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Corporate governance and climate change: policy, innovation, strategies, and legitimacy

Gobierno corporativo y cambio climático: política, innovación, estrategias y legitimidad

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Abstract
This study is intended to understand the governance practices addressed in the literature to address climate change, identifying common variables, methods, regions, and sources of information that facilitate the framing of novel analyses for researchers and practitioners. We perform a systematic review of 45 studies between 1980 and 2019 published in Web of Science. The results suggest that policy, innovation, operations, and legitimacy are common variables in addressing climate change. Our findings show that Ordinary Least Squares and Panel Data are the most frequent methods developed in the literature. Emerging economies such as India, Brazil, Indonesia, Iran, South Korea, and Mexico offer an interesting context to explore. The climate crisis has become one of the major threats to modern society.

Keywords: corporate governance, climate change, climate governance, systematic literature review

Resumen
Se busca conocer las prácticas de gobernanza abordadas en la literatura para enfrentar el cambio climático mediante la identificación de variables, métodos, regiones y fuentes de información que faciliten análisis novedosos para los investigadores. Al respecto, se realiza una revisión sistemática de 45 estudios entre 1980 y 2019 publicados en Web of Science. Los resultados sugieren que la política, innovación, operaciones y la legitimidad son variables comunes para abordar el cambio climático. Los hallazgos muestran que mínimos cuadrados ordinarios y los datos de panel son métodos comunes en la literatura. Economías emergentes como India, Brasil, Indonesia, Irán, Corea del Sur y México ofrecen un contexto interesante para explorar. En este sentido, la crisis climática es una de las principales amenazas para la sociedad moderna.

Palabras clave: gobierno corporativo, cambio climático, gobernanza climática, revisión sistemática de literatura

Introduction

Concerns about implementing solutions to address climate change have increased during the last decades due to its consequences for society, involving both national governments and companies (Akbaş & Canikli, 2018; Amran *et al*., 2011; Moya-Clemente *et al*., 2019). This interest has motivated the development of

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different international agreements to avoid an increase in global temperature, with governments and companies expressing their willingness to be part of the solutions, from the Rio Earth Summit and the Kyoto Protocol to the Paris Agreement and COP 26 Summit (IPCC, 2018; Wijen & Ansari, 2012).

During this time, national governments and companies have been considered two main actors facing this climate crisis based on their resources and capabilities, especially the latter (Wright & Nyberg, 2017). Particularly, the role that firms have is relevant because they have the necessary resources to design, develop, and implement solutions that contribute to the decrement of emissions, but at the same, they have the required innovation to decarbonize the global economy (GlobeScan, 2019; Wright & Nyberg, 2017). On the other side, national governments are establishing ambitious objectives for 2030, like reducing 40% of national emissions and incorporating strategies for sustainable energies, legal obligations to adopt domestic mitigation, and the establishment of transparent public disclosure (European Commission, 2016).

Despite the strategies developed by both, the results of these agreements have not been enough (Mann & Kump, 2015; Talbot & Boiral, 2015). For this reason, the United Nations (UN) adopted in 2015 an initiative related to Sustainable Development Goals (SDGs), which have joined national governments and companies to clarify the path to a sustainable world. One of these goals, named Climate Action, is focused especially on addressing climate concerns through the accomplishment of different targets aimed at greenhouse gas (GHG) reductions, in which private and public institutions have expressed their desire to take part (Busch & Lewandowski, 2018; Qian *et al*., 2020).

Based on the importance of these climate issues, scholars have been motivated to develop studies that integrate the role that companies have in increasing GHG emissions, addressing the influence that corporate governance has on the decision-making process to solve different concerns, such as climate change, exerting practices that support the solution of these matters, but at the same time, maximize the value of the company, taking as a result, a market-oriented approach (Aguilera & Jackson, 2010; Husted & Serrano, 2002).

Consequently, firms have started to integrate solutions encompassing climatic aspects, i.e., carbon schemes, target emissions, energy efficiency, and renewable energy sources. Such implementations have increased the role that companies have towards climate change, responding to the demands exerted by stakeholders for the integration of actions that contribute to the decrement of emissions (Hoang Duc & Do Ba, 2017; Yunus *et al*., 2016).

Such implementations are derived from the role that corporate governance has in the supervision and direction of the strategies developed by firms (Kiel & Nicholson, 2005). However, in the management literature, there is not a current consensus about those practices, methods, or concepts that tackle efficiently this climate threat, increasing the interest of scholars and practitioners in the development of studies to address this phenomenon.

For example, one of the attempts to clarify climate-related practices is the work of Galbreath (2010) who suggests five corporate practices to examine their effect on climate change, i.e. board oversight, management execution, emission accounting, public disclosure, and strategic planning as mechanisms to tackle it. Also, Tang & Luo (2014) categorized ten carbon management practices into four areas: carbon governance, carbon operations, emission tracking, and reporting, and engagement and disclosure. These practices suggest a positive effect on the environmental performance of companies, influencing GHG reductions. Complementary, Hoang Duc and Do Ba (2017) identified various practices implemented to assess climate performance. They identified four categories that encourage climate activities in multinational subsidiaries: self-regulation and information, process improvement, product development, and transferring and trading.

Despite the interest that researchers and practitioners have in the influence of corporate governance on climate change, we still lack a systematic understanding of their impact at a firm level, suggesting the need for a systematic review that extends the current understanding of this gap. For this reason, we propose the following research questions:

a) What are the most common variables for corporate governance towards climate change?
b) What are the most commonly used research methods to address climate change?
c) Which countries and regions are the most frequently examined in this field?
d) What data sources are predominantly used in the literature to analyze corporate governance and climate change?

Based on these research questions, our paper aims to identify the common variables used in the literature to address this climate crisis from a corporate governance perspective. The second purpose of this study is to distinguish the methods that have been widely used in the literature to examine this phenomenon, as well as recognize the regions examined in previous studies that might guide novel perspectives. Finally, the sources of information are the last objective of this paper to provide a basis for future studies that might use triangulation to enhance their explanation.

Our methodological perspective is a systematic literature review. In the first step, we scan the fields of business, management, finance, and economics in a reproducible way. This process permits to decrease in the probability of missing relevant studies. Second, we explain the exclusion process to simplify future updates. Third, we include the findings that might help readers better understand the field. Using this systematic review, we intend to create new knowledge about this topic through quantitative and qualitative studies.

