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A Bibliometric Analysis of Carbon Emissions Disclosure Research in ASEAN Countries

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Abstract

This study aims to conduct a bibliometric analysis of carbon emission disclosure research in ASEAN countries. The analysis consists of 130 articles from Scopus-indexed journals from 2012 to 2025. The result of this study shows the analysis of carbon emissions disclosure research in ASEAN, that involves (1) trend in research publications, (2) distribution of publication and citations 3) distribution of publications based on affiliation, (4) distribution of publications by authors and citations, and (5) journal analysis, (6) top 10 most frequently used keywords, (7) the influential research on carbon emissions disclosure in ASEAN countries, (8) keyword co-occurrence networks. The analysis reflects that research on carbon emission disclosure in ASEAN is dominated by publication from Indonesia and Malaysia. In terms of the type of disclosure, ASEAN countries exhibit varying disclosure regulations. Indonesia, Malaysia, Thailand, the Philippines and Viet Nam adopt voluntary disclosure regulations, with different timelines for future mandatory implementation. In addition, Singapore implements mandatory disclosure regulations. Furthermore, this study provides insights into potential future research that can be further explored in the context of carbon emission disclosure in ASEAN, by identifying four variables, namely adaptive management, apathy behavior, educational policy, and campus sustainability.

Keywords: Carbon Emission Disclosure, Bibliometric Analysis, ASEAN, Future Research Agenda

1. Introduction

The issue of climate change has become a major concern over the past decade since it has negative impacts on humans and the environment such as extreme weather, ecosystem damage, rising sea levels, global warming, and other negative impacts. The primary factor that impacts climate change is the increase in CO₂ concentration in the atmosphere, which is caused by high levels of carbon emissions and results in the rise of global temperatures that cause climate change (Chen et al., 2021). In recent years, the increase in CO₂ concentration in the atmosphere has reached a critical level. According the data from NOAA's Global Monitoring Lab, the average global atmospheric CO₂ concentration reached its highest level of 427 ppm in May 2024 (Lindsley, 2025). In

fact, according to WHO, the ideal CO₂ level ranges from 310-330 ppm. Therefore, the carbon emission problem requires more serious attention.

In a business context, companies have a significant contribution in the increase of CO₂ concentration in the atmosphere. According to Climate Watch, the energy sector contributes to 75% of global carbon emissions in 2021. A report from the Carbon Disclosure Project (2017) shows that 100 companies in the world responsible for 71% total global carbon emissions. According to a report from InfluenceMap (2024) titled "The Carbon Major Database: Launch Report", 80% of global emissions from 2016 to 2022 were produced by 57 companies, both state-owned enterprises and private companies.

Businesses are held accountable for the environmental effects of their actions (Wulan, 2022). Corporate negligence in their operations also exacerbates the rise in carbon emissions (Nasih et al., 2019). This means that businesses are a big part of the problem of rising carbon emissions and need to do something about it. Therefore, companies need to give serious attention to this issue, given the increasing pressure from stakeholders for them to provide transparent data regarding carbon emission disclosures (Mayapada & Lyu, 2025). It is important to disclose carbon emissions because it can be used to judge how well companies are doing, especially when it comes to carbon emissions (Syafik et al., 2025). Companies can show that they are serious about lowering their carbon footprint by disclosing their carbon emissions. This can also help the world reach the Sustainable Development Goals (Poole, 2022). By encouraging the use of low-carbon practices, improving energy efficiency, and fostering long-term innovation that is good for the economy and the environment, carbon emission disclosure can make companies more accountable and help with bigger development goals (Setiawan et al., 2025).

In the academic context, previous studies have sought to investigate the determinants and both the economic and non-economic consequences of carbon emissions disclosure. For instance, several previous studies have investigated the impact of firm characteristics (Bae Choi et al., 2013; Chu et al., 2013; Wahyuningrum et al., 2024), ownership structure (Bedi & Singh, 2024; Singhania & Bhan, 2024), and industry type (Ott et al., 2017) on carbon emissions disclosure. Prior research has examined the effects of carbon emissions disclosure on 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 (Mayapada & Lyu, 2025). Additionally, certain studies have performed literature reviews to delineate the research concerning carbon emissions disclosure. There have been a number of literature review studies, such as those by Hahn et al. (2015), Borghei, (2021), and Setiawan et al. (2025). Additionally, Manani & P. S. (2025) performed a literature review examining the correlation between carbon emission disclosure and earnings management. Nonetheless, the majority of these studies focus on literature reviews regarding carbon emission disclosure on a global scale. There remains a scarcity of literature review studies on carbon emission disclosure that concentrate on particular regions, such as the ASEAN region.

Research on countries in the ASEAN region is important, as these countries are significant contributors to carbon emissions, with a total of 1.76 gigatons of CO₂ originating from Indonesia, Vietnam, Thailand, Malaysia, and the Philippines (Lau, 2022). However, the level of carbon emission disclosure in ASEAN countries remains relatively low, with only around 30% of companies in six countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) providing carbon disclosure reports, far below the disclosure level in the European Union, which reaches 90% (CDP, 2022). In addition, there is variation in the regulations and policies governing carbon disclosure, as each country has its own set of rules (Yang & Li, 2024). This makes ASEAN different from regions such as Europe, which are more homogeneous in terms of regulation and reporting. Furthermore, the level of public awareness regarding climate issues also varies across countries. Some nations, such as Singapore and Thailand, have societies that are highly concerned about sustainability issues and demand strong sustainability practices, whereas in other countries, carbon emission disclosure is driven more by regulatory requirements than by public awareness of sustainability issues.

