthesizing fragmented evidence, and highlighting inconsistencies across levels of analysis and geographical contexts. One important direction for future research lies in the development of standardized measurement frameworks for private climate finance effectiveness, as current studies employ highly heterogeneous indicators ranging from financial performance to aggregate investment volumes.

Although the determinants of private climate finance such as ESG performance, green financial instruments, and policy incentives have been extensively examined, there remains a significant knowledge gap regarding moderating and mediating mechanisms. Future research should explore how institutional quality, governance arrangements, innovation capacity, and risk-sharing mechanisms influence the relationship between private finance and climate outcomes.

Moreover, beyond the commonly studied financial outcomes, future studies should investigate the relationship between private climate finance and non-financial dimensions, including climate resilience, social equity, just transition outcomes, and stakeholder welfare. Such analyses would provide a more holistic understanding of the broader impacts of private sector engagement in climate action. There is substantial scope for primary data-based research, particularly qualitative and mixed-methods studies capturing the perceptions of key stakeholders such as institutional investors, financial intermediaries, policymakers, and project developers. Exploring investor attitudes toward climate and adaptation finance especially in developing and climate-vulnerable economies would offer valuable insights into behavioural and institutional barriers. Emerging areas such as private adaptation finance, blended finance governance, climate finance assurance, and the relationship between private climate finance and cost of capital also present promising avenues for future academic inquiry.

6. Conclusion

This study provides a systematic synthesis of the emerging literature on private sector climate finance, addressing the growing need to mobilise private capital in support of global climate and sustainable development objectives. By adopting a Systematic Literature Review (SLR) approach, the study consolidates evidence from 27 peer-reviewed articles and offers a structured understanding of how private sector finance has been conceptualised and analysed in the academic literature.

The review identifies four dominant themes: corporate and capital-market-based climate finance instruments, private investment mobilisation for climate action, public–private interactions in climate finance, and governance and institutional determinants. The findings reveal that existing research is largely concentrated on mitigation-oriented finance, capital-market instruments, and risk–return considerations, with comparatively limited attention to climate adaptation, local-level finance, and socially inclusive outcomes. Moreover, while the literature exhibits considerable theoretical diversity, many studies rely on implicit theoretical foundations, highlighting the need for clearer and more integrated theoretical frameworks.

Methodologically, the literature is dominated by quantitative studies using secondary panel and time-series data, whereas qualitative and mixed-method approaches remain underutilised. This imbalance constrains deeper understanding of behavioural, institutional, and governance-related drivers of private climate finance, particularly in developing and climate-vulnerable contexts.

Overall, this study contributes to the literature by clarifying dominant research trajectories, identifying persistent gaps, and highlighting underexplored areas for future inquiry. The findings underscore the importance of stronger governance frameworks, policy credibility, and de-risking mechanisms in mobilising private capital toward climate objectives. By offering a comprehensive thematic synthesis, this review provides valuable insights for researchers, policymakers, and practitioners seeking to design more effective and inclusive private sector climate finance strategies.

Reference

1. Alkhani, R. (2020). Understanding private-sector engagement in sustainable urban development and delivering the climate agenda in northwestern Europe—A case study of London and Copenhagen. Sustainability, 12(20), 8431. https://doi.org/10.3390/su12208431

2. Blei, D. M., Ng, A. Y., & Jordan, M. I. (2003). Latent dirichlet allocation. Journal of machine Learning research, 3(Jan), 993-1022.

