The Anáhuac Journal, Vol. 26, núm. 1, 2026 | ISSN-e 2683-2690 | https://doi.org/10.36105/theanahuacjour.2026v26n1.3233 | e3233 (pp. 147-180 | https://revistas.anahuac.mx/index.php/the_anahuac_journal

Determinants of Carbon Disclosure Quality: The Role of Corporate Governance and Managerial Discretion in Mexico

Determinantes de la calidad de la divulgación de carbono: el papel del gobierno corporativo y la discreción gerencial en México

Dr. Joel Cumpean, Universidad Autónoma de Tamaulipas, Mexico (alcumpean@uat.edu.mx) https://orcid.org/0000-0002-5020-6854

Abstract

This study examines how corporate governance characteristics, managerial discretion (MD), and firms' network embeddedness (measured by board interlocks and centrality) affect the quality of carbon disclosure among firms listed on both the Mexican Stock Exchange (BMV) and the Institutional Stock Exchange (BIV) that are involved in the Carbon Disclosure Project (CDP). The research examines the internal and external dynamics of organizations and is grounded in agency and institutional theories. Using STATA 17, a dataset of 71 companies for the years 2016–2022 was created, and an ordinal logistic panel regression was used to evaluate the impact of corporate governance and MD on carbon disclosure. The primary conclusions imply that an environmental committee and board independence are useful for observing and enhancing sustainable reporting.

Resumen

Este estudio analiza cómo las características del gobierno corporativo, la discreción gerencial gerencial y la integración en la red empresarial (medida por el entrelazamiento y la centralidad de los consejos) afectan la calidad de la divulgación de carbono de las empresas que cotizan tanto en la Bolsa Mexicana de Valores (BMV) como en la Bolsa Institucional de Valores (BIVA) y participan en el Carbon Disclosure Project (CDP; en español, Proyecto de Divulgación de Carbono). La investigación examina la dinámica interna y externa de las organizaciones y se basa en las teorías de agencia e institucional. Mediante STATA 17, se creó un conjunto de datos de 71 empresas para el periodo 2016–2022 y se aplicó una regresión logística ordinal de panel para evaluar el impacto del gobierno corporativo y la discreción gerencial en la divulgación de carbono. Nuestras conclusiones principales indican que la independencia del comité ambiental y de la junta directiva resulta útil para observar y mejorar la presentación de informes de sostenibilidad.

KEYWORDS / PALABRAS CLAVE

Carbon disclosure, managerial discretion, board independence, board interlocks, agency theory / Divulgación de carbono, discreción gerencial, independencia del consejo, consejos entrelazados, teoría de agencia.

JEL Classification / Clasificación JEL: *G34, M14, Q56.*

Received: February 21, 2026 | Reviewed: May 21, 2026 | Approved: May 27, 2026 | Published: June 23, 2026.

The Anáhuac Journal, **Vol. 26, núm. 1, 2026.**
https://doi.org/10.36105/theanahuacjour.2026v26n1.3233
e3233 (pp. 147-180)

1. Introduction

Carbon disclosure has become increasingly important in environmental disclosure (García et al., 2020; Hahn et al., 2015). The literature identifies two approaches to it: *i)* An opportunistic use aimed at obscuring poor practices and, *ii)* An informative approach intended to reduce information asymmetry and enhance transparency (He et al., 2022; Hopwood, 2009).

Managers may exploit information asymmetries between firms and their stakeholders (Hsueh, 2019) by using socially valued practices such as carbon disclosure (Haque & Ntim, 2020). In contrast, evidence supports the argument that voluntary disclosures increase companies' value (Yu et al., 2020). Greater disclosure can reduce information asymmetry, generating benefits such as increased legitimacy (Datt et al., 2019; O'Donovan, 2002), lower capital costs (García-Sánchez & Noguera-Gámez, 2017), and greater investment (Roychowdhury et al., 2019).

Companies implement corporate governance mechanisms to constrain opportunistic behavior and promote informative disclosure. These mechanisms include the establishment of various committees (Hossain & Farooque, 2019; Krishnamurti & Velayutham, 2018), board structures (Nguyen & Faff, 2006), and a larger number of board members (Wu et al., 2019), which contribute expertise and monitoring capacity. Additionally, companies may leverage connections within the business network, through board interlocks, to exchange experiences and information. These connections may influence disclosure quality by facilitating the dissemination of key facts, norms, and best practices, as well as by increasing external exposure and reputational pressures on firms (Briseño-García et al., 2022).