Therefore, based on these issues and research gaps, the objective of this study is to conduct a bibliometric analysis of carbon emission disclosure research in ASEAN countries. We chose bibliometric analysis because it

gives us a comprehensive overview of the current state of research and enables us to identify future research directions, especially on carbon emission disclosure research in ASEAN countries. This study investigates (1) trends in research publications, (2) distribution of publications and citations 3) distribution of publications based on affiliation, (4) distribution of publications by authors and citations, and (5) journal analysis, (6) top 10 most frequently used keywords, (7) the influential research on carbon emissions disclosure in ASEAN countries, (8) keyword co-occurrence networks. Additionally, this study seeks to offer insights into prospective future research that can be further examined regarding carbon emission disclosure in ASEAN, by identifying four variables that are rarely used, namely adaptive management, apathetic behavior, educational policy, and campus sustainability.

This study aims to contribute to the literature by concentrating on carbon emission disclosure research at the regional level (ASEAN), in contrast to prior studies that have primarily focused on the global level or developed countries. The ASEAN region has its own unique features that set it apart from other areas. For example, the rules and policies for carbon disclosure are different in each country, and the level of public awareness about climate change varies from country to country. Consequently, a literature review on carbon emission disclosure in this region is both distinctive and significant.

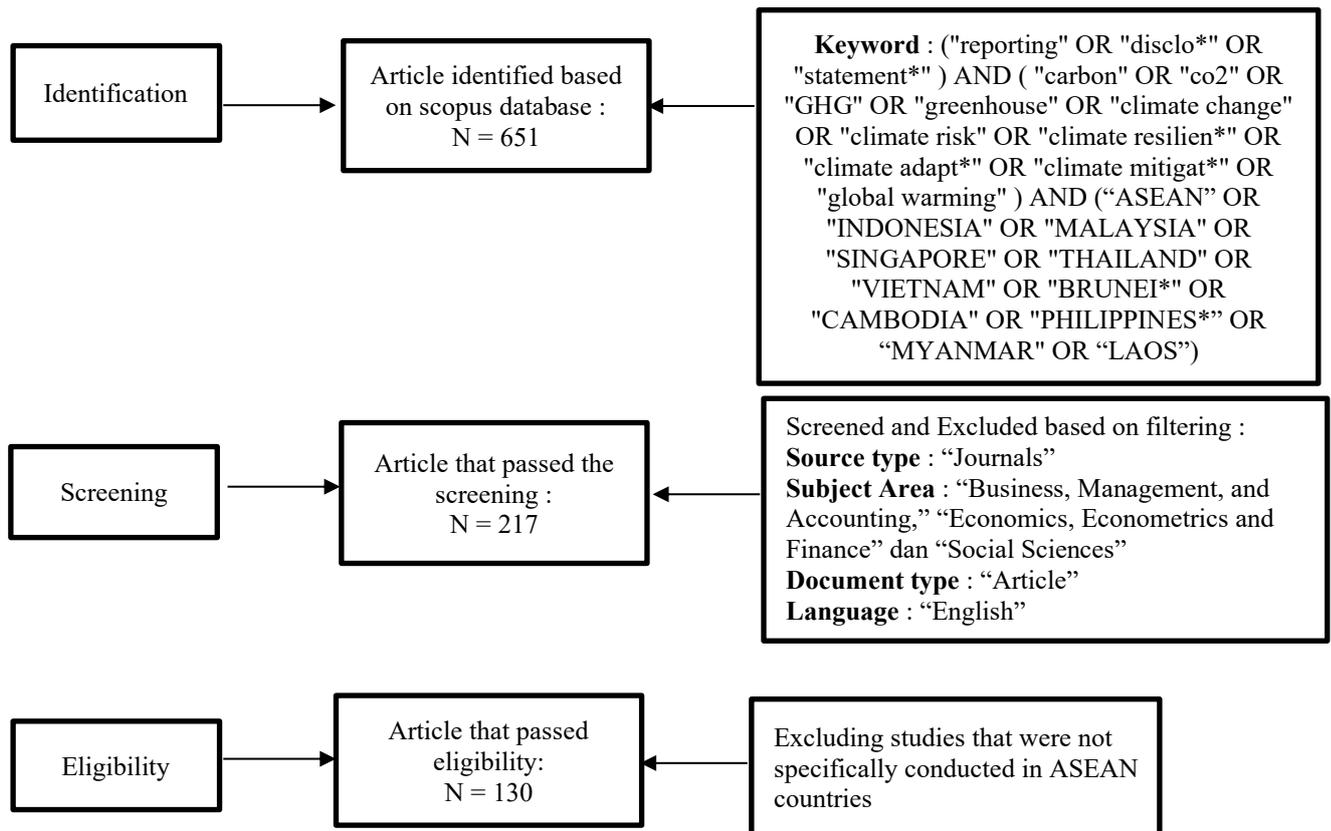
2. Research Methodology

This study employs bibliometric analysis that incorporates both quantitative and qualitative mapping and bibliometric visualization. This study conducts a search for research articles relevant to the topic of carbon emissions disclosure in the Scopus database. The Scopus database was selected because it provides coverage of reputable peer-reviewed journals and offers a structured indexing system along with comprehensive metadata analysis (Manani & P. S, 2025). The keywords used in this study are based on the research conducted by Borghei (2021) who performed a systematic literature review on carbon disclosure research in the global context. This study modifies those keywords by adding country-specific terms related to ASEAN nations. The keywords used are as follows.

("reporting" OR "disclo*" OR "statement*") AND ("carbon" OR "co2" OR "GHG" OR "greenhouse" OR "climate change" OR "climate risk" OR "climate resilien*" OR "climate adapt*" OR "climate mitigat*" OR "global warming") AND ("ASEAN" OR "INDONESIA" OR "MALAYSIA" OR "SINGAPORE" OR "THAILAND" OR "VIETNAM" OR "BRUNEI*" OR "CAMBODIA" OR "PHILIPPINES*" OR "MYANMAR" OR "LAOS")

The search using these keywords resulted 651 research article documents. The filtering process was then conducted by limiting the source type to 'journals'; restricting the subject area to 'Business, Management, and Accounting,' 'Economics, Econometrics and Finance,' and 'Social Sciences'; limiting the document type to 'articles'; and restricting the language to 'English'. This filtering process resulted in 217 research article documents.