Our findings suggest four main areas used to examine this relationship: policies, innovation, operations, and legitimacy, measured through multiple indicators. For policies, environmental schemes, the use of indicators and certifications, and the creation of committees to quantify the company's performance are widely used by researchers. For the innovation variable, product development, and stakeholder engagements are common methods to address this phenomenon. For the operation variable, environmental certifications and policies, as well as the establishment of target emissions and emission trading schemes in corporate activities are mechanisms used by researchers to measure this variable. Finally, the legitimacy variable has been explored through stakeholder engagement, where the firm's environmental reports and corporate environmental indicators, such as emission accounting and carbon performance, have been used by scholars.

Also, the most common methods to address this phenomenon were regressions, i.e., ordinary least square and panel data models. The use of content analysis, conceptual papers, literature reviews, and cases of study were frequently addressed in the qualitative approach. The application of mix-methods was not commonly explored in the studies, where a complimentary analysis that integrates both perspectives might be necessary for future examinations.

Concerning data sources, the Carbon Disclosure Project is widely used given the information that it provides related to GHG. Another important data source identified is companies' annual reports, which contain information provided directly by firms related to emissions, policies, and strategies.

The regions mainly addressed in these studies are developed globally, analyzing more than three countries. Nevertheless, one of the main regions examined is Australasia, especially Australia, followed by North America (the US and Canada), Europe (mainly the UK), and Asia (primarily Japan, China, and Russia). Despite the importance of these regions, it might be worthwhile to address other economies given their contribution to GHGs for example, India, Indonesia, Saudi Arabia, Pakistan, and Thailand. The Latin American region is not addressed in the sample, which creates an exciting context to be considered given that some economies such as Brazil and Mexico are regarded as significant GHG contributors (WRI, 2020). The journals addressed by researchers are mainly *Business Strategy and the Environment* due to the aim and scope of this publication in the management field, followed by the Journal of Business Ethics whose perspective concerning ethical issues in the business context is relevant.

The rest of the paper is organized as follows. In the first section, we present the relevance of this field in the management literature. Next, we explain the method used for this review. Then, we focus on the results provided by this analysis. Finally, we present our conclusions and prospective from this review.

1. Corporate governance and climate change

The relevance of corporate governance is based on its importance in the decision-making process to implement mechanisms that address corporate issues, such as climate change, encouraging managers to cope with such concerns, and at the same time maximize the value of the firm (Rodriguez-Jasso *et al*., 2021; Teixeira *et al*., 2016).

Consequently, managers and decision-makers might design, develop and implement strategies to face such concerns and increase the benefits for shareholders' and investors' interests, aligning their objectives with the owners' concerns, and reducing the asymmetries of information (Coles *et al*., 2001; Queen, 2014).

The management literature identifies various corporate governance systems. One of these is the Anglo-American, which is characterized by short-term equity financing, substantial shareholder rights, and dispersed property. On the other hand, the European system has long-term equity financing and property of concentrated blocks. Both systems have similarities, such as the presence of incentives, authority patterns, and legitimacy norms, which encourage specific characteristics in the behavior of the companies that generate competitive advantages and facilitate the investors' opportunities (Carney, 2005; Hall & Soskice, 2001).

Corporate governance is a crucial element in the achievement of benefits for the company, where the use of specific assets, knowledge exchange, and the resources and capabilities of the firm are essential elements to develop by this governance to fulfill the corporate expectations and strengthen its legitimacy in the market, increasing its competitive advantages (Lehn, 2021).

In terms of climate change, the pressures coming from these stakeholders influence the adoption of management practices that reduce the impact of corporate operations, and encourage the establishment of emission objectives, making corporate governance an essential element for the success of these actions (Sullivan & Gouldson, 2017; Freeman, 1984).

Based on the importance that corporate governance represents for the strategic direction of the firm, it has motivated the development of studies that address this concern. Damert & Baumgartner (2017) conceptualize these governance structures as market and non-market actions to reduce emissions and legitimate corporate activities. Their study suggests eleven activities to promote climate mitigation which are categorized into four main areas: governance, innovation, compensation, and legitimacy.

Galbreath (2010) proposes some corporate practices to address climate change based on the proposition of the Coalition for Environmentally Responsible Economies (CERES) through five dimensions: board oversight, management execution, emission accounting, public disclosure, and strategic planning. Tang & Luo (2014) suggest a model that integrates ten corporate climate practices related to carbon management and classifies them into four categories: governance, operations, monitoring of emissions and reporting, and disclosure, having an impact on climate performance.

An additional study developed by Hoang Duc & Do Ba (2017) identified climate policies implemented in an emergent economy and classified them into four areas: self-regulation and information, process improvement, product development, and trading. Their findings suggest that these policies permit an assessment of the corporate's performance and adapt the necessary practices to address climate change effectively. Finally, Damert *et al*. (2017)examined the influence of corporate policies on financial and carbon performance having three common aspects: governance, reduction, and competitiveness. Their findings suggest that governance is related to the management capabilities to face risks and opportunities that imply climate change, and different mechanisms to achieve it.

As a result, firms have started to address climate change in different manners, i.e., implementing carbon schemes, establishing emission targets, producing efficient energy, and producing renewable energy, to reduce the pressures exerted on them by different stakeholders in the implementation of climate solutions (Hoang

Duc & Do Ba, 2017; Kawai *et al*., 2018). The integration of practices aimed at mitigating carbon emissions varies according to the industry. The uncertainty in climate policies besides the trade-offs between sustainability and economic performance encourages a reactiveness towards these implementations (Abreu *et al*., 2017; Amran *et al*., 2015)Nevertheless, the increasing pressures from consumers, investors, and regulators incite a transformation in the current market logic framed by the economic perspective to a sustainable framework that considers the integration of climate change into their decision process (Ganda, 2018; Yunus *et al*., 2016).

The importance of climate change in the management literature is increasing, which demands studies that analyze the practices implemented by companies to address this climate threat and provide a better understanding of the practices that effectively face this phenomenon. Corporate governance is crucial in achieving these emissions reductions, supporting the decision-makers to implement policies that strengthen such objectives (Kılıç & Kuzey, 2018; Tang & Luo, 2014).

2. Research method

Research on corporate governance and climate change encompasses a variety of data, theoretical perspectives, study designs, and analytical methods leading to a disjoint body of literature. For this reason, it is complicated to analyze the results of accumulated research in the arena, where a literature review becomes important for scholars and practitioners to comprise this complexity (Gough *et al*., 2017; Torraco, 2016). For scholars, this review allows the creation of new knowledge based on the existing literature, facilitating theory development, addressing gaps, and having a better understanding that generates interesting questions that lead to future research. For practitioners, this review might provide relevant insights about effective implementations for future business strategies that guide the policy-making process (Bodolica & Spraggon, 2018; Velte *et al*., 2020).

Based on this, we followed an established process for this systematic review (Denyer & Tranfield, 2009). Firstly, to map and analyze the relevant literature we clarified our research objectives by establishing the research questions and using them to guide the review. Using these questions we defined the dataset and keywords, and limited the range of years, adopting a replicable and clear procedure to decrease bias in the search and selection of studies, enhancing its objectivity (Tranfield *et al*., 2003). Table 1 shows the review protocol used for this study.

Second, we outlined the constructs we wanted to search in the literature framing our expectations about the existing research gaps. We used specific terms and searched them in the Web of Science (WOS), which has indexed journals with high impact factors compared to other databases instead of predefining journals (Li *et al*., 2017; Severo *et al*., 2021)but this field of study still needs to be better depicted and understood because violations of its core principles still frequently occur worldwide. In this study, our goal was to perform a bib-liometric performance and network analysis (BPNA. The search string used included relevant keywords ("corporate governance" AND "climate change", "global climate" AND "corporate governance", "transnational" AND "climate governance", "governing AND climate change", and related terms). Figure 1 shows the research process with the number of studies gathered in each stage. The total number of documents was 4 072.

Third, we established the study filters. We limit to those studies that belong to the management, business, finance, and economics categories. We did not restrict the period of the studies (1980-2019) or the country of origin. We considered quantitative and qualitative articles published only in peer-reviewed journals. Even though we did not limit the quality of the journal, the vast majority were journals Q1 and Q2. A great number of articles used secondary data for their dependent, independent, and control variables, and few of them used primary data.

Fourth, we developed the study selection. We filtered the studies to ensure no article duplicity because some of them appeared in different search strings (29 exclusions). Then, we scanned the titles and abstracts

of the manuscripts to identify those relevant papers to read, not pursuing articles that match the exclusion criteria (165 exclusions). We filtered through the number of citations excluding those with 14 or lower to increase the relevance of the documents analyzed (60 exclusions). The screening process provided a final sample of 45 studies.

Fifth, we performed an depth analysis. We scanned the paper's main features, i.e., research questions, the study's purpose and contribution, the journal published, the method section, variables analyzed, measurements used, data sources, and main results. We create a matrix to order and give structure to the information extracted from the studies analyzed (Garrad, 2004). The studies' final sample was read in-depth to verify the studies' features and main information identified in the evaluation step. Figure 2 shows the literature review process.

TABLE 1
Literature review protocol

Stage	Step	Description
0	1	Definition of the re-view's purpose
1	1	Identification of research
	1.1	Selection of database
	1.2	Identification of keywords and search terms
	1.3	Identification of search strings
	1.4	Identification of the period of the study
	2	Search strategy
	2.1	Establishment of the use of the Web of Science database
	2.2	Search by topic
	2.3	Use of the keywords and search terms selected
	2.4	Analysis period 1980-2019
	3	Selection of the studies
	3.1	Inclusion criteria Selection of categories (Management, Business, Finance, Economics) Selection of type of documents (peer-reviewed journal articles) Period of study (1980-2019) Type of publication (Q1 and Q2 journals)
	3.2	Exclusion criteria No duplicity filters Relevance to the literature review topic Number of citations (15 or higher)
	4	Study Quality Assessment
	4.1	Title and Abstract Review
	4.2	Journal published and paper main features The topic addressed in the study Research questions Study's purpose Study's contribution Full-text analysis Study's methods Variables used in the study Measurements explored in the manuscripts Data sources General results and implications

Source: elaborated by authors.

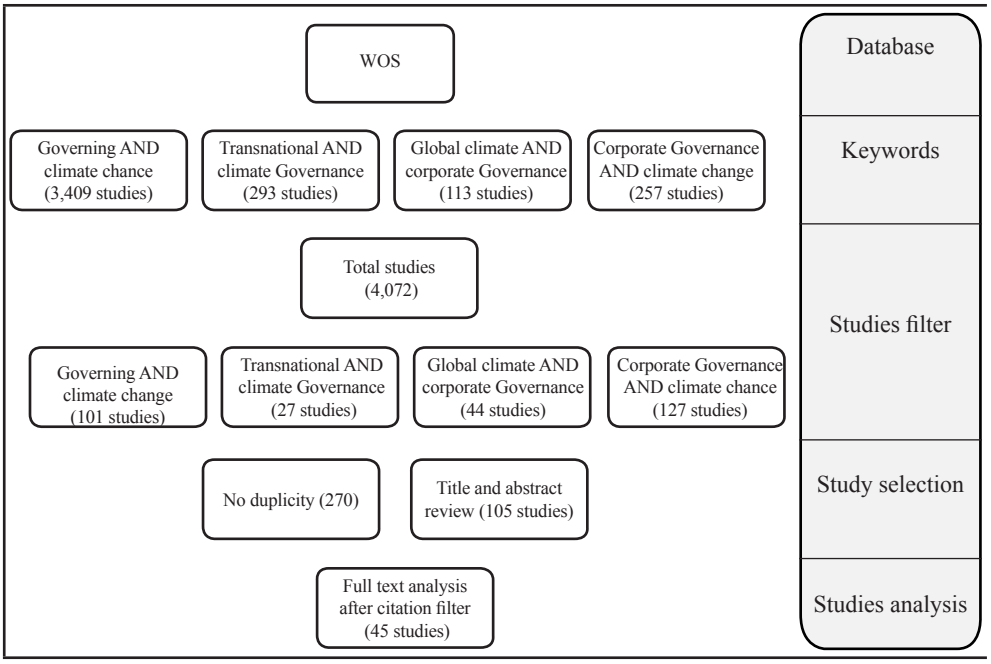

FIGURE 1
Selection of the studies
Source: elaborated by authors.

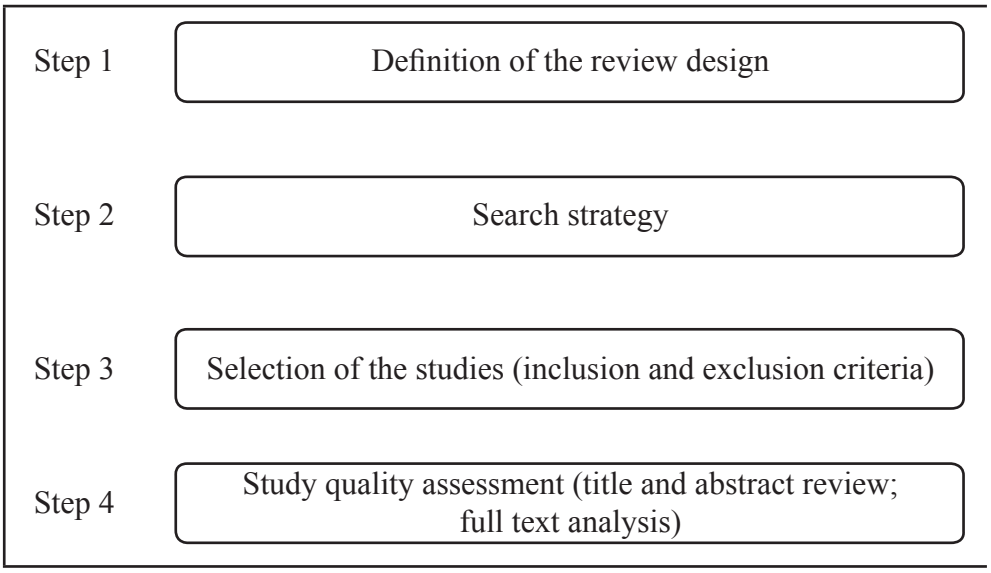

FIGURE 2
The systematic literature review process
Source: elaborated by authors.

3. Findings of the literature review

3. 1. Descriptive content analysis

Table 2 shows the methodological approach of the final sample categorizing each study by its methodological approach and the quartile of the journal published. Each article was classified according to the main method used. The quantitative approach was the most common method in Q1 journals.

The final sample comprised 45 studies. The concepts of "corporate governance" and "climate change" have been addressed in the literature previously, so we expect an intermediate stage of development that derives from previous studies from separate states of the art to build new constructs or theoretical relationships (Edmondson & McManus, 2007). This perspective integrates hybrid data (quantitative and qualitative) where the main methods explored were content analysis, exploratory statistics, and preliminary tests. Table 2 shows a balance between the quantitative and qualitative study's methodological approaches, being in line with the Edmondson & McManus (2007) suggestion toward intermediate theory research.

TABLE 2
Final sample

	Qualitative		Mixed methods		Quantitative	
Journal ranking	n	%	n	%	n	%
Q1	16	36%	5	11%	20	44%
Q2	1	2%			2	4%
Q3	1	2%				
Total	18	40%	5	11%	22	49%

Source: elaborated by authors.
Note: The journal ranking is according to SCImago.

Table 3 shows the number of articles published by journals. *Business Strategy and the Environment* is a journal with more interest for researchers given its orientation towards business responses to improving environmental performance. The *Journal of Business Ethics* is the second most required by authors given the scope and interests for ethical issues related to business. The Accounting, Auditing, and Accountability Journal is a publication that researchers aim to publish given its socio-economic, institutional, and political environment profile. Finally, Business and Society is a preferred journal based on the interest of this publication in the understanding of important societal issues and their relationship with business.

TABLE 3
Corporate governance and climate change by journal

Journal	Number of papers	%
Business Strategy and the Environment	9	20%
Journal of Business Ethics	4	9%
Accounting, Auditing and Accountability Journal	3	7%
Business and Society	3	7%
Australian Accounting Review	2	4%
Corporate Social Responsibility and Environmental Management	2	4%
Journal of Environmental Economics and Management	2	4%
The British Accounting Review	2	4%
Others	18	40%
Total	45	100%

Source: elaborated by authors.

The classification of the studies by country and region allows for identifying areas that are commonly explored and distinguishing others that are barely considered in the literature. Table 4 shows that most of the studies developed a global perspective (47%) examining more than three countries. A great number of manuscripts (18%) analyzed Australia and New Zealand, which might be explained by the tendencies toward climate change awareness which encourages the disclosure of sustainable reports, and the introduction of new legislation and taxes towards the natural environment.

North America and Europe were two of the most common regions examined in the sample (13%) addressing mainly the US, which contributes 12.67% of global GHG, and the UK which contributes 0.95% of global GHG (WRI, 2020). It is worth noting that a minor number of studies examined Asia which has some of the most important GHG emitters. The most common countries examined in Asia were China (contributing with 26.1%), Russia (contributing with 26.1%), and Japan (contributing with 2.5%). Nevertheless, there are other Asian countries considered high GHG emitters according to the World Resources Institute (2020), such as India (contributing with 7.08%), Indonesia (contributing with 2.03%), Iran (contributing with 1.74%), South Korea (contributing with 1.51%), Saudi Arabia (contributing with 1.34%), Pakistan (contributing with 0.9%), and Thailand (contributing with 0.88%) that might be an interesting context to examine.

Another region that was not addressed is Latin America (LATAM). Brazil and Mexico are the two main GHG contributors in the region. Brazil contributes 2.19%, and Mexico with 1.42% of global GHG. There are other Latin American countries considered high emitters, i.e., Argentina (contributing with 0.77%), Venezuela (contributing with 0.49%), Colombia (contributing with 0.38%), Chile (contributing with 0.23%), and Peru (contributing with 0.2%).

TABLE 4
Countries examined in the sample

Region and country	Articles	%	Articles	%
North America			6	13%
USA	4	9%		
Canada	2	4%		
Europe			6	13%
UK	6	13%		
Asia			4	9%
Japan	2	4%		
China	1	2%		
Russia	1	2%		
Australasia			8	18%
Australia	7	16%		
New Zealand	1	2%		
Global>3			21	47%
	21	47%		
Total	45	100%		

Source: elaborated by authors.

