International Journal of Economics, Business and Management Research

Vol. 9, No.12; 2025

ISSN: 2456-7760

A Comparison of Carbon Emission Disclosure Research Between Indonesia and the Global Context: A Bibliometric Review and Future Research Agenda

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doi.org/10.51505/IJEBMR.2025.92121 URL: https://doi.org/10.51505/IJEBMR.2025.92121

Received: Dec 07, 2025 Accepted: Dec 15, 2025 Online Published: Dec 24, 2025

Abstract

This study aims to conduct a bibliometric review to compare carbon emission disclosure research between Indonesia and the global context to propose a future research agenda about carbon emission disclosure in Indonesia. The analysis consists of articles from Scopus-indexed journals from 2005 to 2025. The result of this study shows the comparison analysis of research between Indonesia and global context, that involves (1) publication trend, (2) distribution of publication by country, (3) authorship distribution and citation, (4) keyword co-occurrence network visualization using VOSviewer for both global and Indonesian studies, and (5) the variables that are widely used in both the global and Indonesian contexts. The comparison analysis reflects that research about carbon emission disclosure in Indonesia is still relatively low compared to the global context. Furthermore, this study provides insights into potential future research by identifying variables that can be further explored in the context of carbon emission disclosure in Indonesia, namely supply chain engagement, cost of debt, family control/family firms, earnings management, and carbon reduction performance.

Keywords: Carbon emission disclosure, Bibliometric review, Indonesia, Global context, Future research agenda

1. Introduction

Over the last decade, the problem of climate change has become the main focus of global attention due to its harmful impacts on human life and the environment, including the increasing intensity of extreme weather, ecosystem degradation, rising temperatures and sea levels, and other effects. Carbon emission is one of the most decisive factors that lead to climate change mainly due to the high CO_2 concentration in the atmosphere, and thus contribute to climate change (Chen et al., 2021). In the past several years, the CO_2 concentration in the atmosphere has risen considerably to concerning levels. To further elaborate, the global average of CO_2

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concentration was 427 ppm in May 2024 according to data published by NOAA's Global Monitoring Laboratory (Lindsley, 2025). Notably, this level is well above the recommended optimal level from the World Health Organization (WHO), which has a set range of 310-330 ppm. Thus, this condition indicates that carbon emission problem should get more serious attention

In the context of business, however, the largest contribution to CO_2-induced atmospheric levels comes from companies. One hundred companies around the globe are responsible for 71% of worldwide carbon emissions (Carbon Disclosure Project, 2017). In 2024, in accordance with a report by InfluenceMap (2024) titled, "The Carbon Major Database: Launch Report," 57 enterprises were responsible for 80% of global emissions generated between 2016 and 2022, both state-owned enterprises and private corporations. This indicates that companies contribute significantly to the increase in carbon emissions and hold responsibility for addressing this issue. Thus, organizations should take this topic more seriously, as concerns from stakeholders about clear information on carbon emission can encourage companies to disclose this information (Mayapada & Lyu, 2025). In this situation, carbon emissions disclosure is also crucial. According to Setiawan et al., (2025), carbon emission disclosure is part of a strategy to enhance corporate accountability and sustain the sustainable development agenda by applying low-carbon practices, energy efficiency optimization, and environmentally-friendly innovation in the long term. Furthermore, carbon emission disclosure serves as an assessment tool for possible corporate activities that would generate carbon emissions (Syafik et al., 2025). Also, carbon emissions disclosure denotes an organization's intention to minimize its carbon emissions and is an important component under global environmental initiatives aimed at the United Nations Sustainable Development Goals (Poole, 2022). Hence carbon emissions are becoming very important for reducing carbon emissions.