From these 217 documents, studies that were not specifically conducted in ASEAN countries were excluded, including those from Australia, the United Kingdom, the United States, China, the Netherlands, Canada, Taiwan, Sweden, South Korea, Nigeria, New Zealand, Jordan, Japan, India, Belgium, Germany, Italy, France, Finland, Bangladesh, Austria, the United Arab Emirates, Turkey, Tunisia, Spain, Somalia, Saudi Arabia, Poland, Palestine, Mexico, Iraq, and Hong Kong. This process produced a final dataset of 130 research article documents. The article selection process is illustrated in Figure 1, the PRISMA Flowchart below.

Figure 1: Prisma *Flowchart*

3. Result and Analysis

The results of the analysis based on the Scopus search, which identified 130 research articles on carbon emission disclosure in ASEAN countries, are presented as follows.

3.1. Trend In Research Publications

The trend of research publications on carbon emissions disclosure in ASEAN countries increased every year from 2012 to 2025, with the fluctuation occurring between 2012 and 2017. Figure 1 shows that there is an increase in article after 2017. This is due to the 2016 Paris Agreement, which influenced the growth of research publications on carbon emission disclosure. The most significant increase occurred in 2023 with 23 documents driven by the 2022 Sustainable Development Goals (SDGs) reporting that emphasized climate change. The sharp increase continued from 2023 to 2025, reaching 38 publications. This indicates growing academic attention to this topic in ASEAN.

3.2. Distribution of Publications and Citations

Figure 3 and table 1 present the distribution of publications and citations in ASEAN Countries. Indonesia ranks first with 81 documents and 616 citations. This indicates that the concern regarding carbon emission disclosure in Indonesia is higher than in other countries. This may be due to the fact that carbon emission issues in Indonesia are more significant compared to those in other countries. This is supported by the fact that Indonesia is the largest emitter of carbon in Southeast Asia, with a total of 600 million metric tons of carbon emissions in 2021 (International Energy Agency, 2025). Furthermore, Malaysia ranks second with around 35 documents and

356 citations. This indicates that Malaysia also faces notable carbon-emission challenges, particularly due to its rapid industrial growth, high energy consumption, and reliance on fossil fuels, which in turn increases the need for comprehensive carbon emission disclosure. In addition, Thailand ranks third with 13 publications and a total of 65 citations, while Vietnam ranks fourth with 10 publications and 47 total citations. Meanwhile, Singapore, Brunei Darussalam, and the Philippines show relatively low publication counts and citations. These findings illustrate an uneven distribution of research contributions across ASEAN countries strengthening the argument that the level awareness regarding climate issues varies across countries in ASEAN.

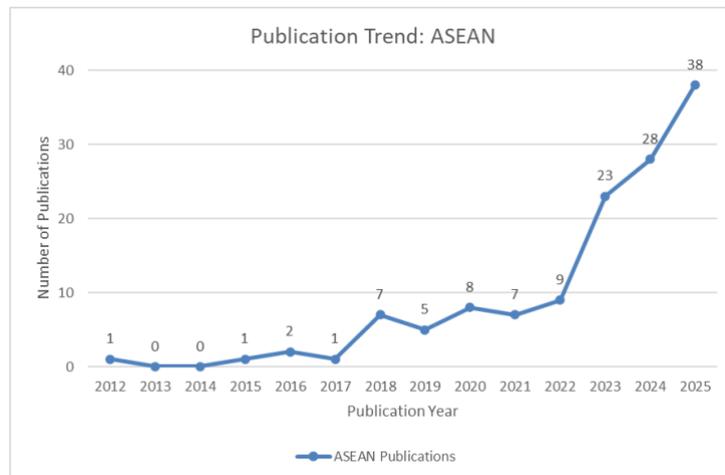


Figure 2: Trend in Research Publications

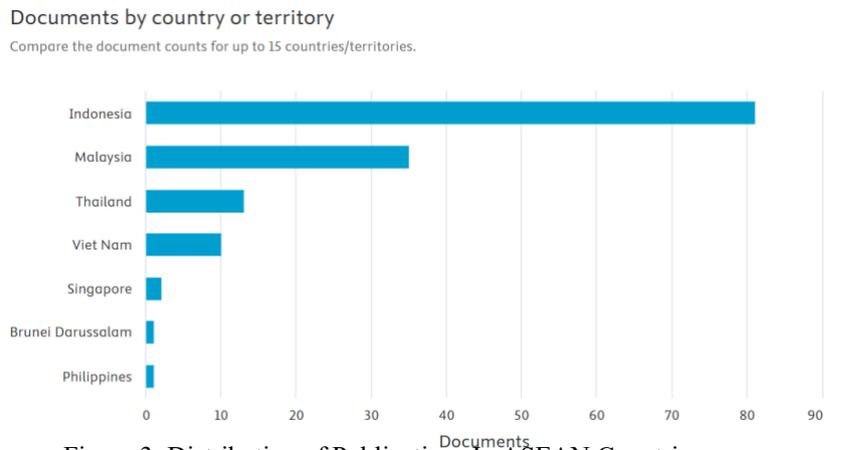


Figure 3: Distribution of Publications In ASEAN Countries

Table 1: Distribution of Publications and Citations in ASEAN Countries

No	Country	Total Publication	Total Citation
1	Indonesia	81	616
2	Malaysia	35	356
3	Thailand	13	65
4	Viet Nam	10	47
5	Singapore	2	18
6	Brunei Darusallam	1	18
7	Philippines	1	1

3.3. Distribution of Publications Based on Affiliation

Figure 4 present the distribution of research articles based on affiliation. Universitas Sebelas Maret in the top position with 12 documents, followed by Universitas Airlangga with 7 documents. Universiti Sains Malaysia, Universitas Diponegoro, and Bina Nusantara University each produced 6 publications. Below them are Universiti Malaysia Terengganu and Universitas Negeri Semarang with 5 documents. Prince of Songkla University, Khon Kaen University, and Universiti Teknologi Malaysia follow with 4 documents each. This distribution shows that research contributions are dominated by institutions in Indonesia and Malaysia, indicating strong academic interest in both countries regarding carbon emission disclosure issues. In addition, the findings shows an uneven distribution of research contributions across ASEAN countries strengthening the argument that the level awareness regarding climate issues varies across countries in ASEAN.