3. Boccaletti, S., & Gucciardi, G. (2025). ESG performance, institutional factors, and the cost of

debt. Journal of Sustainable Finance & Investment, 1-29. https://doi.org/10.1080/20430795.2025.2489386

4. Bose, S., Shams, S., Ali, M. J., & Mihret, D. G. (2021). COVID-19 impact, sustainability performance and firm value: International evidence. Accounting and Finance. Advance online publication. https://doi.org/10.1111/acfi.12801
5. Buchner, B., Clark, A., Falconer, A., Macquarie, R., Meattle, C., Tolentino, R., & Wetherbee, C. (2019). Global landscape of climate finance 2019 (p. 36). Climate Policy Initiative.
6. Chawla, K., & Ghosh, A. (2019). Greening new pastures for green investments. Council on Energy, Environment and Water.
7. Chirambo, D. (2021). Corporate Sector Policy Innovations for Sustainable Development Goals (SDGs) implementation in the Global South: the case of Sub- Saharan Africa. Journal of Sustainability Research, 3(2). https://doi.org/10.20900/jsr20210011
8. Chirambo, D. (2021). Corporate sector policy innovations for sustainable development goals (SDGs) implementation in the global south: The case of Sub- Saharan Africa. Journal of Sustainability Research, 3(2). https://doi.org/10.20900/jsr20210011
9. Dai, X., Rao, F., Liu, Z., Mohsin, M., & Taghizadeh-Hesary, F. (2023). Role of public and private investments for green economic recovery in the post-COVID- 19. Economic research-Ekonomska istraživanja, 36(1),1146-1166. https://doi.org/10.1080/1331677X.2022.2081865
10. Demšar, J., Curk, T., Erjavec, A., Gorup, Č., Hočevar, T., Milutinovič, M., ... & Zupan, B. (2013). Orange: data mining toolbox in Python. the Journal of machine Learning research, 14(1), 2349-2353. https://dl.acm.org/doi/10.5555/2567709.2567736
11. Desalegn, G., Fekete-Farkas, M., & Tangl, A. (2022). The effect of monetary policy and private investment on green finance: evidence from Hungary. Journal of Risk and Financial Management, 15(3), 117. https://doi.org/10.3390/jrfm15030117
12. Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. Journal of Business Research, 133, 285–296. https://doi.org/10.1016/j.jbusres.2021.04.070
13. Fichtner, J., Schairer, S., Haufe, P., Aguila, N., Baioni, R., Urban, J., & Wullweber, J. (2025). Channels of influence in sustainable finance: A framework for conceptualizing how private actors shape the green transition. Finance and Society, 11(1), 56-80. https://doi.org/10.1017/fas.2024.24
14. Hilburn, H., & Ronish, Y. (2023). What is preventing private capital from reaching local climate action?. Environmental Law Review, 25(4), 249-259. https://doi.org/10.1177/14614529231214012
15. Intergovernmental Panel on Climate Change (IPCC). (2018). Global warming of 1.5°C:. https://www.ipcc.ch/sr15/
16. Ishak, N., Abdul Aziz, N. A., & Ab Rahim, F. (2024). Green policy effect on firm sustainability: examining the stock performance of ESG adopters in heavy- polluter industry in Malaysia. Cogent Economics & Finance, 12(1), 2334102. https://doi.org/10.1080/23322039.2024.2334102
17. Jackson, P. (2007). From Stockholm to Kyoto: a brief history of climate change. UN Chronicle, 44(2). https://www.un.org/en/chronicle/article/stockholm-kyoto-brief-history- climate-change
18. Jaffe, A. B., Newell, R. G., & Stavins, R. N. (2005). A tale of two market failures: Technology and environmental policy. Ecological Economics, 54(2–3), 164–174. https://doi.org/10.1016/j.ecolecon.2004.12.02
19. Kraus, S., Breier, M., Lim, W. M., Dabić, M., Kumar, S., Kanbach, D., Mukherjee, D., Corvello, V., Piñeiro-Chousa, J., Liguori, E., Palacios-Marqués, D., Schiavone, F., Ferraris, A., Fernandes, C., & Ferreira, J. J. (2022). Literature

reviews as independent studies: guidelines for academic practice. Review of Managerial Science, 16(8), 2577–2595. https://doi.org/10.1007/s11846-022- 00588-8