Previous studies have explored several variables that affect carbon emission disclosure, including firm characteristics (Bae Choi et al., 2013; Chu et al., 2013; Saraswati et al., 2021; Wahyuningrum et al., 2024), board characteristics (Saraswati et al., 2021; Wahyuningrum et al., 2024; Wulan, 2022), ownership structure (Bedi & Singh, 2024; Singhania & Bhan, 2024; Wahyuningrum et al., 2024; Wulan, 2022), and industry type (Ott et al., 2017). Additionally, the impact of carbon emission disclosure has been studied in terms of financial performance (Desai et al., 2022; Khunkaew et al., 2023), firm value (Mahmudah et al., 2023), reputation (Khalid et al., 2024), stock price (Griffin et al., 2017; Jaggi et al., 2018), and earnings management at the firm level (Mayapada & Lyu, 2025).

In the context of the literature review, Setiawan et al. (2025) conducted a bibliometric analysis on 278 research articles published in the Scopus database between 2004 and 2024. The study reveals that the field of carbon disclosure research has grown significantly as a global phenomenon, mainly in emission disclosure, carbon performance, corporate governance and as environmental compliance risk. A literature review and meta-analysis of the relationship between ownership mechanisms and voluntary carbon disclosure was presented by Singhania & Bhan (2024) that was based on 55 empirical studies over 13 countries across 2008 to 2022. The

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analysis results show that institutional ownership and state ownership positively influence voluntary carbon disclosure, whereas ownership concentration, managerial ownership, and foreign ownership have no significant impact on carbon disclosure. Wang (2023) reviewed 78 literature articles published in reputable journals between 2011–2021 that evaluated the financial effects of carbon risk and carbon disclosure on firm performance and firm value. The implications of these results suggest that the association between carbon disclosure and financial performance is still inconsistent as it is influenced by the variability in the measurement methods, geographical contexts and the research periods.

This study is aimed to conduct a comparative literature review to compare the work on carbon emission disclosure research between Indonesia and the global context. This comparison is important to highlight future research for the carbon emission disclosure in the Indonesian context. Research on carbon emission disclosure in Indonesia is particularly important because Indonesia is the largest carbon emitter in Southeast Asia, with a total of 600 million metric tons of carbon emissions in 2021 (International Energy Agency, 2025). In addition, Indonesia ranks seventh globally as a carbon-emitting country (Climate Watch, 2022). Therefore, research on carbon emission disclosure in Indonesia has become important.

In particular, this study provides a comparative analysis between Indonesia and the global context, which involves the comparison of (1) publication trend, (2) distribution of publication by country, (3) authorship distribution and citation, (4) keyword co-occurrence network visualization using VOSviewer for both global and Indonesian studies, and (5) the variables that are widely used in both the global and Indonesian contexts. Furthermore, this study provides insights into potential future research by identifying variables that can be further explored in the context of carbon emission disclosure in Indonesia, namely supply chain engagement, cost of debt, family control/family firms, earnings management, and carbon reduction performance.

2. Methodology

This study is a bibliometric review. Bibliometric analysis is chosen because it enables a comprehensive comparison of carbon emission disclosure research in Indonesia and the global context. Through this approach, the study examines publication trends, the distribution of publications by country, authorship distribution and citation, and Keyword Co-occurrence Network Visualization. These analyses provide a clear mapping of the existing research landscape and help identify gaps and potential directions for future research. This study searches for articles that are relevant to carbon emission disclosure in the Scopus database. The Scopus database was selected because it covers reputable peer-reviewed journals. In addition, Scopus offers a well-structured indexing system and comprehensive metadata analysis (Manani & P. S, 2025). The keywords used are as follows.
("carbon emission* disclosure*" OR "carbon disclosure*" OR "greenhouse gas emission* disclosure*" OR "greenhouse gas disclosure*")

The search using these keywords resulted in 868 article documents. After that, the researchers conducted filtering by: limiting the “source type” to “journals”; limiting the “subject area” to

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"Business, Management, and Accounting," "Economics, Econometrics and Finance," and "Social Sciences"; limiting the "document type" to "articles"; and limiting the "language" to "English." The filtering process resulted in 591 research articles. Subsequently, to exclude studies conducted in Indonesia, all Indonesia-based research was removed. This led to a final set of 528 carbon emission research documents conducted in the global context, excluding Indonesia. Figure 1 illustrates the PRISMA flowchart of the article selection process.