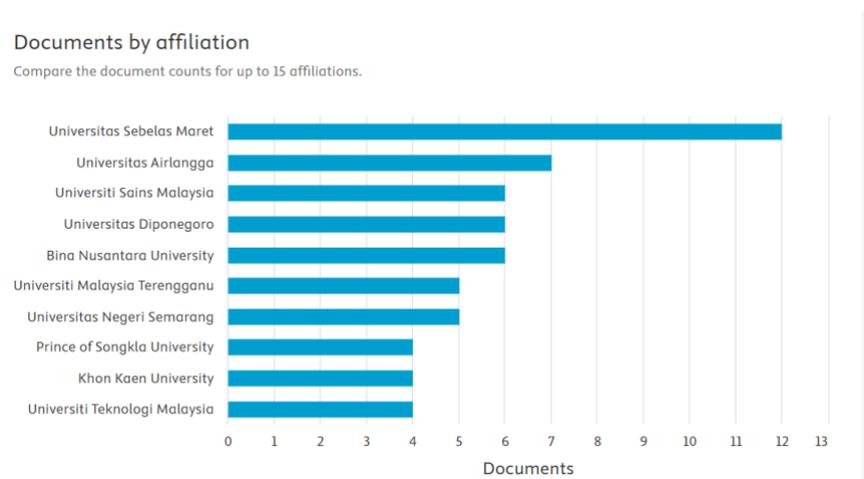


Figure 4: Distribution of Articles Based on Affiliation

3.4. Distribution of Publications by Authors and Citations

Figure 5 and Table 2 illustrate the distribution of publications by authors and citations across ASEAN Countries. The most productive author is Doddy Setiawan, with a total of 34 citations in 10 publications. In contrast, M. Nasih records the highest citation count with 128 citations despite having only three publications. Several authors, including Azlan Bin Amran, Hafiza Aishah Hashim, and Zalilah Salleh, each contribute four publications with relatively high citation counts, reflecting consistent research impact. Other authors show moderate publication output with varying citation levels, highlighting differences in research visibility and influence.

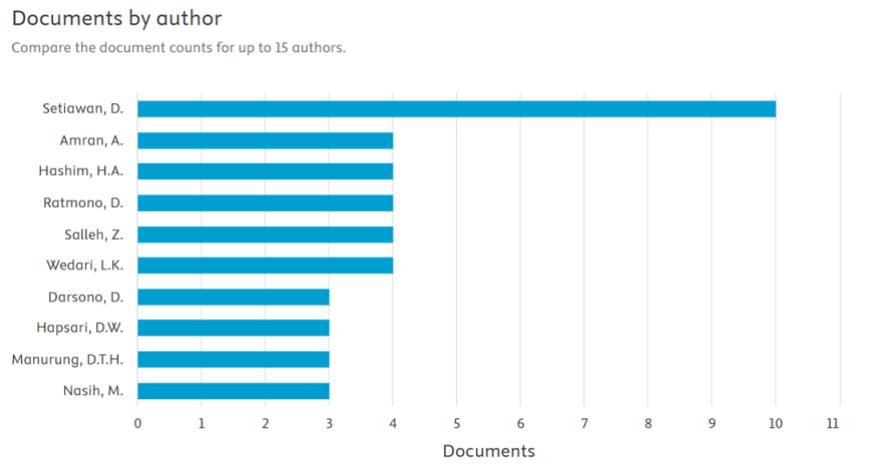


Figure 5: Distribution of Publication Articles by Author (Top 10)

Table 2: Distribution of Publication Articles by Author and Citations (Top 10)

No	Authors	Total Publication	Total Citation
1	Doddy Setiawan	10	34
2	Azlan Bin Amran	4	83
3	Hafiza Aishah Hashim	4	65
4	Dwi Ratmono	4	22
5	Zalailah Salleh	4	65
6	Linda Kusumaning Wedari	4	14
7	Darsono	3	21
8	D.W. Hapsari	3	18
9	D.T.H. Manurung,	3	18
10	M. Nasih	3	128

3.6. Journal Analysis

Table 3 present top 10 journals that publish research on carbon emission disclosure in ASEAN countries. The International Journal of Energy Economics and Policy rank first with the total of 15 publications, followed by International Journal of Sustainable Development and Planning with 8 publications, and Sustainability (Switzerland) with 7 publications. Overall, the quartile distribution varies and is relatively evenly distributed across the ten journals. Similarly, the publishers are distributed in a varied manner. This reflects the interdisciplinary nature and growing academic interest in this research area, particularly in ASEAN countries.