According to the literature, Latin American countries exhibit stakeholder conflicts, a prevalence of family-owned businesses, and limited attention to local interest groups (Husted & Sousa-Filho, 2019). In this context, managerial discretion (MD) becomes particularly relevant for voluntary disclosure practices (Raimo et al., 2020). High levels of discretion may affect environmental performance and compromise the quality of both financial and non-financial information (Wangrow et al., 2015).

In research on MD, the direct effects of the board of directors have been examined, as highlighted in a previous study (Velte et al., 2020). Previous studies have analyzed MD in relation to governance attributes such as board independence, board size, gender diversity, and the presence of sustainability or environmental committees (Jaggi et al., 2018; Kılıç & Kuzey, 2019). However, the literature on non-financial

disclosures has paid limited attention to the indirect effects of the board of directors on MD, understanding indirect effects as the influence of board characteristics on disclosure quality through MD as an intermediate mechanism. This gap is particularly salient in Latin American capital markets.

Accordingly, this study examines how MD, corporate governance, and ownership structure affect the quality of carbon disclosure among Mexican-listed firms participating in the Carbon Disclosure Project (CDP). Carbon disclosure is directly linked to greenhouse gas emissions, which are largely driven by human activities and have significant environmental impacts. Beyond performance metrics, carbon disclosure reflects firms' strategic responses to decarbonization challenges (Radu & Maram, 2020). Despite its growing prevalence, the quality of carbon disclosure remains uneven. This variability highlights the importance of examining firm-level determinants that shape firms' incentives and capacity to provide transparent and reliable carbon information.

2. Literature Review

2.1 Quality of Carbon Disclosure

Among the non-financial information that has gained significant importance in the last couple of decades, data related to Greenhouse Gas (GHG), particularly carbon dioxide stands out (Cumpean-Luna et al., 2022). Carbon disclosure has been defined in various ways in the literature; however, in every definition there is a consensus that it involves considering the risks, opportunities, benefits, and strategies companies undertake regarding their carbon-related information, similar as Velte et al. (2020) propose: Carbon disclosure is a tool that connects companies with both internal and external stakeholders, providing information about the company's carbon performance, strategies, and outlook. This term is closely linked to climate change because it focuses on carbon emissions. However, it is understood that companies consistently respond to pressure from institutions, investors, shareholders, and, primarily, customers, aiming to decarbonize the global economy to contribute to society's overall well-being (He et al., 2022).

The importance of corporate carbon disclosure varies depending on the perspective from which it is observed. It is significant from an economic standpoint primarily because the literature indicates that it can substantially impact company valuations

by affecting current and future costs of carbon compliance and mitigation, which may represent unaccounted liabilities (Borghei, 2021; He et al., 2022). It can also help companies obtain government subsidies, as is the case under mandatory carbon management reporting regimes, such as the European Union Emissions Trading System (EU ETS) (Tang & Demeritt, 2018).

In the literature on carbon-related information, few studies examine how the quality of Greenhouse Gas (GHG) reporting has developed, evolved, and improved (Comyns & Figge, 2015). Comyns and Figge (2015) conducted relevant research on the quality of such information. They measured disclosure quality using a self-constructed index based on seven dimensions: *i*) Accuracy; *ii)* Integrity; *iii)* Consistency; *iv)* Credibility; *v)* Relevance; *vi)* Timeliness, and *vii)* Transparency. Due to societal pressure over carbon and other GHG emissions, companies began taking action to reduce or offset their carbon footprints. Among these actions, carbon disclosure and performance are underscored; however, the quality of both remains to be determined by stakeholders.

As Pitrakkos and Maroun (2020) aptly state, "quantity" is not the same as "quality." Therefore, they conducted a study to measure the quality of carbon information reported by companies listed on the Johannesburg Stock Exchange. They assessed the quality of their information using eight characteristics of their reports, including: *i)* Density index; *ii)* Attribute; *iii).* Management orientation; *iv)* Integrated; *v) Assurance*; *vi)* Strategy; *vii)* Readability, and *viii)* Repetition. Their study found that disclosure quality is compromised by the level of carbon risk companies face and varies with the legitimacy strategy they employ. These perspectives are particularly relevant to this study, as factors such as legitimacy pressures, external stakeholder demands, and exposure to carbon-related risks shape firms' governance structures and influence MD in disclosure practices.

In the Mexican context, the institutional environment for carbon disclosure comprises both mandatory and voluntary mechanisms. Under the General Law on Climate Change (in Spanish, Ley General de Cambio Climático, LGCC), firms exceeding specific emissions thresholds must report their greenhouse gas emissions to the National Emissions Registry (in Spanish, Registro Nacional de Emisiones, RENE), which establishes a baseline for environmental transparency (Herrero et al., 2026). However, broader carbon disclosure practices remain largely voluntary and are often driven by participation in initiatives such as the CDP.

Previous research has shown that voluntary environmental programs in Mexico can generate spillover effects, encouraging firms to adopt improved environmental

practices and reporting behaviors beyond regulatory requirements (Henriques et al., 2012). More recently, the adoption of Sustainability Reporting Standards (in Spanish, Normas de Información de Sostenibilidad, NIS), aligned with international frameworks, including those issued by the International Sustainability Standards Board (ISSB), suggests a transition toward more standardized and potentially mandatory disclosure practices (IFRS®, 2025). This hybrid regulatory setting makes Mexico a relevant case for examining how governance mechanisms and firm-level characteristics influence the quality of carbon disclosure.

3. Hypothesis Development

Building on agency theory and with an institutional lens, this study argues that corporate governance mechanisms, ownership structures, and firms' network embeddedness shape the quality of carbon disclosure by either constraining or enabling MD. In this context, governance structures influence the incentives and monitoring capacity surrounding disclosure practices, while ownership and interorganizational relationships may affect both the transparency and credibility of reported environmental information.

3.1 Managerial Discretion (MD)

In general, shareholders and stakeholders are interested in organizations engaging in environmental and social practices that create greater value for the company, such as carbon disclosure through the CDP (Shen et al., 2020). Not all voluntary environmental disclosures, however, are value-enhancing. Prior et al. (2008) suggest that managers who align with Corporate Social Responsibility (CSR) activities, such as environmental disclosure, are not necessarily ethical and may use such disclosures to manipulate external stakeholders' perceptions or enhance their job security. Similarly, Velte et al. (2020, p. 14) mention that "Carbon performance and its disclosure are associated with increased managerial discretion, risks of greenwashing, and information overload."

In emerging economies such as Mexico, firms often adopt a defensive stance toward climate-related initiatives (Kolk et al., 2008) and exhibit relatively low levels of environmental responsiveness (Jeswani et al., 2008). Environmental information is frequently disclosed through sustainability reports, which allow greater MD, whereas

involvement in more demanding platforms, such as the CDP, remains limited (Ben-Amar et al., 2017; Matisoff et al., 2013).

Clarkson et al. (2008) note that voluntary environmental disclosure is susceptible to MD, representing an agency problem *per se* that could increase agency costs for companies. Such discretion may result in misleading disclosures and adversely affect stakeholders' decision-making (Callery & Perkins, 2021; Velte et al., 2020).

Similarly, García-Sánchez et al. (2018) find evidence that MD in CSR activities increases market uncertainty, a result comparable to that of Hambrick and Abrahamson (2017). As mentioned earlier, the director's interest is to increase the company's value by reducing information asymmetry. However, in emerging economies like Mexico, it remains challenging to find managers committed to environmental practices such as carbon disclosure, particularly when voluntary (Jeswani et al., 2008). Thus, given the results and arguments developed, and considering that MD may manifest particularly through opportunistic disclosure practices (e.g., greenwashing), which directly undermine the credibility and reliability of reported information (Velte, 2021; Callery & Perkins, 2021), the following hypothesis is proposed:

Hypothesis 1: Managerial discretion negatively affects the quality of carbon disclosure.