Table 5 shows the methods that scholars used in the regions examined. The quantitative approach is the most common way to address this phenomenon. For global studies, interviews, case studies, data panels, and Ordinary Least Squares (OLS) regression were the most used methods.

A great number of studies developed a qualitative view. Content analysis was commonly used to retrieve information from interviews, annual reports, and databases. For the quantitative approach, regression models were the most used technique of analysis. For North America, most of the studies developed a quantitative perspective, the same for Europe and Asia except for Australasia, in which the studies were balanced. In this way, there is a steadiness between the type of perspective that this phenomenon is addressed in the literature with a slight preference towards the quantitative approach in some regions.

TABLE 5
Method of contribution by region

	Qualitative		Quantitative		Mixed-Method		Total	
	Articles	%	Articles	%	Articles	%	Articles	%
GLOBAL	10	22%	7	13%	4	9%	21	44%
Content Analysis	5	11%						
Conceptual Framework	3	7%						
Comparative Analysis					3	7%		
Regression			4	9%				
Panel Data			1	2%				
Descriptive Analysis			1	2%				
Other	2	4%	1		1	2%		
AMERICA	1		5				6	11%
Regression			2	4%				
Panel Data			3	7%				
Literature Review	1							
AUSTRALASIA	4		4				8	18%
Content Analysis	2	4%						
Literature Review	1	2%						
Case Study	1	2%						
Regression			3	7%				
Panel Data			1	2%				
EUROPE	2		4				6	13%
Content Analysis	2	4%						
Regression			3	7%				
Panel Data			1	2%				
ASIA	1		2		1		4	9%
Case Study	1	2%						
Regression			1	2%				
Panel Data			1	2%				
Other					1	2%		
TOTAL	18	40%	22	49%	5	11%	45	100%

Source: elaborated by authors.

Table 6 shows the data sources used in the sample. For qualitative studies, researchers retrieved information from interviews, datasets, and historical records. For quantitative studies, the most common sources of information were the Carbon Disclosure Project (CDP), sustainability and annual companies report, and the use of datasets (Thomson Reuters, Connect4, eGRID, Datastream). For the mixed-method approach, the use of the CDP and companies' annual reports were frequently used as data sources to triangulate information.

TABLE 6
Data source

	Qualitative		Mixed methods		Quantitative	
Data source	n	%	n	%	n	%
Company annual reports	2	3.3	2	3.3	4	6.6
Bloomberg					1	1.6
CDP reports	4	6.6	2	3.3	8	13.1
CSR and environmental reports	1	1.6	1	1.6	2	3.3
Capital IQ					1	1.6
Asset4, Connect 4, Thomson Reuters	1	1.6			2	3.3
CERES database					2	3.3
eGRID					2	3.3
Sustainability reports					4	6.6
Interviews	6	9.8	1	1.6		
Scopus and other literature review data	4	6.6				
GHG reports					2	3.3
Datastream					2	3.3
Other (websites, IR RC Database)	3	4.9			2	3.3

Source: elaborated by authors.

Finally, Table 7 shows the climate governance measures. The policy dimension has been addressed through the establishment of environmental aspects, i.e., policies related to the management or reduction of GHG. Another indicator used for this variable is the setting of committees, i.e., corporate social responsibility (CSR) and sustainable committees. The company's reports have been widely examined because in such documents is possible to find information related to certain specific practices, i.e., the risk management and opportunities discussed, the organizational and staff involvement, environmental partnerships, environmental certifications, and international standards of sustainability, like the use of environmental, social, and governance (ESG) indicators, and the Global Reporting Initiative alignment (GRI).

For innovation, the creation of departments aimed at the development and improvement of processes and products is used as an indicator. Stakeholder engagement in corporate activities and access to new markets provide a way to address the corporate innovation process. The operational variable has been measured through GHG emission controls. These measurements include the practices implemented by suppliers to regulate their emissions, i.e., the integration of suppliers' certifications, policy implementations, the setting of target emissions, and emission trading schemes. Target emissions establish a limit of the firm's releases that lead to the integration of mechanisms to achieve this objective. Meanwhile, the adoption of emission schemes is a way that companies have to address climate change in an efficient financial way (Hossain & Farooque, 2019; Kumarasiri, 2017).

Finally, legitimacy has been explored through several measurements due to the importance of the companies' survival where communication with stakeholders is a relevant indicator (Ahn & Park, 2018; Bravo & Reguera-Alvarado, 2018; Imtiaz *et al*., 2019).Researchers have addressed these interactions through the company's reports, i.e., CSR and sustainability reports, where they communicate the actions implemented by firms that might be interesting for some groups, such as investors. Another way to enhance these interactions is via the firm's indicators, such as ESG performance, being of interest to the company's investors who prefer firms with sustainable profiles (García-Sánchez *et al*., 2020; Hossain & Farooque, 2019).

TABLE 7
Climate governance measures

Variables	Measures
Policies	Environmental policies
	GHG management policy
	Organizational and staff involvement
	Risk management and opportunities discussed
	CSR committee
	Sustainability Committee
	Sustainability reports
	Environmental Partnership
	ESG indicators
	Certifications
	GRI alignment
Innovation	Process improvement department
	Product development and improvement department
	Access to new markets
	Stakeholder engagement in corporate activities
Operations	Suppliers' GHG emission controls
	Emission trading and compensations
	Target emissions
	Suppliers' certifications
	Policies implementations
Legitimacy	Stakeholder cooperation in sustainable activities
	CSR reports
	Sustainability reports
	ESG indicators
	Communication with stakeholders
	Emission accounting / Carbon accounting
	Carbon assurance

Source: elaborated by authors.

Limitations and prospective for future research

This study highlights a variety of corporate governance practices on climate change addressed in the literature. However, Figure 3 shows that these variables might be extended by addressing additional research paths (RP) in line with corporate governance, i.e., board composition or board interlocks from an agency perspective. Specific board features might be addressed in detail in further analysis, such as educational background, board members' age, Chief Executive Officer (CEO) duality, gender, and nationality.

Researchers should include in their future analysis external and internal audits, which are not commonly explored in the literature. Also, they might complement the carbon assurance measure traditionally used in the literature. Additionally, the business cultural context might provide remarkable insights into the regions explored, for example, Latin America shares a similar system of norms and values that frame the business setting and influence the corporate mechanisms towards climate change.

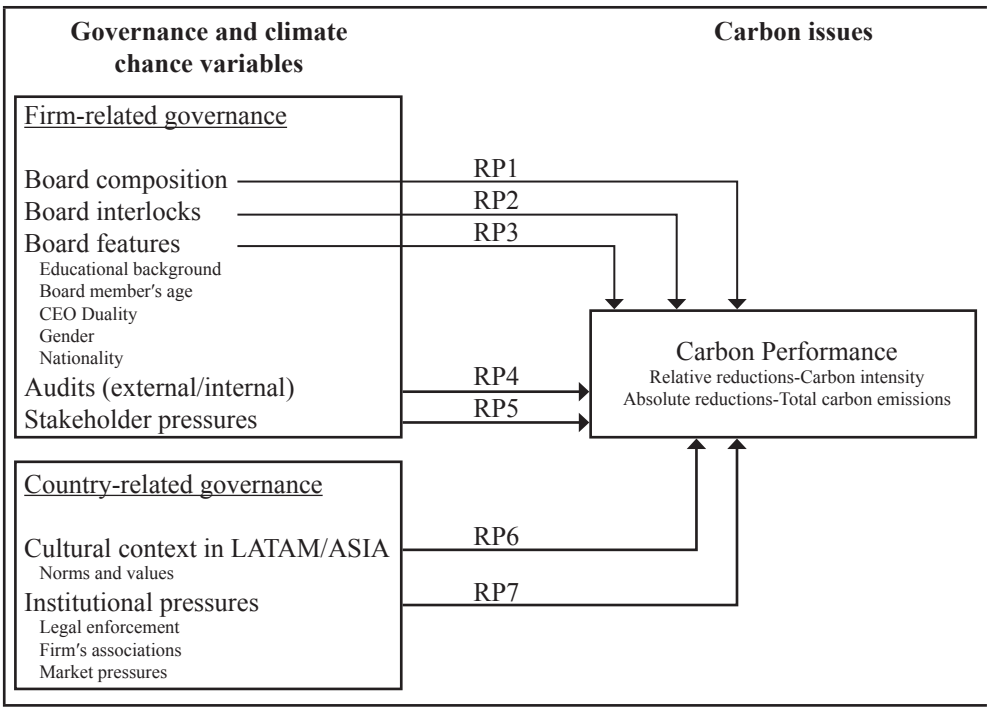

FIGURE 3
Main research path
Source: elaborated by authors.

Lastly, this study presents some limitations. We used the WOS engine to explore and collect studies for this review. Nevertheless, the exclusive use of this database limits the scope of the analysis for other studies, especially with regional. For this reason, other platforms like Scopus and Google Scholar might be used for further analysis. Besides this, we restricted our research to those studies with peer-reviewed journal articles where the inclusion of books or chapters might enhance the examination. Furthermore, our analysis focused on manuscripts with 15 or more citations to ensure their quality. Further examinations might include publications with a fewer number of citations. Also, keywords might be expanded to identify other relevant studies.

A final suggestion for future studies is the use of a quantitative meta-analysis. This research method is useful in examining sustainable studies where the main objective is based on summarizing statistically the current research and improving the quality of the results (Dao & Ta, 2020; Velte *et al*., 2020). This review highlights the diverse results of quantitative and qualitative studies. However, through a meta-analysis is possible to develop a moderator analysis across different studies. Based on the increasing interest in climate governance, we expect that future researchers address this phenomenon based on this research method.

Discussion and conclusion

Corporate climate governance is a research field that has attracted the attention of scholars and practitioners both in theory and practice, as well as in the regulatory and research context based on its importance in the establishment of corporate strategies for the integration of mechanisms that address climate change.

Despite a great variety of variables and mechanisms explored in the studies analyzed, four main variables are identified as common ways to address this phenomenon: *a*) policies, *b*) innovation, *c*) operation, and *d*) legitimacy. For the measurement of these variables, there are different suggestions explored by the authors that might serve as a starting point for novel studies (see Table 7). However, these measurements were explored in specific contexts that do not necessarily provide the same results for a different setting, such as in Latin America, South,

or West Asia (see Table 4). These results might be contrasted with the findings explored in previous studies to determine whether or not those variables or indicators offer a similar outcome.

The policy variable has been explored in the literature through several indicators, such as the implementation of environmental policies (GHG management policy, risk management, and opportunities discussed), the use of environmental indicators and certifications (ESG indicators, GRI alignment), and the creation of environmental committees to quantify the company's performance (CSR and Sustainability committees). The methodology used to create these indicators might be adapted to the context examined, taking into consideration the data availability.

The innovation variable has been examined through the creation of a department aimed at product and process development, as well as the stakeholder engagements as a firm's mechanism that allows access to new markets. These indicators might be contextualized according to the sample addressed. The operation variable was addressed with the adoption of environmental certifications and policies, such as suppliers' GHG emission controls, the establishment of target emissions, and trading schemes, where data may vary according to the companies examined. Finally, for the legitimacy variable, the use of stakeholder engagement and the companies' environmental reports, as well as the firm's environmental indicators, such as emission accounting and carbon performance were used to examine the disclosure that firms have with their stakeholders and in this manner enhance their legitimacy.

A different context might require the integration of different indicators according to the information provided by companies, where cultural aspects may be a relevant factor to consider. For example, despite the actions implemented by national governments in the establishment of regulations aimed at emission diminishment, companies might implement some mechanisms to address climate change symbolically to enhance their legitimacy and assure survival. For this reason, the integration of different indicators could be necessary to enhance the prediction of the results for novel examinations in such contexts.

This integration might be complementary to the use of a mixed-method approach. The majority of the studies analyzed used a quantitative perspective, where OLS regression models and panel data analysis were the most common methods (see Table 5). Nevertheless, the use of qualitative and quantitative perspectives might be useful to validate the information from self-reports published by firms. The triangulation method in which scholars may lean on different techniques of research with different strategies, sources of information (see Table 6), and diverse points of view might help to reduce the shortcomings of the firms' self-reports and validate the information produced by them.