Table 3: Top 10 Journals

No	Journal	Total Publication	Quartile	Publisher
1	International Journal of Energy Economics and Policy	15	Q2	Econjournals
2	International Journal of Sustainable Development and Planning	8	Q3	International Information and Engineering Technology Association
3	Sustainability (Switzerland)	7	Q1	MDPI
4	Business Strategy and Development	5	Q2	John Wiley & Sons
5	Cogent Business and Management	5	Q2	Cogent OA
6	Corporate Social Responsibility and Environmental Management	4	Q1	John Wiley & Sons

Table 3: Top 10 Journals

No	Journal	Total Publication	Quartile	Publisher
7	International Journal of Scientific and Technology Research	3	Q4	Amazedia Solutions
8	International Journal of Management and Sustainability	3	Q4	Conscientia Beam
9	Journal of Cleaner Production	3	Q1	Elsevier
10	Journal of Sustainability Science and Management	3	Q3	Universiti Malaysia Terengganu

3.7. Top 10 Most Frequently Used Keywords

Table 5 shows top 10 most frequently used keywords of carbon emission disclosure research in ASEAN. Climate change emerges as the most dominant keyword, with 29 occurrences and the highest total link strength, indicating its central role in the research network. Carbon emission disclosure and Indonesia follow closely, each appearing 23 occurrences. Keywords such as sustainability, carbon emission, and corporate governance further reflect the integration of environmental and governance perspectives. Additionally, terms related to firm outcomes, including financial performance, firm value, and carbon performance, suggest an emphasis on the economic implications of carbon-related issues. Overall, the keyword distribution illustrates the multidimensional and interconnected nature of carbon emission disclosure research in ASEAN countries.

Table 5: Top 10 Most Frequently Used Keywords

No	Keyword	Occurrences	Total Link Strength
1	Climate change	29	206
2	Carbon emission disclosure	23	112
3	Indonesia	23	206
4	Sustainability	14	124
5	Carbon emission	10	91
6	Corporate governance	9	35
7	Financial performance	9	43
8	Firm value	9	37
9	Carbon performance	8	46
10	Malaysia	8	61

3.7. The Influential Research on Carbon Emissions Disclosure in ASEAN Countries

Table 6 shows the ten most influential research on carbon emissions disclosure in ASEAN countries based on how many times they have been cited. The most cited article, with a total of 116 citations, Nasih et al. (2019), investigates the impact of firm size, corporate governance structure, and industry characteristics on carbon emission disclosure (CED) in Indonesia. The study employs a quantitative methodology, utilizing content analysis and OLS regression to examine 305 firm-year observations of mining and agricultural companies listed on the Indonesian Stock Exchange from 2011 to 2016. The sample concentrates on environmentally sensitive sectors to more accurately reflect disclosure behavior. The results show that larger companies and companies with larger boards are more likely to share information about their carbon emissions. On the other hand, companies with more independent commissioners and directors are less likely to share this information, which means they are more likely to report conservatively. Mining companies also have a higher CED than agriculture companies. The authors recommend that future research focus on actual carbon emission reductions instead of mere disclosure, broaden industry coverage, and include institutional ownership or cross-country comparisons to enhance insights into governance and disclosure. Faisal et al. (2018), the second most cited article, look at how

much and why Indonesian listed companies disclose their greenhouse gas (GHG) emissions. The study employs a quantitative content analysis methodology to examine 148 firm-year observations of non-financial companies listed on the Indonesia Stock Exchange from 2011 to 2014. The sample encompasses various sectors, including agriculture, mining, basic industry and chemicals, consumer goods, infrastructure, utilities, transportation, trade, services, and investment, with a specific focus on sensitive industries. This research use multiple regression analysis to see how the characteristics of a company affect its GHG disclosure. The findings indicate that profitability, firm size, and industry type exert a positive and significant influence on GHG emission disclosure, whereas leverage demonstrates a negative impact, and government ownership lacks significance. The study recommends that subsequent research investigate the quality and substance of disclosures, include extended observation periods, and evaluate the influence of regulatory enforcement on actual emission reductions.

The following research was conducted in Indonesia, Malaysia, Vietnam, Thailand, and Singapore, with Indonesia and Malaysia emerging as the dominant contributors. Most studies employ panel data from listed companies, particularly those operating in carbon-intensive sectors such as manufacturing, energy, mining, and infrastructure. In terms of the type of disclosure (regulation), ASEAN countries exhibit varying disclosure regulations. Indonesia, Malaysia, Thailand, the Philippines and Viet Nam adopt voluntary disclosure regulations, with different timelines for future mandatory implementation. In addition, Singapore implements mandatory disclosure regulations.

The findings consistently show that stronger corporate governance structures are associated with higher levels or better quality of carbon disclosure, supporting arguments based on legitimacy theory, stakeholder theory, agency theory, and institutional theory. Several studies further demonstrate that carbon disclosure is linked to firm value, corporate performance, and risk management, suggesting that disclosure serves not only compliance or legitimacy purposes but also strategic and signaling functions.

Overall, these influential studies reveal that while awareness and quality of carbon disclosure in ASEAN have improved over time, disclosure practices remain uneven across countries and firms. This body of literature highlights the need for more harmonized regulations, deeper exploration of mandatory disclosure regulation, and further investigation into how carbon disclosure affects long-term corporate sustainability and financial outcomes in the ASEAN context.

Table 6: The influential research on Carbon Emissions Disclosure in ASEAN Countries

No	Author (Year)	Title	Country	Sample Size & Sector	Type of Disclosure (Voluntary or Mandatory)	Variable	Findings	Cited
1	Nasih et al. (2019)	Carbon emissions, firm size, and corporate governance structure: Evidence from the mining and agricultural industries in Indonesia	Indonesia	305 firm-year observations (2011–2016) from Mining and Agricultural Industries	Voluntary Carbon Emissions Disclosure	Independent variables: Firm size, board size, percentage of independent commissioners, percentage of independent directors, industry type (mining vs agriculture). Dependent variable: Carbon Emission Disclosure (CED). Control variables: Profitability, leverage	Firm size and board size have a positive and significant effect on carbon emission disclosure. A higher proportion of independent commissioners and directors negatively affects disclosure. Firms in the mining sector disclose carbon emissions more extensively than those in the agricultural sector	112
2	Faisal et al. (2018)	The content and determinants of greenhouse	Indonesia	148 non-financial firms listed on the Indonesia	Voluntary Carbon Emissions Disclosure	Dependent variable: Greenhouse Gas (GHG) Emission Disclosure.	Profitability, firm size, and industry type have a positive and	76

Table 6: The influential research on Carbon Emissions Disclosure in ASEAN Countries

No	Author (Year)	Title	Country	Sample Size & Sector	Type of Disclosure (Voluntary or Mandatory)	Variable	Findings	Cited
		gas emission disclosure: Evidence from Indonesian companies		Stock Exchange (2011–2014) from Agriculture, Mining, Basic Industry and Chemicals, Miscellaneous Industries, Consumer Goods, Property and Construction, Infrastructure, Trade and Services		Independent variables: Profitability, leverage, firm size, industry type (sensitive vs. non-sensitive), government ownership.	significant effect on GHG emission disclosure. Leverage has a significant negative effect, while government ownership has no significant influence on the level of GHG disclosure.	
3	Hardiyansah et al. (2021)	The Effect of Carbon Emission Disclosure on Firm Value: Environmental Performance and Industrial Type	Indonesia	82 companies listed on the Indonesia Stock Exchange (IDX) and recipients of the Indonesian Sustainability Reporting Award (ISRA) during 2014–2018 from various sectors, classified into high-profile and low-profile industries	Voluntary Carbon Emissions Disclosure	Independent variable: Carbon Emission Disclosure. Dependent variable: Firm Value (Tobin's Q). Moderating variables: Environmental Performance (ISO 14001 certification), Industrial Type (high-profile vs. low-profile). Control variables: Profitability (ROA), firm size, institutional ownership, leverage (DER).	Carbon emission disclosure has a positive and significant effect on firm value. Environmental performance (ISO 14001 certification) and industrial type significantly strengthen the relationship between carbon emission disclosure and firm value. Firms in high-profile industries and those with strong environmental performance gain higher market valuation from carbon disclosure.	60
4	Hermawan et al. (2018)	Going green: Determinants of carbon emission disclosure in manufacturing companies in Indonesia	Indonesia	22 manufacturing companies listed on the Indonesia Stock Exchange (2014–2016)	Voluntary Carbon Emissions Disclosure	Dependent variable: Carbon Emission Disclosure (CED). Independent variables: Regulator (state-owned vs. private firms), institutional ownership, firm size, profitability.	The regulator has a positive and significant effect on carbon emission disclosure. Firm size and profitability also positively influence carbon emission disclosure. Institutional ownership has no significant effect on the level of carbon emission disclosure	50
5	Amran et al. (2012)	Relationship of firm attributes, ownership structure and business network on climate change	Malaysia	100 publicly listed companies (annual and CSR reports, year 2009) from multiple sectors (Plantation &	Voluntary Climate Change Disclosure	Dependent variable: Climate Change Mitigation Efforts (weighted index). Independent variables: Firm size, profitability, industry membership, foreign	Firm size, profitability, industry membership, government ownership, and business network membership have a positive and	46

Table 6: The influential research on Carbon Emissions Disclosure in ASEAN Countries

No	Author (Year)	Title	Country	Sample Size & Sector	Type of Disclosure (Voluntary or Mandatory)	Variable	Findings	Cited
		efforts: Evidence from Malaysia		Mining, Finance, Property & Hotel, Trading & Technology, Construction, Consumer Products, Industrial)		ownership, government ownership, business network membership.	significant effect on climate change mitigation efforts. Foreign ownership has a negative and insignificant effect. Firms that are members of sustainable business networks exhibit higher levels of climate change mitigation activities than non-members	
6	Nguyen et al. (2020)	The determinants of environmental information disclosure in vietnam listed companies	Viet Nam	120 listed companies (106 valid responses); agriculture, industry & construction, trade & services	Mandatory environmental information, Voluntary carbon disclosure	Business sector, firm size, managers' awareness, profitability, financial leverage, community pressure, stakeholder pressure, government pressure	Environmental information disclosure in Vietnam is strongly influenced by government regulations, followed by stakeholder and community pressure. Firm size and managerial awareness positively affect disclosure, while profitability and financial leverage show a negative relationship. Disclosure is largely undertaken to comply with regulatory requirements rather than for voluntary transparency motives.	30
7	Khunkaew et al. (2023)	Sustainability reporting, gender diversity, firm value and corporate performance in ASEAN region	ASEAN Countries (Thailand, Malaysia, Indonesia, and the Philippines)	776 firm-year observations (2010–2019) from non-financial listed companies (Top 90–100 firms per country)	Voluntary/Semi mandatory (comply or explain basis) in Thailand, Malaysia, Indonesia, and The Philippines	Sustainability reporting (energy use, water management, carbon emissions, waste management, labor turnover, work safety, labor spending); gender diversity	Energy use, water management, and work safety positively affect corporate performance, while carbon emissions and waste management negatively affect performance. Water management, waste management, and work safety positively influence firm value. Gender diversity improves corporate performance but does not affect firm value and does not moderate the sustainability reporting–firm	24

Table 6: The influential research on Carbon Emissions Disclosure in ASEAN Countries

No	Author (Year)	Title	Country	Sample Size & Sector	Type of Disclosure (Voluntary or Mandatory)	Variable	Findings	Cited
							value relationship.	
8	Abdalla et al. (2025)	The effect of corporate governance best practices on the quality of carbon disclosures among malaysian public listed companies	Malaysia	72 public listed companies (360 firm-year observations, 2015–2019); carbon-intensive industries (chemicals, oil & gas, construction, energy & infrastructure)	Voluntary (comply or explain framework)	Corporate Governance Best Practices (board effectiveness, audit committee, environmental committee); control variables: firm size, profitability, age, liquidity, leverage, audit quality	Corporate governance best practices have a positive and significant effect on carbon disclosure quality. Firms with stronger boards, audit committees, and environmental committees provide higher-quality carbon disclosures. Although disclosure quality has improved over time, overall carbon disclosure in Malaysia remains low due to its voluntary nature.	17
9	An (2025)	Accelerating sustainability through better reporting	Singapore	Single firm case study (City Developments Limited); Real estate sector	Mandatory climate-related disclosure	Sustainability reporting quality; ESG reporting frameworks (GRI, TCFD, ISSB); climate-related disclosure	Robust and long-term sustainability reporting using GRI as a core framework enhances ESG integration, strategic decision-making, risk management, and long-term business resilience. Climate-related disclosure is becoming increasingly mandatory due to regulatory and investor pressure.	14
10	Khuong et al. (2024)	Corporate governance and corporate carbon disclosures: The moderating role of earnings management	Viet Nam	134 listed companies (panel data, 2015–2022); non-financial firms listed on the Vietnam stock market	Voluntary Carbon Emissions Disclosure	Corporate governance (board size, board independence, CEO duality, female board members, board meetings); earnings management (moderating variable)	Larger board size, higher board independence, and CEO duality reduce the likelihood of carbon disclosure, while a higher proportion of female board members and more frequent board meetings increase carbon disclosure. Earnings management significantly moderates the relationship between corporate governance and carbon disclosure.	6

3.9. Keyword Co-Occurrence Network (VOSviewer)

Figure 6 presents the visualization of keyword occurrence using VOSViewer in the context carbon emission disclosure research in ASEAN. 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 6, several keywords or variable are still rarely used in the carbon emissions disclosure research in ASEAN Countries, namely “adaptive management”, “apathy behavior”, “educational policy”, and “campus sustainability”. Therefore, future research can further explore these variables, particularly in the context of the ASEAN countries.

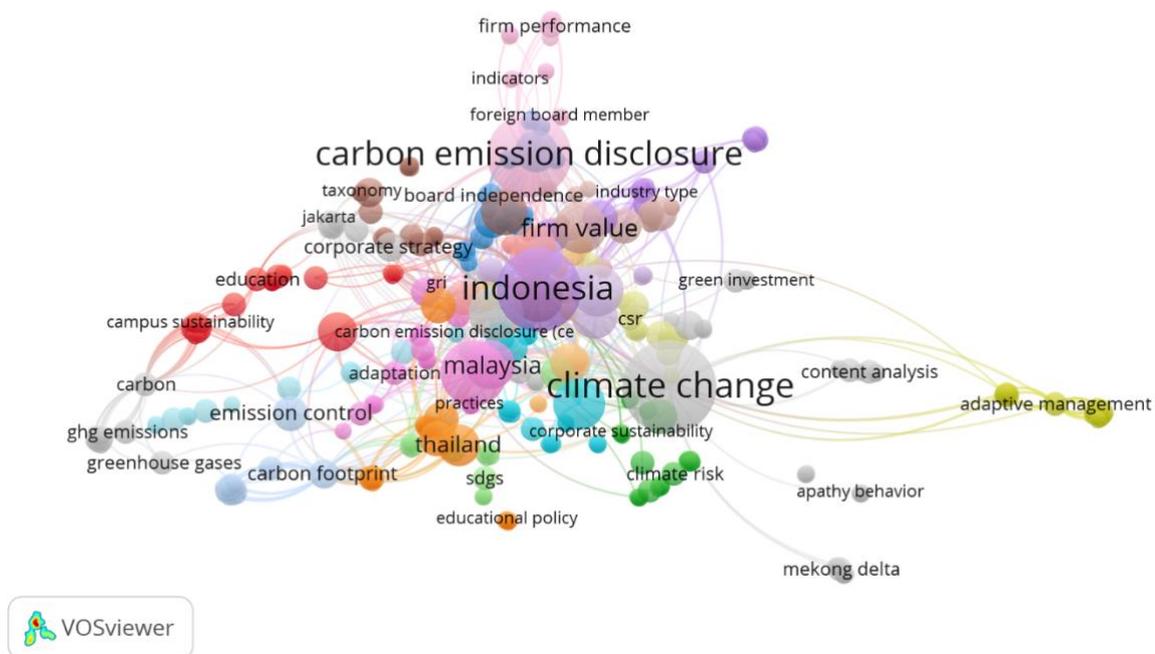


Figure 6: Keyword Keyword Co-Occurrence Network (VOSviewer)

3.9. Analysis and Future Research Direction

Based on the analysis of the keyword co-occurrence network using VOSviewer, several variables that are rarely used in carbon emission disclosure research in the ASEAN region can be identified as potential directions for future research. The four variables include adaptive management, apathy behavior, educational policy, and campus sustainability. The following presents the analysis of each variable and the future research directions associated with these variables.

1) Adaptive Management

Adaptive management refers to an organization’s ability to adjust its strategies and policies in response to environmental uncertainty (Walters, 1986). In the environmental literature, this concept has been widely applied in studies on public policy and natural resource management. However, adaptive management remains relatively underexplored in accounting and sustainability reporting research, particularly in carbon emissions and climate risk disclosure. Firms with higher levels of adaptive management tend to be more proactive in integrating climate risk considerations into their business strategies and sustainability reporting practices. Nevertheless, in many developing countries, adaptive management is mainly limited to minimum regulatory compliance. This condition has implications for the low quality and inconsistency of carbon emission disclosure over time.

Future research may develop an adaptive management index based on disclosures of climate adaptation strategies and changes in internal corporate policies. Longitudinal studies are particularly relevant to examine how adaptive management influences the dynamics of carbon emission disclosure before and after regulatory changes or specific climate-related crises. In addition, adaptive management can be positioned as a mediating variable between climate risk exposure and firm performance or firm value. In the ASEAN context, future research may compare firms in countries with high levels of climate vulnerability (e.g., Indonesia, the Philippines, and Thailand) to assess whether adaptive management encourages more substantive carbon emission disclosure.