3.2 CEO Duality

CEO duality occurs when the same person holds both the CEO and Chairman of the Board positions within a company (Khlif et al., 2021; Pucheta-Martínez & Gallego-Álvarez, 2019). This structure concentrates executive and supervisory authority within a single individual (Al-Shaer et al., 2023; Husted & Sousa-Filho, 2019).

While some studies point to potential benefits, such as faster decision-making and leadership cohesion, agency theory emphasizes the governance risks associated with CEO duality. Power concentration, conflicts of interest, and weakened monitoring mechanisms may impair effective oversight and firm value (Gold et al., 2022; Khan et al., 2021).

From an agency perspective, CEO duality facilitates discretionary decision-making by limiting checks and balances within the board (Garcia-Sanchez et al., 2020). Separating the roles of CEO and board chair is therefore viewed as a governance mechanism that enhances transparency and accountability (Ahmad et al., 2017; Khan et al., 2021). Furthermore, conflicts of interest associated with CEO duality may

discourage investment in long-term sustainability initiatives, which typically entail uncertain, deferred returns (Berrone & Gomez-Mejia, 2009; Rashid et al., 2020). From this perspective, the concentration of power may also weaken the rigor and objectivity of disclosure processes, potentially affecting not only the extent but also the quality and credibility of carbon-related information (Garcia-Sanchez et al., 2020). Therefore, hypothesis 2 is proposed:

Hypothesis 2: CEO duality negatively impacts the quality of carbon disclosure.

3.3 Board Independence

Board independence has traditionally been considered an essential mechanism for shareholders to control and monitor management actions (Kılıç & Kuzey, 2019). Independent directors are less embedded in internal relationships, enabling more objective supervision of management decisions (Nguyen & Nielsen, 2010).

Agency theory suggests that independent boards mitigate managers' self-interested behavior and reduce information asymmetry (Eisenhardt, 1989; Jensen & Meckling, 1976). Previous research highlights the role of independent directors in enhancing transparency and accountability, particularly in areas where MD is pronounced, such as environmental disclosure (Wang & Oliver, 2009; Ammer et al., 2020; Yang et al., 2022).

Empirical evidence indicates that boards with greater independence are more likely to integrate environmental risks into decision-making and to ensure credible disclosure practices (Amiraslani et al., 2025; Ienciu et al., 2012).

Reputational concerns further motivate independent directors to promote truthful and high-quality disclosure (Fernández-Gago et al., 2018). In particular, independent directors may enhance disclosure quality by strengthening verification processes and limiting symbolic or purely impression-management reporting practices (Ammer et al., 2020; Yang et al., 2022). Based on the analyzed studies and the above arguments, hypothesis 3 is proposed:

Hypothesis 3: Board independence positively impacts the quality of carbon disclosure.

3.4 Environmental Committees

Environmental committees operate as specialized subcommittees within boards of directors, providing expertise and oversight on sustainability-related issues (Liao

et al., 2015; Martínez-Ferrero et al., 2021). Their primary role is to design, implement, and monitor environmental strategies, including decarbonization initiatives.

Similar to audit committees in financial reporting, environmental committees enhance the credibility and accuracy of environmental disclosure (Peters & Romi, 2014). Their existence signals organizational commitment to sustainability and facilitates communication with external stakeholders.

Empirical evidence suggests that environmental committees improve CSR strategies and environmental transparency, particularly in firms exposed to higher environmental risks (Orazalin, 2020). In emerging economies, Martínez-Ferrero et al. (2021) show that such committees strengthen firms' sustainability commitment and disclosure practices. Given the above, research hypothesis 4 is proposed:

Hypothesis 4: The presence of an environmental committee positively impacts the quality of carbon disclosure.

3.5 Network Centrality (Board Interlocks)

Board interlocks arise when directors serve on multiple boards simultaneously, creating interorganizational networks that position firms differently in terms of centrality (Palmer, 1983; Freeman, 1978). Firms occupying central positions within these networks benefit from greater visibility, access to information, and influence (Shropshire, 2019).