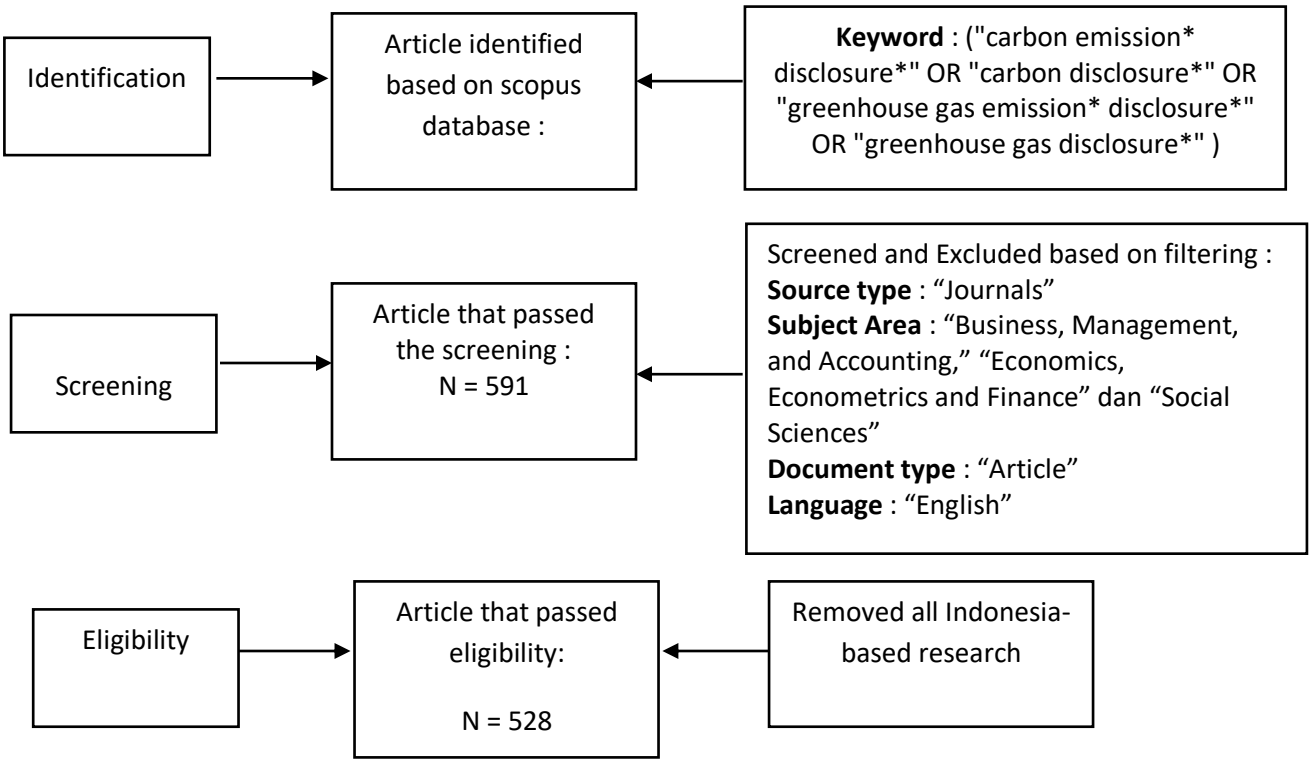

Figure 1. Prisma *Flowchart*

To search for articles in the Indonesian context, the same keywords were used. The filtering method was also the same, except for the country parameter. Articles were limited to research conducted in Indonesia, resulting in 63 articles.

3. Results

The results of the analysis, based on data retrieved from the Scopus database, which identified 528 global carbon emission disclosure research articles and 63 studies conducted in Indonesia, are presented as follows.