The findings from novel studies developed by researchers and practitioners might be disseminated by different journals, the most representative *Business Strategy and the Environment*, as well as the *Journal of Business Ethics*, based on the aim and scope of both of them (see Table 3). However, this cannot be considered a limitation for authors.

The climate crisis that faces modern society has motivated the interest of scholars, practitioners, and national governments to find the most effective mechanisms that address GHG emissions. In the management literature, there is not a general agreement on those practices implemented by companies that contribute effectively to this decrement; however, more and more authors are exploring such practices to determine the best mechanisms that practitioners and decision-makers might integrate into their daily operations and contribute to climate mitigation.

Several aspects need to be considered for novel studies, such as the context. Some regions, such as Latin America, might offer unique perspectives given their cultural orientation that might differ from previous studies. Contrasting approaches between regions may be beneficial for the determination of the best corporate practices to implement in the business and management area, always following the same objective, climate change mitigation.

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References

Abreu, M. C., Freitas, A. R. P., & Rebouças, S. M. (2017). Conceptual model for corporate climate change strategy development: Empirical evidence from the energy sector. *Journal of Cleaner Production*, *165*, 382-392. https://doi.org/10.1016/j.jclepro.2017.07.133

Aguilera, R. V. ., & Jackson, G. (2010). Comparative and International Corporate Governance. *The Academy of Management Annals*, *4*(1), 485-556. https://doi.org/10.1080/1351847X.2014.902857

Ahn, S., & Park, D. (2018). Corporate Social Responsibility and Corporate Longevity: The Mediating Role of Social Capital and Moral Legitimacy in Korea. *Journal of Business Ethics*, *150*(1), 117-134. https://doi.org/10.1007/s10551-016-3161-3

Akbaş, H. E., & Canikli, S. (2018). Determinants of voluntary greenhouse gas emission disclosure: An empirical investigation on Turkish firms. *Sustainability*, *11*(1), 1-24. https://doi.org/10.3390/su11010107

Amran, A., Ooi, S. K., Wong, C. Y., & Hashim, F. (2015). Business Strategy for Climate Change: An ASEAN Perspective. *Corporate Social Responsibility and Environmental Management*, *23*(4), 213-227. https://doi.org/10.1002/csr.1371

Amran, A., Periasamy, V., & Zulkafli, A. H. (2011). Determinants of climate change disclosure by developed and emerging countries in the asia pacific. *Sustainable Development*, *22*(3), 188-204. https://doi.org/10.1002/sd.539

Bodolica, V., & Spraggon, M. (2018). An end-to-end process of writing and publishing influential literature review articles: do's and dont's. *Management Decision*, *56*, 2472-2486.

Bravo, F., & Reguera-Alvarado, N. (2018). Sustainable development disclosure: Environmental, social, and governance reporting and gender diversity in the audit committee. *Business Strategy and the Environment*, *28*(2), 418-429. https://doi.org/10.1002/bse.2258

Busch, T., & Lewandowski, S. (2018). Corporate carbon and financial performance: a meta-analysis. *Journal of Industrial Ecology*, *22*(4), 745-759.

Carney, M. (2005). Corporate Governance and Competitive Advantage in Family-Controlled Firms. *Entrepreneurship Theory and Practice*, *29*(3), 249-265. https://doi.org/10.1111/j.1540-6520.2005.00081.x.

Coles, J. W., McWilliams, V. B., & Sen, N. (2001). An examination of the relationship of governance mechanisms to performance. *Journal of Management*, *27*(1), 23-50. https://doi.org/10.1016/S0149-2063(00)00085-4

Damert, M., & Baumgartner, R. J. (2017). External pressures or internal governance–What determines the extent of corporate responses to climate change? *Corporate Social Responsibility and Environmental Management*, *25*(4), 473-488. https://doi.org/10.1002/csr.1473

Damert, M., Paul, A., & Baumgartner, R. J. (2017). Exploring the determinants and long-term performance outcomes of corporate carbon strategies. *Journal of Cleaner Production*, *160*, 123-138. https://doi.org/10.1016/j.jclepro.2017.03.206

Dao, B., & Ta, T. (2020). A meta-analysis: capital structure and firm performance. *Journal of Economics and Development*, *22*(1), 111-129. https://doi.org/10.1108/jed-12-2019-0072

Denyer, D., & Tranfield, D. (2009). Producing a systematic review. In D. Buchanan & A. Bryman (Eds.), *The Sage Handbook of Organizational Research Methods.* Sage Publications Ltd.

Edmondson, A. C., & McManus, S. E. (2007). Fit in Methodological Management Field Research. *Academy of Management Review*, *32*(4), 1155-1179.

European Commission. (2016). *The Road from Paris: assessing the implications of the Paris Agreement and accompanying the proposal for a Council Decision on the signing, on behalf of the European Union, of the Paris Agreement, adopted under the United Nations Framework Convention on Cl.* chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52016DC0110

Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Pitman.

Galbreath, J. (2010). Corporate governance practices that address climate change: An exploratory study. *Business Strategy and the Environment*, *19*(5), 335-350. https://doi.org/10.1002/bse.648

Ganda, F. (2018). The effect of carbon performance on corporate financial performance in a growing economy. *Social Responsibility Journal*, *14*(4), 895-916.

García-Sánchez, I., Rodríguez-Ariza, L., Aibar-Guzmán, B., & Aibar-Guzmán, C. (2020). Do institutional investors drive corporate transparency regarding business contribution to sustainable development goals? *Business Strategy and the Environment*, *29*(5), 2019-2036. https://doi.org/10.1002/bse.2485

Garrad, J. (2004). *Health Sciences Literature Review Made Easy: The Matrix Method* (2nd ed.). Jones & Barlett Publ Inc.

GlobeScan. (2019). *The Climate Decade. Ten years to deliver the Paris Agreement*. https://globescan.com/webinar-2020-climate-survey-evaluating-progress/

Gough, D., Oliver, S., & Thomas, J. (2017). Introducing systematic reviews. In D. Gough, S. Oliver, & J. Thomas (Eds.), *An introduction to systematic reviews* (2nd ed)., pp. 1-18. SAGE Publications.

Hall, P. A., & Soskice, D. (2001). *An introduction to varieties of capitalism*. Oxford.