20. Li, L., Ye, Q., You, J., & Chen, Z. (2025). Does AI mitigate climate risk and reduce the cost of capital? Evidence from firm-level data. International Review of Financial Analysis, 104708. https://doi.org/10.1016/j.irfa.2025.104708
21. Lim, W. M., Kumar, S., & Ali, F. (2022). Advancing knowledge through literature reviews: 'what', 'why', and 'how to con tribute.' The Service Industries Journal, 42(7–8), 481–513. https://doi.org/10.1080/02642069.2022.2047941
22. Lou, W., Lu, S., Li, M. et al. Determinants of green energy investment—financial drivers and equitable transition. Humanit Soc Sci Commun 12, 489 (2025). https://doi.org/10.1057/s41599-025-04760-9
23. Ma, H., Luo, G., Li, Y., & Jing, H. (2025). Do Green Bonds Boost Corporate Investment Efficiency? Evidence from China's Mandatory Bond Market. Finance Research Letters, 109378. https://doi.org/10.1016/j.frl.2025.109378
24. Mercure, J.-F., Knobloch, F., Pollitt, H., Paroussos, L., & others. (2016, July 11). Policy-induced

energy technological innovation and finance for low-carbon economic growth (Study on the macroeconomics of energy and climate policies). Directorate-General for Energy, European Commission.
25. Nkwaira, C., & Van der Poll, H. M. (2024). An Exposition of the Gap between Public Sector and Private Sector Participation in Green Finance. Risks, 12(7), 103. https://doi.org/10.3390/risks12070103
26. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., … Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. The BMJ, 372. https://doi. org/10.1136/bmj.n71
27. Panayotou, T. (1993). Empirical tests and policy analysis of environmental degradation at different stages of economic development (ILO Working Paper No. 992927783402676). International Labour Organization.
28. Pauw, W. P. (2017). Mobilising private adaptation finance: developed country perspectives. International Environmental Agreements: Politics, Law and Economics, 17(1), 55-71. https://doi.org/10.1007/s10784-016-9342-9
29. Polzin, F. (2017). Mobilizing private finance for low-carbon innovation – A systematic review of barriers and solutions. Renewable and Sustainable Energy Reviews. Elsevier Ltd. https://doi.org/10.1016/j.rser.2017.04.007
30. Ragosa, G., & Warren, P. (2019). Unpacking the determinants of cross-border private investment in renewable energy in developing countries. Journal of Cleaner Production, 235, 854-865. https://doi.org/10.1016/j.jclepro.2019.06.166
31. Raman, R., Ray, S., Das, D., & Nedungadi, P. (2025). Innovations and barriers in sustainable and green finance for advancing sustainable development goals. Frontiers in Environmental Science, 12. https://doi.org/10.3389/fenvs.2024.1513204
32. Samuwai, J., Hills, J. M., & Michalena, E. (2019). Thinking outside the box: Deepening private sector investments in Fiji's nationally determined contributions through scenario analysis. Sustainability, 11(15), 4161. https://doi.org/10.3390/su11154161
33. Siddaway, A. P., Wood, A. M., & Hedges, L. V. (2019). How to do a systematic review: A best practice guide for con ducting and reporting narrative reviews, meta-analyses, and meta-syntheses. Annual Review of Psychology, 70, 747–770. https://doi.org/10.1146/annurev-psych-010418-102803
34. Sisodia, G., Joseph, A., & Dominic, J. (2022). Whether corporate green bonds act as armour during crises? Evidence from a natural experiment. International Journal of Managerial Finance, 18(4), 701-724. https://doi.org/10.1108/IJMF- 10-2021-0501
35. Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed manage ment knowledge by means of systematic review. British Journal of Management, 14(3), 207–222. https://doi.org/10.1111/1467-8551.00375
36. United Nations Conference on Trade and Development (UNCTAD). (2014). World investment report 2014: Investing in the SDGs: An action plan. United Nations. https://unctad.org/webflyer/world-investment-report-2014
37. United Nations Framework Convention on Climate Change (UNFCCC). (2010). The Cancun agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (Report of the Conference of the Parties on its sixteenth session, FCCC/CP/2010/7/Add.1). United Nations. https://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf