

From Voluntary Reporting to Climate Accountability: A Systematic Literature Review of Greenhouse Gas Disclosure

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Abstract

The purpose of this study is to examine the paradigm shift in greenhouse gas (GHG) disclosure over the past decade and map emerging research trends, the antecedents of GHG disclosure, theoretical perspectives, and future research agendas. This study employs a Systematic Literature Review (SLR) approach guided by the PRISMA framework. Data were collected from the Scopus database for the period 2015–2025, yielding 143 articles, of which 50 met the established inclusion criteria following the screening process and were analyzed using a thematic approach. The findings reveal a significant shift in GHG disclosure practices from predominantly voluntary reporting toward increasingly mandatory disclosure requirements. The study further demonstrates that the quality and quantity of GHG disclosure are influenced by several key factors, including national regulations, external pressures, effective corporate governance, industry characteristics, and the geographical context in which companies operate. Legitimacy theory, agency theory, and corporate governance theory serve as the primary theoretical foundations for explaining transparent GHG disclosure practices. Based on these findings, future research should place greater emphasis on developing-country contexts, examine the relationship between climate-related regulations and policies and corporate GHG disclosure practices, and promote the presentation of GHG information in a quantitative, measurable, comparable, and standardized manner in accordance with established GHG reporting frameworks.

Keywords

Greenhouse Gas Disclosure; Climate Accountability; Systematic Literature Review.



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INTRODUCTION

Greenhouse Gas (GHG) emissions have become one of the central issues in the accounting and sustainability literature over the past decade. This growing attention is closely associated with the increasingly tangible impacts of climate change across different parts of the world. The National Oceanic and Atmospheric Administration (NOAA) reported that five major greenhouse gases—carbon dioxide, methane, nitrous

oxide, CFC-12, and CFC-11—accounted for approximately 96% of radiative forcing in 2024, with carbon dioxide being the largest contributor (gml.noaa.gov, 2024). Similarly, the World Meteorological Organization (WMO) reported that GHG concentrations in 2024 reached their highest levels since records began, making them a major driver of accelerating global climate change (wmo.int, 2024). These findings confirm that GHG emissions have shifted from being merely an environmental discourse to becoming an issue requiring concrete responses from various stakeholders, including the corporate sector.

As one of the parties expected to respond, companies occupy a strategic position because their operational activities generate GHG emissions, both directly and indirectly. In this context, transparency in emissions disclosure is important not merely as a form of compliance, but also as an indicator of a company's ability to manage climate-related risks, meet stakeholder expectations, and demonstrate its commitment to sustainability (Broadstock et al., 2018; Liao et al., 2015). Through such disclosures, investors, regulators, and society obtain relevant information for economic decision-making. Therefore, it is reasonable that demands for higher-quality GHG disclosure continue to increase over time.

These growing demands have subsequently encouraged the development of various regulations directing GHG disclosure from practices that were initially voluntary toward more standardized reporting. The United Kingdom, for example, introduced Carbon Disclosure Requirements in 2013, while the United States implemented the Greenhouse Gas Reporting Program (GHRP). Since then, the direction of disclosure has gradually shifted: it is no longer viewed solely as a voluntary corporate choice but has also become associated with disclosure quality, legal risks, and corporate performance (Huang et al., 2023; Matthews et al., 2025).

The momentum toward standardization reached a significant milestone with the issuance of IFRS S2 Climate-related Disclosures by the International Sustainability Standards Board (ISSB), which became effective on January 1, 2024. This standard requires companies to disclose climate-related risks and opportunities, including Scope 1, Scope 2, and Scope 3 GHG emissions. Consequently, reporting practices that previously varied across countries are increasingly being directed toward a more consistent, relevant, and comparable format.

Although regulation has become a major driver, GHG disclosure practices are, in reality, not determined solely by compliance with formal standards. Several studies indicate that corporate governance and stakeholder pressure also play important roles in encouraging more comprehensive disclosure (Chithambo et al., 2020; Tingbani et

al., 2020). From the perspective of environmental reputation and accountability, Momin et al. (2017) even found that disclosure practices in China tend to be symbolic and more oriented toward managerial image-building than substantive accountability.

Similar patterns can also be observed when these determinants are examined across geographical and market contexts. In developed countries, strong regulatory pressure, investor expectations, and more established reporting infrastructures have encouraged GHG information to become an important consideration in investment decision-making. This condition contrasts with developing countries. Faisal et al. (2018), for example, found that only a small proportion of publicly listed companies in Indonesia consistently disclosed their GHG emissions. Such variation indicates that the quality of GHG disclosure is shaped by a complex interaction among regulation, corporate governance, and the institutional context of a country.

To explain these complex interactions, the GHG disclosure literature has extensively relied on four classical theories: Legitimacy Theory (Suchman, 1995), Stakeholder Theory (Freeman, 1984), Signaling Theory (Spence, n.d.), and Institutional Theory (DiMaggio & Powell, 1983). Although each theory provides a distinct perspective, these four theoretical approaches are considered insufficient to fully accommodate the contemporary dynamics that have emerged in recent years.

With regard to Legitimacy Theory, Depoers et al. (2016) demonstrate that legitimacy is primarily developed as a response to social pressures and environmental issues, meaning that GHG disclosure tends to be viewed as a symbolic action that pays insufficient attention to disclosure quality. A similar limitation is evident in Stakeholder Theory. Yasar and Yalçın (2023) demonstrate that this theory remains insufficiently sensitive to measuring the impact of disclosure on individual stakeholder groups and cannot adequately explain whether corporate disclosures are merely symbolic, particularly amid the increasing prevalence of greenwashing practices and concerns regarding the accuracy of Scope 3 emissions measurement that have recently received considerable attention (Beck et al., 2025; Luu et al., 2025).

Similar limitations can also be identified in the other two theories. Signaling Theory tends to emphasize the economic benefits of disclosure but does not fully explain non-economic motivations, such as ethics, social responsibility, and a company's moral commitment to sustainability (Lu et al., 2024). Meanwhile, Institutional Theory (DiMaggio & Powell, 1983) is capable of explaining the convergence of disclosure practices but is less sensitive to differences in national contexts between developed and developing countries, which in practice generate different corporate responses to GHG disclosure.

Collectively, the limitations of these four classical theories have become increasingly relevant in light of contemporary developments, including the growing prevalence of greenwashing (Luu et al., 2025), rapid advances in reporting technologies (Beck et al., 2025; Molnár et al., 2024), and changes in corporate governance structures, such as multiple institutional ownership and greater diversity in board backgrounds (Barg et al., 2024). These conditions indicate the existence of a theoretical gap that needs to be addressed, for example, by integrating classical theories with modern theoretical approaches such as the Resource-Based View or Agenda-Setting Theory. Such integration could enrich the analysis of GHG disclosure by explaining the roles of internal resources, organizational capabilities, media, and public agendas in shaping reporting practices (Barg et al., 2024; Song et al., 2024).

Based on the research gaps concerning trends, determinants, and theoretical perspectives described above, this study is designed to address the following four research questions:

RQ1: How have trends and paradigm shifts in GHG disclosure developed over the past decade?

RQ2: What factors influence the quality and quantity of GHG disclosure across different industry contexts?

RQ3: How do Legitimacy Theory, Stakeholder Theory, Agency Theory, and Institutional Theory contribute to explaining GHG disclosure practices?

RQ4: How can future research agendas be developed in the field of GHG disclosure?

As discussed above, research on GHG disclosure has thus far been dispersed across separate themes: some studies focus on trends and regulations, others examine determinants, while others emphasize theoretical foundations. These studies have generally been empirically tested within specific national, industrial, or variable-based contexts. This study offers a different contribution by providing a more comprehensive synthesis of the literature through a Systematic Literature Review (SLR) approach that integrates four themes simultaneously: (1) developments in disclosure trends, (2) factors influencing disclosure, (3) underlying theoretical perspectives, and (4) future research agendas. The novelty of this study lies in its systematic mapping of the GHG disclosure literature over the 2015–2025 period, while identifying the shift from voluntary reporting practices toward more standardized disclosure oriented toward climate accountability.

Furthermore, this study classifies the determinants of GHG disclosure into six major dimensions: regulation, stakeholder pressure, corporate governance, firm and

industry characteristics, geographical context, and the quality of emissions data. In addition, the study critically examines the limitations of the dominant theories—Legitimacy Theory, Stakeholder Theory, Signaling Theory, and Institutional Theory—in explaining the complexity of GHG disclosure while opening opportunities for the development of a theoretical framework that is more relevant to contemporary contexts.

METHODS

This study employed a Systematic Literature Review (SLR) approach to identify, select, evaluate, and synthesize scientific articles relevant to Greenhouse Gas (GHG) disclosure. The systematic review process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines developed by Moher et al. (2009), as PRISMA provides a systematic, transparent, and replicable reporting framework covering the stages from article identification to final inclusion. The guidelines have also been widely adopted to improve the quality of reporting and methodology in systematic reviews across various research fields (Panic et al., 2013; Siddaway et al., 2019; ter Huurne et al., 2017). The article search process began by searching a reputable scientific database, namely Scopus, using keywords relevant to the research focus, consisting of “GHG Disclosure,” “Greenhouse gas reporting,” and “Greenhouse gas disclosure.” The initial search identified a total of 143 articles, comprising 10 articles for “GHG Disclosure,” 70 articles for “Greenhouse gas reporting,” and 63 articles for “Greenhouse gas disclosure.” Before proceeding to the screening stage, an initial selection was conducted by removing articles that did not meet the predetermined criteria. A total of 56 articles were excluded, consisting of 2 duplicate articles, 29 articles published outside the 2015–2025 period, 2 articles that were not published in Q1, Q2, Q3, or Q4 journals, and 23 incomplete articles. Consequently, 87 articles remained for the subsequent screening stage. During the study selection stage, the titles and abstracts of the 87 articles were reviewed to ensure their relevance to the research objectives. One article was excluded because it was not relevant to the research focus, leaving 86 articles for full-text retrieval. During the full-text search, 25 articles could not be obtained or were not fully accessible. Therefore, 61 articles were successfully retrieved and subsequently assessed for eligibility based on the predetermined inclusion and exclusion criteria. Following the eligibility assessment, 11 articles were excluded because they did not satisfy the research criteria. Ultimately, 50 articles met all the final criteria and were included in the systematic review. Following the PRISMA-based selection process, the 50 final articles were analyzed using a thematic analysis approach. Thematic analysis was employed to

identify, categorize, and interpret the major patterns emerging from the GHG disclosure literature. The analysis involved systematically reading each article, coding relevant information, and mapping the main themes associated with research trends, determinants of GHG disclosure, theoretical perspectives, and future research agendas. The analytical process was also supported by the Watase Uake tool (Wahyudi, 2024), which facilitated article organization, coding, and systematic mapping of themes within the literature. The use of this tool was intended to improve the consistency of the analytical process and strengthen transparency in the synthesis of the reviewed literature. The overall methodological procedure is presented in the PRISMA design shown

FINDINGS AND DISCUSSION

1. Publication Trends and Highly Cited Articles

The analysis of annual publication trends was conducted to examine the development of academic attention toward GHG disclosure during the 2015–2025 period. Based on the synthesis of publications, research on GHG disclosure has shown an increasing trend in recent years. The number of articles addressing this topic has generally increased, with the highest number of publications occurring in 2023 and 2024, reaching 9 and 10 publications, respectively. This increase indicates that GHG emissions disclosure has received growing attention in the accounting, sustainability, and corporate governance literature. This trend is consistent with the increasing urgency of climate change, the development of sustainability reporting standards, and growing demands for corporate transparency and accountability regarding environmental impacts (Liao et al., 2015; Chithambo et al., 2020). Meanwhile, the number of publications in 2025 shows a decline. However, this decline should be interpreted cautiously because the data used in this study were collected only up to June 2025. Therefore, the lower number of publications does not necessarily indicate declining research interest in GHG disclosure but rather reflects the limited data collection period. Publications during the second half of 2025 may still increase, meaning that the 2025 trend remains temporary.

After analyzing the annual publication trend, this study examined articles with the highest citation counts to identify the most influential publications in the GHG disclosure literature. Highly cited articles indicate important contributions to the development of theoretical foundations, research focuses, and directions within the field. The ten most highly cited articles identified in this study were Liao, Lin, and Tang (2015), published in a Q2 journal, with 1,210 citations and entitled Gender diversity, board independence, environmental committee and greenhouse gas disclosure. The second most cited article was by Tingbani, Chithambo, Tauringana, and Papanikolaou (2020), published in a Q1 journal, with 219 citations and entitled Board gender diversity, environmental committee and greenhouse gas voluntary disclosures. The third was Hollindale, Kent, Routledge, and Chapple (2017),

published in a Q2 journal, with 193 citations and entitled Women on boards and greenhouse gas emission disclosures. Alessi, Ossola, and Panzica (2021), published in a Q1 journal, received 124 citations for their article What greenium matters in the stock market: The role of greenhouse gas emissions and environmental disclosures. Broadstock, Collins, Hunt, and Vergos (2018), published in a Q2 journal, received 110 citations for Voluntary disclosure, greenhouse gas emissions and business performance: Assessing the first decade of reporting. Chithambo, Tingbani, Agyapong, Gyapong, and Damoah (2020), published in a Q1 journal, received 100 citations for Corporate voluntary greenhouse gas reporting: Stakeholder pressure and the mediating role of the chief executive officer. Al-Qahtani and Elgharbawy (2020), published in a Q2 journal, received 99 citations for The effect of board diversity on disclosure and management of greenhouse gas information: Evidence from the United Kingdom. Comyns and Figge (2015), published in a Q1 journal, received 98 citations for Greenhouse gas reporting quality in the oil and gas industry. Akbaş and Canikli (2018), published in a Q1 journal, received 82 citations for Determinants of voluntary greenhouse gas emission disclosure: An empirical investigation on Turkish firms. Finally, Faisal, Andiningtyas, Achmad, Haryanto, and Meiranto (2018), published in a Q1 journal, received 74 citations for The content and determinants of greenhouse gas emission disclosure: Evidence from Indonesian companies.

The highly cited literature demonstrates that GHG disclosure research is predominantly concerned with corporate governance, board diversity, environmental committees, and determinants of GHG disclosure. Liao et al. (2015) represents the most influential study, with 1,210 citations, examining gender diversity, board independence, environmental committees, and GHG disclosure. The high citation count indicates that corporate governance has become one of the major foundations for understanding factors influencing GHG disclosure practices. In addition, the studies by Tingbani et al. (2020), with 219 citations, and Hollindale et al. (2017), with 193 citations, further reinforce the importance of board gender diversity and environmental committees in improving corporate emissions transparency. These findings indicate that board structure and composition play a strategic role in encouraging corporate attention to environmental issues.

Beyond corporate governance, several highly cited studies have increasingly connected GHG disclosure with economic, market, and firm-specific dimensions. Alessi et al. (2021) examined the relationship between GHG emissions, environmental disclosure, and the stock market, whereas Broadstock et al. (2018) investigated the relationship between voluntary disclosure, GHG emissions, and business performance. This development indicates a shift in research focus from identifying the factors driving disclosure toward examining its consequences for firm value, corporate performance, cost of capital, and investor responses. Meanwhile, studies by Comyns and Figge (2015), Akbaş and Canikli (2018), and Faisal et al. (2018) demonstrate that GHG disclosure research has expanded across different industrial sectors and geographical regions, including developing countries such as Indonesia.

From a methodological perspective, the reviewed literature indicates that most studies employ quantitative approaches, particularly regression analysis and panel data analysis. Other studies employ qualitative or mixed-method approaches to understand reporting practices, emissions measurement, and challenges associated with implementing GHG disclosure (Chithambo & Tauringana, 2017; Molnár et al., 2023).

2. GHG Disclosure Paradigm Over the Past Decade

GHG emissions disclosure has undergone significant development over the past decade, both in terms of reporting orientation and research focus. In its early development, GHG disclosure was largely understood as a voluntary reporting practice undertaken by companies in response to growing concerns about climate change and demands for social legitimacy. During this stage, companies tended to disclose emissions information as part of sustainability or environmental reports, emphasizing corporate commitment to environmental issues and sustainability (Comyns & Figge, 2015; Borghei et al., 2018; Wegener et al., 2019).

As regulatory pressures, investor demands, and sustainability reporting standards developed, the GHG disclosure paradigm gradually shifted from voluntary reporting toward reporting that was more standardized, measurable, and accountable. This shift can be observed in the development of emissions reporting regulations across various countries, including the European Union, which encouraged companies to present emissions information in a more systematic and comparable manner (Rosa et al., 2021). In this context, GHG disclosure is no longer viewed merely as an expression of environmental concern but also as an instrument of climate accountability, risk management, and economic decision-making for stakeholders.

Research trends also demonstrate an expansion of the scope of investigation. Early studies primarily examined factors influencing corporate decisions to disclose GHG emissions, including firm characteristics, stakeholder pressure, and corporate governance mechanisms (Liao et al., 2015; Faisal et al., 2018; Tingbani et al., 2020). Subsequently, research expanded by linking GHG disclosure with corporate performance, market responses, litigation risk, cost of capital, and emissions reporting quality (Broadstock et al., 2018; Borghei et al., 2018; Huang et al., 2023). More recent research has begun to address increasingly complex issues, including the reliability of Scope 1, Scope 2, and Scope 3 emissions data, the role of technology in emissions measurement, and the relationship between GHG disclosure and corporate sustainability strategies.

Thus, the development of GHG disclosure over the past decade reflects a paradigm shift from symbolic and voluntary reporting toward reporting practices that are more substantive, data-driven, and oriented toward climate accountability. This transformation demonstrates that GHG disclosure has evolved into a dynamic and multidisciplinary research field that is increasingly relevant to the literature on sustainability accounting, corporate governance, and climate change (Huang et al., 2023; Mamatzakis & Tzouvanas, 2025).

3. Factors Influencing the Quality of GHG Disclosure

The synthesis of the literature indicates that the quality and quantity of GHG disclosure are influenced by several major groups of factors, including firm characteristics, corporate governance, stakeholder pressure, regulation, industry characteristics, and geographical context. These factors do not operate independently but interact with one another in determining the extent to which companies disclose GHG emissions information in a comprehensive, detailed, consistent, and reliable manner.

First, firm characteristics represent an important factor in GHG disclosure. Larger companies tend to possess greater resources, more developed reporting systems, and greater exposure to public scrutiny, which encourages them to disclose emissions information more extensively. In addition, financial characteristics such as profitability, leverage, and corporate performance may influence both a company's capacity and incentives to disclose GHG information (Faisal et al., 2018; Tingbani et al., 2020). Companies with high public visibility generally pay greater attention to corporate image and legitimacy, making GHG disclosure an important mechanism for demonstrating environmental transparency.

Second, corporate governance plays an important role in determining the quality of GHG disclosure. Board structure, board independence, gender diversity, environmental committees, and internal monitoring mechanisms can encourage companies to provide better emissions information. Liao et al. (2015) demonstrated that board characteristics are associated with carbon emissions disclosure, while Al-Qahtani and Elgharbawy (2020) emphasized the importance of governance mechanisms in strengthening environmental reporting transparency. These findings indicate that GHG disclosure is influenced not only by external demands but also by the effectiveness of internal oversight and corporate commitment to sustainability.

Third, stakeholder pressure represents an important driver of the quantity and quality of GHG disclosure. Investors, regulators, governments, communities, consumers, media organizations, and environmental groups increasingly demand greater transparency regarding corporate emissions impacts. Chithambo et al. (2020) found that stakeholder pressure and managerial characteristics influence GHG disclosure. In this context, the greater the pressure exerted by stakeholders, the stronger the incentive for companies to improve the disclosure of emissions information, reduction targets, mitigation strategies, and climate-related risks.

Fourth, regulations and reporting standards are highly influential determinants. In countries with stronger climate reporting regulations, companies tend to present GHG disclosures in a more structured and comparable manner. In contrast, in contexts where voluntary reporting remains dominant, disclosure practices often vary substantially across companies and do not always reflect adequate information quality. Based on the reviewed articles, the United States is the only country identified in this study as having mandatory

GHG reporting supported by standardized requirements. Other countries discussed in the reviewed studies continue to treat GHG reporting primarily as a voluntary practice.

Regarding the standards applied in GHG disclosure, the reviewed studies indicate that GHG Protocol is the most dominant framework, being identified in studies covering 20 countries, including Australia, Brazil, Canada, China, Europe, Germany, Hungary, Indonesia, Malaysia, New Zealand, the United Kingdom, and the United States. GRI Standards were identified in studies covering five contexts, namely Australia, Canada, China, Italy, and multiple countries. ESRs was identified in Austria, while EU ETS was identified in Europe. Meanwhile, ISSB/IFRS S2 was identified in studies covering multiple countries. These findings demonstrate that GHG Protocol remains the dominant reference framework for emissions measurement, particularly through the classification of Scope 1, Scope 2, and Scope 3 emissions. Nevertheless, the emergence of ISSB/IFRS S2 indicates a potential shift toward broader GHG-related disclosure because IFRS S2 addresses not only emissions but also climate-related risks and opportunities relevant to investors and economic decision-making. Thus, GHG Protocol continues to function as a major foundation for emissions measurement, while IFRS S2 has the potential to strengthen GHG disclosure within the broader framework of climate accountability and global sustainability reporting.

Fifth, industry characteristics also influence the level of GHG disclosure. Companies operating in high-emission sectors, such as energy, mining, oil and gas, manufacturing, and transportation, generally face greater pressure to disclose emissions than companies operating in lower-emission sectors. High emissions intensity makes companies in these industries more vulnerable to public scrutiny, reputational risks, and regulatory demands. Therefore, industry characteristics represent an important factor explaining differences in the quantity and depth of GHG disclosure across companies.

The analysis of industry sectors indicates that research on GHG emissions disclosure is most concentrated in the energy sector, including electricity, gas, and oil. This sector accounts for 19 of 62 studies, or 30.6% of the total articles analyzed (Comyns & Figge, 2015; Subramanian et al., 2015; Wegener et al., 2019). The dominance of the energy sector can be explained by its direct relationship with fossil fuel consumption and its position as one of the major sources of GHG emissions. Consequently, energy companies face greater pressure from regulators, investors, communities, and environmental organizations to provide emissions information that is transparent, measurable, and accountable. The strong academic interest in this sector is also reflected in its relatively high citation levels, such as the study by Subramanian et al. (2015), which received 141 citations, demonstrating the relevance of the energy sector within the GHG disclosure literature.

The financial services sector represents the second most frequently studied sector, with 18 studies, or 29% of the total articles. The substantial attention given to this sector indicates that GHG disclosure is not only important for industries that directly generate emissions but also for sectors involved in financing, investment, and climate risk assessment. Studies of the financial sector frequently examine corporate governance, ownership structure, market risk,

and environmental performance (Al-Qahtani & Elgharbawy, 2020; Barg et al., 2023; Gurney et al., 2021). GHG information is relevant to investors and financial institutions because it can be used to assess exposure to climate risks, reputational risks, cost of capital, and long-term sustainability prospects. Although the average citation level in this sector is not necessarily higher than that of the energy sector, Liao et al. (2015) remains one of the most influential studies, with 1,210 citations, highlighting the importance of corporate governance in promoting carbon emissions disclosure.

The manufacturing sector ranks third, with 13 studies, or 21% of the total articles. Research in this sector generally examines the relationship between GHG disclosure, environmental performance, and firm characteristics (Hassan & Romilly, 2018; Faisal et al., 2018). The manufacturing sector is important because production activities involve energy consumption, raw material use, operational processes, and potentially significant emissions. Consequently, manufacturing companies frequently face pressure to disclose detailed GHG information as part of their environmental accountability and sustainability strategies.

Sixth, geographical context also influences GHG disclosure practices. Studies conducted across different countries demonstrate that companies in developed countries generally have higher levels of disclosure because they are supported by stronger regulations, greater investor pressure, and more mature reporting infrastructures. In contrast, developing countries continue to face challenges including limited regulations, low reporting awareness, inadequate emissions data, and weak monitoring mechanisms. These conditions help explain differences in GHG disclosure practices across contexts such as the United Kingdom, the United States, Australia, China, Germany, and Indonesia.

The geographical classification further indicates that GHG disclosure research remains strongly dominated by developed-country contexts, accounting for 40 articles, while studies focusing on developing countries account for only approximately 8 articles. This substantial difference demonstrates that the GHG disclosure literature has developed predominantly in countries characterized by stronger climate regulations, more mature capital markets, and more established sustainability reporting infrastructures.

The dominance of developed countries can be understood because companies in these countries generally face greater pressure from regulators, investors, and stakeholders to disclose emissions information transparently and in a standardized manner. Conversely, the limited number of studies conducted in developing countries indicates an important research gap. Developing countries also face substantial climate change challenges but often experience limitations in regulation, emissions data quality, reporting capacity, and monitoring mechanisms. Therefore, greater research attention to developing-country contexts is necessary to provide a more balanced understanding of GHG disclosure and to capture institutional conditions that may differ significantly from those found in developed economies.

CONCLUSION

This Systematic Literature Review (SLR) consolidates research findings related to Greenhouse Gas (GHG) Disclosure using the TCM Framework (Theory, Context, Methodology) and reveals three main findings. First, from a theoretical perspective, Agency Theory dominates the literature, appearing in 20 studies, including Liao et al. (2015), Chithambo et al. (2021), and Faisal et al. (2018). The theory is primarily used to explain corporate motivations for disclosing emissions, particularly in relation to conflicts of interest between management and shareholders (Jensen & Meckling, 1976). Other theories, such as Stakeholder Theory (Broadstock et al., 2018) and Institutional Theory (Hollindale et al., 2017), also appear in the literature but with lower frequencies, indicating that GHG disclosure research remains largely focused on agency dynamics and regulatory compliance. Second, from a contextual perspective, GHG disclosure research is concentrated in developed countries, accounting for 76% of the studies, including the United States, the United Kingdom, and Australia (Liao et al., 2015; Stanny, 2018), with the energy sector accounting for 30.6% and the financial services sector accounting for 29% of the studies (Subramanian et al., 2015; Al-Qahtani & Elgharbawy, 2020). This dominance reflects the influence of stricter regulatory environments in developed countries, such as the UK Carbon Disclosure Project, as well as the high emissions associated with fossil-fuel-based industries. Research conducted in developing countries, accounting for 24% of the studies and including Indonesia and Brazil (Faisal et al., 2018; Akbaş & Canikli, 2018), remains limited despite the increasing contribution of these countries to global emissions. This finding indicates an important research gap in understanding GHG disclosure practices in developing economies, where regulatory pressures and institutional capacities differ substantially (Liu & Yang, 2018). Third, from a methodological perspective, quantitative approaches dominate the literature, accounting for 80.6% of the studies, particularly through regression analysis and content analysis (Wegener et al., 2019; Gerged et al., 2020), while qualitative methods such as case studies and interviews are used less frequently. Most data are obtained from annual reports or databases such as the Carbon Disclosure Project (CDP) (Liao et al., 2015), with analytical software such as STATA and NVivo also being utilized in several studies (Borghei et al., 2018). This methodological trend demonstrates a strong preference for statistical hypothesis testing while simultaneously leaving considerable room for deeper qualitative exploration, particularly in understanding the motivations underlying practices such as greenwashing (Luu et al., 2025)

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