Hoang Duc, B., & Do Ba, K. (2017). Business responses to climate change: strategies for reducing greenhouse gas emissions in Vietnam. *Asia Pacific Business Review*, *23*(4), 596-620. https://doi.org/10.1080/13602381.2016.1212557

Hossain, M., & Farooque, O. (2019). The emission trading system, risk management committee, and voluntary corporate response to climate change CDP study. *International Journal of Accounting and Information Management*, *27(2)*, *262-283.*

Husted, B. W., & Serrano, C. (2002). Corporate governance in Mexico. *Journal of Business Ethics*, *37*(3), 337-348. https://doi.org/10.1023/A:1015201417632

Imtiaz, M., Adams, C. A., & Boyce, G. (2019). Institutional drivers of environmental management accounting adoption in public sector water organizations. *Accounting*, *Auditing and Accountability Journal*, *32*(4), 984-1012. https://doi.org/10.1108/AAAJ-09-2017-3145

IPCC. (2018). *IPCC special report on the impacts of global warming of 1.5 °C-Summary for policymakers* (*Issue October 2018*). http://www.ipcc.ch/report/sr15/

Kawai, N., Strange, R., & Zucchella, A. (2018). Stakeholder pressures, EMS implementation, and green innovation in MNC overseas subsidiaries. *International Business Review*, *27*(5), 933-946. https://doi.org/10.1016/j.ibusrev.2018.02.004

Kiel, G. C., & Nicholson, G. J. (2005). Evaluating boards and directors. *Corporate Governance: An International Review*, *13*(5), 613-630. https://doi.org/10.1111/j.1467-8683.2005.00455.x

Kılıç, M., & Kuzey, C. (2018). The effect of corporate governance on carbon emission disclosures: Evidence from Turkey. *International Journal of Climate Change Strategies and Management*, *11*(1), 35-53. https://doi.org/10.1108/IJCCSM-07-2017-0144

Kumarasiri, J. (2017). Stakeholder pressure on carbon emissions: strategies and the use of management accounting. *Australasian Journal of Environmental Management*, *24*(4), 339-354. https://doi.org/10.1080/14486563.2017.1350210

Lehn, K. (2021). Corporate governance and corporate agility. *Journal of Corporate Finance*, *66*, 101929.

Li, Y., Gong, M., Zhang, X. Y., & Koh, L. (2017). The impact of environmental, social, and governance disclosure on firm value: The role of CEO power. *British Accounting Review*, *50*(1), 60-75. https://doi.org/10.1016/j.bar.2017.09.007

Mann, M., & Kump, L. R. (2015). *Dire predictions: Understanding climate change*. (2nd. edition). DK Publishing.

Moya-Clemente, I., Ribes-Giner, G., & Pantoja-Díaz, O. (2019). Configurations of sustainable development goals that promote sustainable entrepreneurship over time. *Sustainable Development*, *28*(4), 572-584. https://doi.org/10.1002/sd.2009

Qian, W., Suryani, A. W., & Xing, K. (2020). Does carbon performance matter to market returns during climate policy changes? Evidence from Australia. *Journal of Cleaner Production*, *259*, 1-10. https://doi.org/10.1016/j.jclepro.2020.121040

Queen, P. (2014). Enlightened Shareholder Maximization: Is this Strategy Achievable? *Journal of Business Ethics*, *127*(3), 683-694. https://doi.org/10.1007/s10551-014-2070-6

Rodriguez-Jasso, A. F., Briseño, A., & Zorrilla, A. L. (2021). The impact of Strategic Climate Planning on Carbon Performance: An empirical examination of Mexican listed firms. *UCJC Business and Society Review (Universia Business Review)*, *18*(3), 52-125. https://doi.org/10.3232/UBR.2021.V18.N3.02

Severo, P., Furstenau, L. B., Sott, M., Cossul, D., Bender, M., & Bragazzi, N. (2021). Thirty years of human rights study in the Web of Science database (1990-2020). *International Journal of Environmental Research and Public Health*, *18*(4), 1-24. https://doi.org/10.3390/ijerph18042131

Sullivan, R., & Gouldson, A. (2017). The Governance of Corporate Responses to Climate Change: An International Comparison. *Business Strategy and the Environment*, *26*(4), 413-425. https://doi.org/10.1002/bse.1925

Talbot, D., & Boiral, O. (2015). Strategies for Climate Change and Impression Management: A Case Study Among Canada's Large Industrial Emitters. *Journal of Business Ethics*, *132*(2), 329-346. https://doi.org/10.1007/s10551-014-2322-5

Tang, Q., & Luo, L. (2014). Carbon management systems and carbon mitigation. *Australian Accounting Review*, *24*(1), 84-98. https://doi.org/10.1111/auar.12010

Teixeira, M., De Déa Roglio, K., & Marcon, R. (2016). Institutional logic and the decision-making process of adopting corporate governance at a cooperative organization. *Journal of Management and Governance*, *21*(1), 181-209. https://doi.org/10.1007/s10997-016-9340-x

Torraco, R. J. (2016). Writing Integrative Literature Reviews: Using the Past and Present to Explore the Future. *Human Resource Development Review*, *15*(4), 404-428. https://doi.org/10.1177/1534484316671606

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of a systematic review. *British Journal of Management*, *14*, 207-222. https://doi.org/10.2307/249689

Velte, P., Stawinoga, M., & Lueg, R. (2020). Carbon performance and disclosure: A systematic review of governance-related determinants and financial consequences. *Journal of Cleaner Production*, *254*, 120063. https://doi.org/10.1016/j.jclepro.2020.120063

Wijen, F., & Ansari, S. (2012). Overcoming inaction through collective institutional entrepreneurship: Insights from regime theory. *Organization Studies*, *28*(7), 1079-1100. https://doi.org/10.1177/0170840607078115

WRI. (2020). World ten top emitters. *World Resources Institut*e. https://www.wri.org/blog/2020/12/interactive-chart-top-emitters

Wright, C., & Nyberg, D. (2017). An inconvenient truth: How organizations translate climate change into business as usual. *Academy of Management Journal*, *60*(5), 1633-1661. https://doi.org/10.5465/amj.2015.0718

Yunus, S., Elijido-Ten, E., & Abhayawansa, S. (2016). Determinants of carbon management strategy adoption. Evidence from Australia's top 200 publicly listed firms. *Managerial Auditing Journal*, *31*(2), 156-179.