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3.1. Comparison of Publication Trends between Indonesia and The Global Context

The trend of research publications on carbon emissions disclosure globally and in Indonesia increased from 2005 to 2025, with global growth being much faster and more significant. Global publications have been steadily increasing since 2011 and have surged sharply after 2020, reaching a peak of 107 publications in 2025. In contrast, Indonesia has only been active since 2011, but growth has been unstable and relatively slow, with a gradual increase since 2018 and reaching a peak of 18 publications in 2024 before declining in 2025. However, this decline is due to the fact that this research was conducted before the completion of 2025, and more publications are likely to be added. Overall, this indicates that Indonesia's research interest is starting to grow, but it still lags behind the global level. Therefore, there is still considerable potential for future research in Indonesia.

Figure 2. Trends in research publications between global and Indonesia

3.2. Distribution of Publication by Country

Figure 3 and Table 1 show the global distribution of publication on carbon emissions disclosure. Australia ranks first with 106 publications, followed by China with 88 publications, The United Kingdom with 75 publications, and The United States with 73 publications. Based on theses data, Indonesia is in fifth position with 62 publications, indicating that its research output remains relatively limited compared to global context, despite the country's significant carbon emission challenges. This findings higlights the need for more comprehensive studies on carbon emission disclosure in the Indonesian context. Furthermore, Other countries such as Canada, Malaysia, India, Germany, and France show lower publication counts, ranging from 25 to 35 publications.

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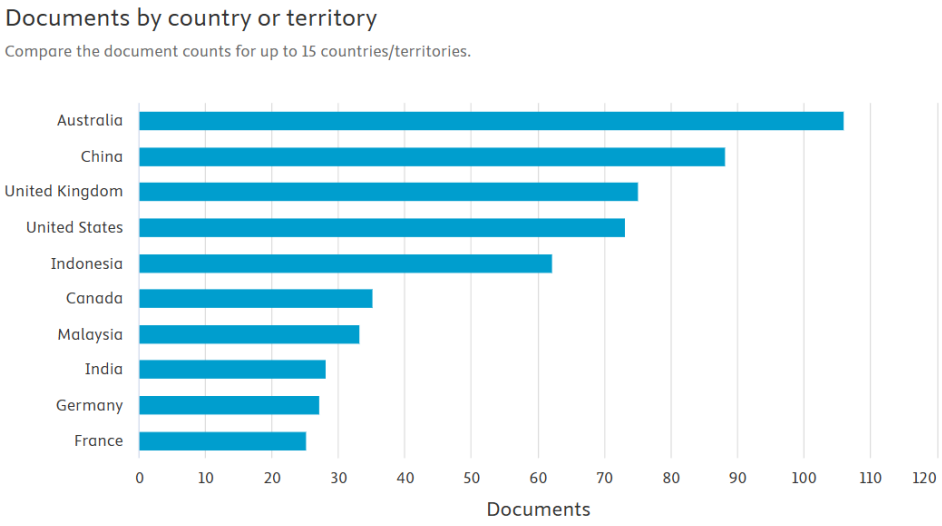

Figure 3. Distribution of Publication by Country

Table 1 Distribution of Publication by Country

Rank	Country	Publications
1	Australia	106
2	China	88
3	United Kingdom	75
4	United States	73
5	Indonesia	62
6	Canada	35
7	Malaysia	33
8	India	28
9	Germany	27
10	France	25

3.3. Comparison of Authorship Distribution and Citation between Indonesia and The Global Context

Based on the comparison of authorship distribution and citation between and The Global context and Indonesia (table 2 & 3), there is a significant difference between global and Indonesian authors in terms of research productivity and academic impact. Global authors such as Tang, Qingliang and Luo, Le have a high number of publications (28 & 24, respectively) with substantial citations, exceeding 3,600, indicating strong scholarly influence. In contrast,

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Indonesian authors show lower productivity, with a maximum 7 publications, with considerably fewer citations, where the highest, Setiawan, Doddy, received only 14 citations. This reflects that global researchers have greater contribution and visibility compared to Indonesian researchers in the field of carbon emission disclosure. The findings highlight the need to enhance research quality, collaboration, and dissemination to strengthen Indonesia's contribution to the global literature.

Table 2 Global Authorship Distribution and Citation

Rank	Author	Publications	Citations
1	Tang, Qingliang	28	3653
2	Luo, Le	24	3667
3	Bui, Binh	7	440
4	Datt, Rina	7	362
5	Houqe, Noor Nurul	6	406
6	González-González, José M.	6	244
7	Zamora-Ramírez, Constancio	6	244
8	Bedi, Ankita	6	45
9	Singh, Balwinder	6	45
10	Choi, Bobae	5	449

Table 3 Indonesian Authorship Distribution and Citation

Rank	Author	Publications	Citations
1	Setiawan, Doddy	7	14
2	Harymawan, Iman	5	143
3	Kurnia, Pipin	3	70
4	Djajadikerta, Hadrian Geri	3	32
5	Manurung, Daniel T.H.	3	18
6	Hapsari, Dini W.	3	18
7	Wahyuningrum, Indah Fajarini Sri	3	17
8	Rusmin, Rusmin	3	13
9	Astami, Emita Wahyu	3	13
10	Kiswanto, Kiswanto	3	8

3.4. Comparison of Keyword Co-occurrence Network Visualization between Indonesia and The Global Context

Figure 5 presents the visualization of keyword occurrence using VOSViewer in the context of global research, whereas figure 6 shows the visualization of keyword occurrence using

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VOSViewer in the context of research conducted in Indonesia. The visualization consists of nodes and edges. The size of nodes represents the frequency of keywords usage in the prior research. The edges that connect the nodes represents the relationship and strength of the research. Based on the analysis of the keyword co-occurrence network visualization in figure 4, several keywords are still rarely used in the carbon emissions disclosure research in the global context, namely "national culture", "cost analysis", "instituonal theory", "environmental risk", and, "investments". Whereas in the Indonesian context, based on figure 5, several keywords are still rarely used in the carbon emissions disclosure research in Indonesian context, namely "competition", "pressure", "economic performance", "gender diversity", and "family controlled firm".

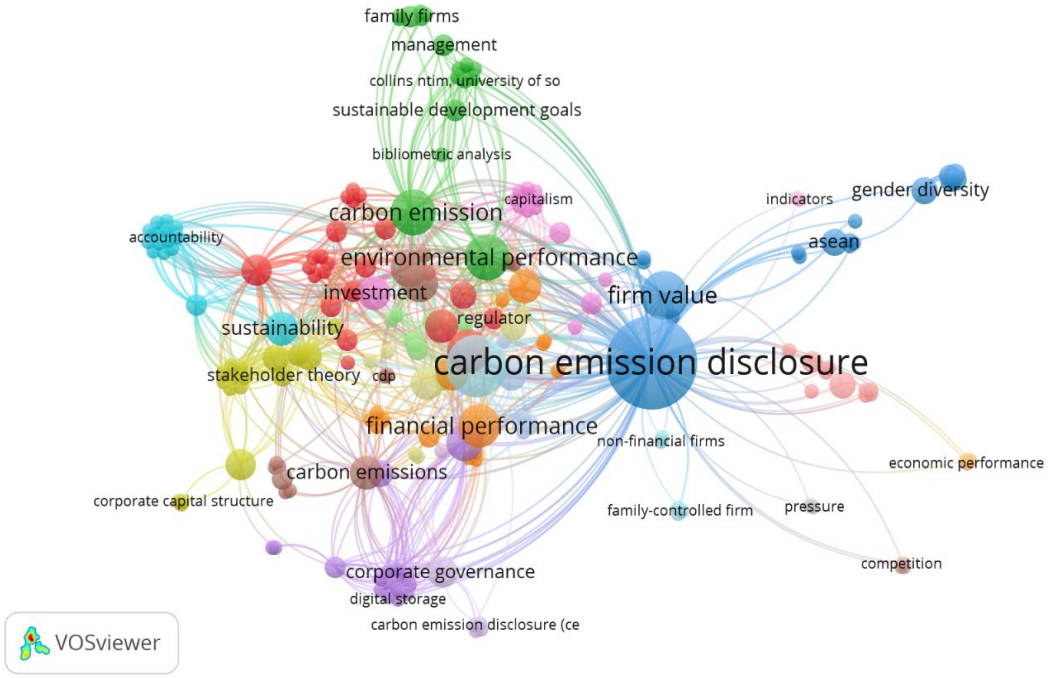

Figure 4. Keyword Occurrence Visualization: Global

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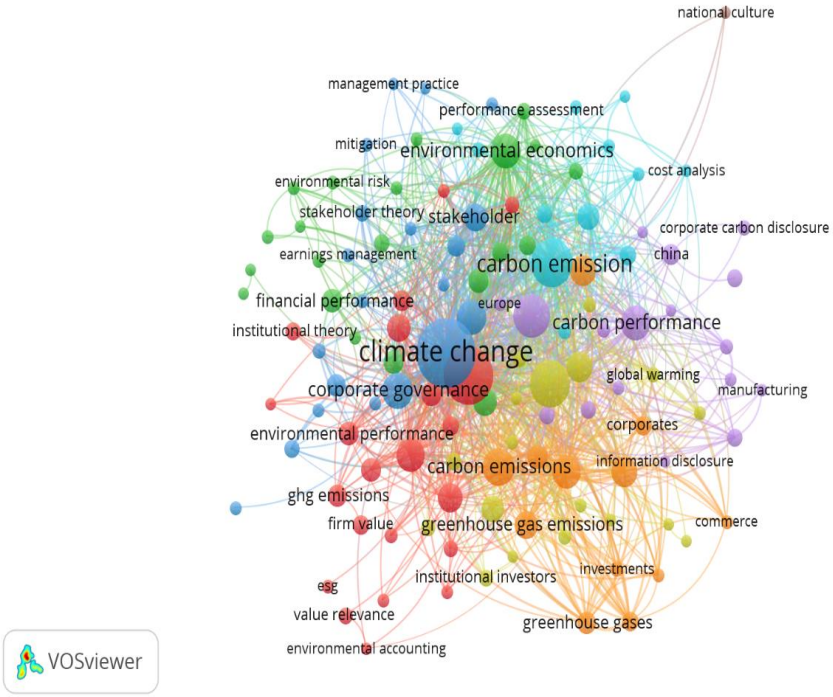

Figure 5. Keyword Occurrence Visualization: Indonesia

3.5. The Variables that are Widely Used in the Global and Indonesian Context

Based on the analysis of research articles on carbon emission disclosure, the five most frequently used variables in the global research context are 1) corporate governance, 2) corporate social responsibility, 3) environmental economics, 4) emission control, and 5) carbon accounting. Meanwhile, the five most frequently used variables in the context of carbon emission disclosure research in Indonesia are 1) profitability, 2) leverage, 3) environmental performance, 4) firm size, and 5) board size.

3.6. Future Research and Analysis

Based on the analysis of research articles on carbon emission disclosure, the following are variables that have been examined in global studies but have not yet been explored or are rarely investigated in research conducted in Indonesia.

1) Supply Chain Engagement

Global research indicates that supply chain engagement plays a significant role in determining carbon emission reduction strategies and the quality of carbon emission disclosure (Blanco,

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2021; Dahlmann & Roehrich, 2019; Lintukangas et al., 2023). However, this variable has not yet been studied in Indonesia despite Indonesian companies' supply chains appearing of intricate complexity, involving different sectors that are the major sources of emissions. Hence, opportunities exist in such investigations as corporate involvement towards supply chain partners in carbon emission disclosure.