Institutional theory suggests that centrally positioned firms face stronger mimetic pressures, leading them to adopt widely accepted practices to maintain legitimacy (DiMaggio & Powell, 1983; Suchman, 1995). In the context of carbon disclosure, network centrality may encourage firms to emulate the sustainability practices of leading organizations (Briseño-García et al., 2022; Liu et al., 2022). Beyond adoption, such interorganizational connections may also influence the quality of disclosure by facilitating the dissemination of reporting standards and best practices, and exerting reputational pressures toward more credible and comprehensive environmental information (Lu et al., 2021).

Additionally, Lu et al. (2021) suggest that board interlocks can be crucial in reducing greenhouse gas emissions, highlighting the relevance of interfirm relationships for sustainability practices. The authors propose that this occurs because companies with fewer resources seek to imitate the environmental practices of more central

organizations that have greater resources for sustainability efforts. Considering the review of studies and the arguments presented, research hypothesis 5 is proposed:

Hypothesis 5: The centrality of companies positively impacts the quality of carbon disclosure.

3.6 Family Ownership

Family businesses can be understood through structure-based, inter-organizational, and aspiration-based approaches (Litz, 1995). This study uses a structure-based approach, defining family businesses as those in which ownership and control are concentrated within the family unit. However, the degree of ownership and control may vary (Litz, 1995). These businesses are characterized by having the founder or a family member, by blood or marriage, playing a role in the company, either as an executive, director, or shareholder, individually or collectively (Villalonga & Amit, 2006).

Regarding environmental considerations, companies under family control tend to be more aware of environmental impact and are inclined to pollute less, according to the socioemotional wealth model (Berrone et al., 2010). Additionally, by their essential nature, these businesses contribute significantly to two critical forms of social capital: businesses and families. In Mexico, this plays a significant role as most companies in the Mexican market (around 60–70%) are family-owned (San Martin-Reyna & Duran-Encalada, 2012). These companies have historically cultivated social and business connections, both matrimonial and entrepreneurial, resulting in widespread interconnectedness (Chavarín-Rodríguez, 2011; Chavarín-Rodríguez & Ríos, 2018). Based on the literature review and the above reasons, research hypothesis 6 was formulated:

Hypothesis 6: Family-owned businesses positively impact the quality of carbon disclosure.

4. Methodological Design

4.1 Data Collection

Data collection was carried out across three sources and at various stages. In the first phase, information for the dependent variable was gathered. Information was collected manually from the CDP website (s.f.), which served as the primary

source for this paper, consistent with other studies (Elsayih et al., 2018; Luo, 2019). The dependent variable is the quality of Carbon Disclosure (CD). The CDP website collects and disseminates data on greenhouse gas emissions from companies and cities worldwide (Charumathi & Rahman, 2019).

In the second phase, Bloomberg databases* were consulted to obtain financial statements and related financial information. This database allowed for the collection of data to subsequently calculate the MD variable and the "environmental committee" variable (Env_Comm), as well as other control variables (e.g., profitability—return on assets—(ROA), firm size (F_size), financial leverage (Lev), and industry).

Finally, companies' annual reports (BIVA, s.f.) were downloaded for the mentioned period and served two purposes. Firstly, to fill in missing data from the Bloomberg databases in some variables that include financial information, and secondly, to gather information on the members of the board of directors, as well as the qualifications they possess on each of these boards (e.g., independence, family ties, related parties, among others).

This study excluded companies in the financial sector because, in terms of their accounting, they operate differently from other companies, making it challenging to obtain the first independent variable, MD (Dechow et al., 1995). Also, companies with missing data in the Carbon Disclosure Leadership Index (CDLI)—a widely accepted measurement index developed by experts from the CDP and the accounting firm PricewaterhouseCoopers (PwC) (Krishnamurti & Velayutham, 2018)—and incomplete or discontinued financial information were also removed. The final sample comprised 71 companies and 309 firm-year observations.

4.2 Measurement of Variables

4.2.1 Dependent Variable

As a source for the dependent variable, Mexican companies' involvement in the CDP was used. CDP is a nonprofit organization that has been collecting greenhouse gas emissions data through questionnaires since 2002 (Lewis et al., 2014). It primarily includes large, publicly listed firms with significant exposure to international

* When citing Bloomberg databases, please note that they were accessed via the Bloomberg terminal located at the EGADE Business School, Tecnológico de Monterrey, in 2022.

investors, as participation is voluntary yet often driven by stakeholders and market pressures. Its classification is based on the CDLI.