2) Apathy Behavior

Apathy behavior reflects an indifferent attitude toward environmental issues, which may hinder proactive environmental actions (Kollmuss & Agyeman, 2002). In the context of companies, such apathy may manifest in limited managerial commitment to environmental transparency (Bansal, 2003), low-quality carbon emission disclosure (Hahn & Kühnen, 2013), and symbolic disclosure practices (Cho et al., 2015). The existing carbon emission disclosure literature has predominantly emphasized structural factors such as corporate governance, firm size, and regulatory pressure, while psychological and organizational behavioral dimensions remain relatively underexplored. In developing countries such as Indonesia, apathetic attitudes may be further reinforced by weak regulatory enforcement, short-term-oriented organizational cultures, and the perception that climate issues are not a primary business priority.

Future research may operationalize apathy behavior as an independent or moderating variable by employing proxies such as managerial environmental awareness, environmental concern indices, or content analysis of sustainability report narratives. Empirical studies may examine whether apathy behavior weakens the influence of stakeholder pressure, regulatory requirements, or ESG ratings on the quality of carbon emission disclosure. In addition, future research may adopt a mixed-methods approach by incorporating managerial interviews to explore the psychological factors underlying low levels of carbon emission disclosure. In the ASEAN context, cross-country comparisons could provide insights into whether national culture and environmental awareness moderate the relationship between apathy behavior and carbon emission disclosure (CED). This variable may also be linked to earnings management or earnings quality to examine whether firms with higher levels of apathy tend to avoid transparency in both financial and non-financial reporting.

3) Educational Policy

Educational policy is typically associated with the public sector and the education system; therefore, it is rarely employed as a variable in accounting and carbon emission disclosure research. However, educational policy plays a long-term role in shaping environmental awareness, human resource competencies, and organizational culture. Curricula that emphasize sustainability, climate change, and ESG issues can influence how managers and accountants perceive the importance of carbon emission disclosure. In many ASEAN countries, the integration of environmental issues into educational policy remains partial, limiting its impact on business practices. The relationship between educational policy and carbon emission disclosure is indirect but significant in the long run through its influence on human capital and organizational mindset.

Future research may examine educational policy as an institutional or macro-level variable that moderates the relationship between environmental regulation and carbon emission disclosure. Cross-country studies within the ASEAN region may investigate whether countries with stronger sustainability-oriented educational policies produce firms with higher-quality carbon emission disclosure (CED). In addition, future research may link educational policy to the quality of ESG reporting, sustainability report assurance, or climate risk disclosure. A multi-level analysis approach (country–firm level) would be particularly relevant for capturing the influence of educational policy on corporate behavior. This variable also has the potential to enrich the CED literature by incorporating long-term development and human capital perspectives.

4) Campus Sustainability

Campus sustainability has generally been examined in the context of educational institutions but is rarely linked to corporate behavior or carbon emission disclosure. However, universities play an important role as producers of knowledge, values, and human capital that later enter the business sector. Campuses that consistently implement sustainability principles have the potential to produce graduates and research that are more sensitive to climate issues and environmental transparency. Nevertheless, the relationship between campus sustainability and corporate carbon emission disclosure practices remains largely underexplored empirically. In developing countries, the linkage between academia and industry is often weak, making the impact of campus sustainability on business practices indirect and fragmented.

Future research may explore campus sustainability as a contextual variable influencing corporate sustainability practices through human capital development, research collaboration, and knowledge transfer. Studies may examine whether firms with strong linkages to sustainability-oriented universities (e.g., through alumni networks, joint research projects, or training programs) exhibit higher-quality carbon emission disclosure (CED). In addition, qualitative approaches can be employed to investigate the role of universities in shaping narratives and standards related to carbon emission disclosure. In the Indonesian and broader ASEAN context, this variable holds significant potential for bridging the literature on education, sustainability, and environmental accounting in an interdisciplinary manner.

4. Conclusion

This study conducts bibliometric analysis to explore carbon emission disclosure research in ASEAN countries. Studies of carbon emissions disclosure on countries in the ASEAN region are important, as these countries are significant contributors to carbon emissions, with a total of 1.76 gigatons of CO₂ originating from Indonesia, Vietnam, Thailand, Malaysia, and the Philippines (Lau, 2022). However, the level of carbon emission disclosure in ASEAN countries remains relatively low, with only around 30% of companies in six countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) providing carbon disclosure reports, far below the disclosure level in the European Union, which reaches 90% (CDP, 2022). In addition, there is variation in the regulations and policies governing carbon disclosure, as each country has its own set of rules (Yang & Li, 2024). This makes ASEAN different from regions such as Europe, which are more homogeneous in terms of regulation and reporting.

The study uses bibliometric analysis to explore: (1) trend in research publications, (2) distribution of publication and citations (3) distribution of publications based on affiliation, (4) distribution of publications by authors and citations, and (5) journal analysis, (6) top 10 most frequently used keywords, (7) the influential research on carbon emissions disclosure in ASEAN countries, (8) keyword co-occurrence networks. The result of this study shows that research on carbon emission disclosure in ASEAN is dominated by publication from Indonesia and Malaysia. Moreover, in terms of the type of disclosure, ASEAN countries exhibit varying disclosure regulations. Indonesia, Malaysia, Thailand, the Philippines and Viet Nam adopt voluntary disclosure regulations, with different timelines for future mandatory implementation. In addition, Singapore implements mandatory disclosure regulations.

This study contributes to the literature by providing future research directions that explore variable that rarely used in prior research on carbon emission disclosure in ASEAN countries, namely adaptive management, apathy behavior, educational policy, and campus sustainability.

This study has a several limitations. 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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