Potential future studies might seek to investigate whether organisations with stronger supply chain engagement have higher quality of carbon emission disclosure. Moderating factors, however, may be the size, governance capacity or regulatory pressure exerted on firms.

One additional thing they could analyze is how industry attributes affect this relationship. For instance, industries such as cement, energy, or mining have supply chains with high carbon risk, whereas the service sector has lower risk. Such research could explore the difference between supply chain carbon pressure across sectors.

2) Cost of Debt

While studies at the global level have reported that carbon emission disclosure quality is related to cost of debt, as banks and investors increasingly take into account companies' climate-related risks (Kumar & Firoz, 2018; Maaloul, 2018; Ririmasse et al., 2025). Yet, there is a dearth of studies in Indonesia that investigate whether carbon emission disclosure influences the cost of debt. By the researcher's observations, the single study that does explore carbon emission disclosure on the cost of debt is the research conducted by Nasih et al. (2024)

Future research could investigate whether companies who disclose their carbon emissions tend to receive a lower cost of debt from financial institutions. Also, moderating variables such as governance quality, the reputation of auditors, or institutional pressure (e.g., foreign institutional ownership) could be tested to see whether they will strengthen the relationship between carbon emissions disclosure and the cost of debt.

3) Family Control/Family Firms

Research on carbon emission disclosure in Indonesia has largely focused on conventional variables such as firm size, profitability, leverage, industry type, environmental performance, and governance structure. However, there is a variable with significant potential that remains underexplored in the context of carbon emission research in Indonesia, namely family firms or family control (Pramono et al., 2023; Qosasi et al., 2022; Susanto et al., 2024). Whereas, the majority of companies in Indonesia have a relatively high family ownership structure (Claessens et al., 2000). Therefore, family firms become an important factor for future research on carbon emission disclosure in Indonesia.

Future research could explore how the family firms influence the quality, extent, and depth of carbon emission disclosure. Theoretically, there are two possible and opposing directions of the relationship. On one hand, Socioemotional Wealth Theory (SEW) suggests that family firms have strong motivations to preserve their reputation, family name, and long-term business

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legacy. This may encourage family firms to be more concerned with sustainability issues and provide more transparent carbon emission disclosures. Thus, family firms may have stronger reputational incentives than non-family firms.

Conversely, according to the Entrenchment Effect Hypothesis and Type II Agency Theory, family firms generally have certain incentives to reduce transparency and transparency will be affected by the perception of privacy of information and less public observation. Consequently, even in this context, we show that family firms may reveal less carbon emission information because they are worried that such information could tarnish their market perception or create governmental pressure to regulate.

Future studies could explore the nature of this relationship in the Indonesian setting by exploring moderators such as board size, board independence, the presence of a sustainability committee, or foreign institutional pressure. Furthermore, studies could classify family firms into categories such as founder-led, second-generation family, and family-controlled with professional management to determine whether the level of family involvement affects CED differently.

4) Earnings Management

Earnings management is one of the central topics in accounting research. However, in the context of carbon emission disclosure, this variable is still rarely used. Therefore, this provides opportunities for future research to understand the relationship between opportunistic behavior in financial reporting and the transparency of corporate carbon emissions. In addition, only few studies have examined the linkage between carbon emission disclosure and earnings management (Houqe et al., 2024; Mayapada & Lyu, 2025).

Future research could explore whether companies engaging in earnings management tend to provide lower or more symbolic carbon emission disclosure as part of an impression management strategy.

It has been reported from international literature that due to the attempts by companies to hide bad financial performance or even accounting manipulation practices, they often enhance the scope of non-financial reporting in order to build a positive image. In this context, research in Indonesia could investigate if firms with high earnings management use carbon emissions disclosure as a legitimacy tool to divert attention of stakeholders.

On the other hand, this relationship could face an opposite side: firms engaged in earnings management could choose to avoid detailed carbon emission disclosures due to the high chances of public scrutiny. Earnings management can produce a less transparent reporting environment, lowering the chances that firms will disclose sensitive or potentially regulatory-sensitive environmental information.

Future research can also study more moderating factors from audit quality, institutional ownership, family control, the presence of a sustainability committee, or environmental

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certification of the relationship between earnings management and carbon emission disclosure quality.

Alternatively, studies could expand the context by highlighting the distinction between certain forms of earnings management such as accrual earnings management, real earnings management, and classification shifting.

5) Carbon Reduction Performance

Global studies have evaluated the contribution of emission reduction efficiency to carbon disclosure. While the studies conducted in Indonesia have concentrated on firm-level factors (e.g., size, profitability, leverage, etc.) rather than on actual performance in emission reduction. Especially important is this variable, since more and more companies in Indonesia are being formally evaluated by means of carbon tax and by carbon trading systems for their emissions.

Future studies might investigate whether companies who perform a more aggressive reduction (Scope 1, Scope 2 or Scope 3) disclose more accurately and are better quality. Future research questions may be: Does emission reduction in the previous year impact on the quality of carbon emission disclosure (CED) in the subsequent year? Do companies with better carbon-reduction results have greater firm value?

Studies might also investigate whether carbon reduction performance moderates the nexus between CED and firm value, thereby providing data on market appreciation for companies that can report, but also action.

Furthermore, as a new means of measurement, the scholars could create an emission reduction performance index for Indonesian enterprises in the future. Further research could examine business involvement in international endeavors like the Carbon Disclosure Project (CDP) versus firms fulfilling only domestic legislative processes.

Future studies might also distinguish among different industries because sectors such as energy and manufacturing are predicted to experience disparate emission reduction challenges and services or financial sectors are expected to have different challenges.

4. Conclusion

This study conducts a bibliometric review to compare carbon emission disclosure research in Indonesia and the global context. This comparative effort is crucial for determining potential future research pathways on carbon emission disclosure in Indonesia. Since Indonesia is the largest carbon emitter in Southeast Asia, with a total of 600 million metric tons of carbon emissions in 2021 (International Energy Agency, 2025), research on carbon emission disclosure in Indonesia plays an important role, especially because Indonesia must improve the quality of its carbon emission disclosures. In addition, Indonesia ranks seventh globally as a carbon-emitting country in 2022 (Climate Watch, 2022).

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The results of this study shows that (1) research interest, based on publication pattern, has begun to rise in Indonesia. Although the research trend in Indonesia is slowly emerging, the country still lags at the global level. Hence, we believe there is still a considerable potential for future research in Indonesia. (2) The distribution of published documents by country shows that Indonesia ranks fifth in terms of publications with 62 publications, which suggests that its research output is still limited compared to the global context despite the substantial challenges confronting the country in the area of carbon emission. Thus, more studies could be conducted, particularly on carbon emission disclosure within the Indonesian context. (3) According to the distribution and citation of authorship by country, scholars around the world contributed and gained notice higher than Indonesia for the carbon emission disclosure. (4) Based on keyword co-occurrence network visualization using VOSViewer for both global and Indonesian studies, there are differences in the keywords that are rarely used between Indonesia and global context. Overall, the comparison analysis results from the aforementioned study suggest that research about carbon emission disclosure in Indonesia is relatively low as compared to worldwide. Furthermore, through analyzing different variables that can be examined further into the carbon emissions disclosure in Indonesia, this study adds to future research on the need for supply chain engagement, cost of debt, family control/family firms, earnings management, and carbon reduction performance.

There are a number of limitations to this study. First, the analysis is based on articles (published) on a Scopus database, thereby potentially excluding relevant articles and a database selection bias. Further research should integrate alternative databases like; Web of Science, Dimensions or Google Scholar to ensure greater coverage. Second, bibliometric analysis provides descriptive information on publication activity, keyword networks, and citation format, but not the methodological authority, theoretical depth, or empirical consistency of the included studies. Consequently, future scholarship could also follow up bibliometric findings with a systematic literature review or meta-analysis, assessing the strength and quality of the evidence base in the area under discussion.

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