Based on content analysis, the CDLI calculates disclosure levels from companies' responses to its questionnaire. Specifically, the CDLI evaluates the completeness, consistency, and strategic integration of disclosed information, assigning scores based on predefined criteria applied to firms' responses. This measurement is divided into five disclosure levels for companies: insufficient information (F), disclosure (D-, D), awareness (C-, C), management (B-, B), and leadership level (A-, A) (Jiang et al., 2021). The score increases based on carbon disclosure. A high score reflects comprehensive reporting on internal practices, strategies, and carbon governance, as well as explicit consideration of business-specific climate-change risks and opportunities. In short, a higher score on the CDLI indicates higher-quality carbon disclosure, as it captures not only the extent of disclosure but also the completeness, consistency, and strategic integration of carbon-related information, as reflected in firms' responses to CDP questionnaires (Jiang et al., 2021).

Given the voluntary nature of CDP participation, it is important to acknowledge the potential for sample selection bias, as firms with greater transparency, resources, or exposure to international stakeholders may be more likely to disclose their carbon-related information through this platform.

4.2.2 Independent Variables

4.2.2.1 Managerial Discretion (MD)

For this study, MD is operationalized through earnings management, following Martínez-Ferrero et al. (2017). Earnings management is used to measure MD because it is, *per se*, a discretionary behavior of managers focused on financial statements, and this practice is challenging to observe (Beneish, 2001). It is argued that managers who use their judgment to manipulate financial and regulated information can do the same, and more efficiently, with non-financial and unregulated information. This assumption is consistent with the argument developed in H1, which posits that MD is expected to affect disclosure quality negatively by fostering opportunistic reporting, thereby reducing the credibility and reliability of non-financial information. Following Dechow et al. (1995), earnings management was estimated using the modified Jones model, which decomposes total accruals into discretionary and non-discretionary components through a regression-based approach. The focus is on finding the discretionary accruals, which capture MD in financial reporting. This method is widely

used in the literature for its ability to control for firm-specific economic conditions and has been applied in emerging-market contexts, such as Mexico (Cumpean-Luna et al., 2021).

4.2.2.2 CEO Duality

CEO duality is a crucial concept in the business domain, referring to the situation in which an individual simultaneously serves as both CEO (Chief Executive Officer) and chairman of the board within the same organization (Ahmad et al., 2017). Following the approach used by previous studies (Elsayih et al., 2021; Khlif et al., 2021), the CEO_Duality variable is defined as a binary variable that takes the value "1" if the CEO also holds the position of chairman of the board of directors in the same organization during the study period and "0" otherwise.

4.2.2.3 Board Independence

To ensure that decisions made in publicly traded companies are as transparent as possible and largely avoid potential conflicts of interest among stakeholders, the National Banking and Securities Commission's Law (in Spanish, Ley de la Comisión Nacional Bancaria y de Valores, LCNBV) stipulates an essential requirement. This requirement mandates that at least 33% of the board of directors' members must be external independent directors. Based on the consulted literature, board independence (B_Ind) was measured as a percentage, defined as the number of independent directors of company i in year j divided by the total number of directors of company i in year j (Wu et al., 2019).

4.2.2.4 Environmental Committee

The environmental committee is vital in today's business landscape, addressing environmental issues and promoting sustainable practices in operations and decisions (Liao et al., 2015). An environmental committee in an organization can significantly influence its approach to environmental responsibility and its ability to mitigate adverse environmental impacts (Orazalin, 2020). In this study, the presence of the environmental committee (Env_Comm) is measured using a dichotomous indicator. Following a similar measurement approach used in previous research, the Env_Comm variable is defined as a binary variable equal to "1" if the organization has an operational environmental committee during the analyzed period and "0" if it does not (Martínez-Ferrero et al., 2021).

4.2.2.5 Network Centrality

One requirement for companies listed on the Mexican Stock Exchange (Bolsa Mexicana de Valores, BMV) and the Institutional Stock Exchange (Bolsa Institucional de Valores, BIVA) is to report on the composition of their board of directors. Their annual reports list the members who served each company. The members' data were collected manually by consulting each of the annual reports of the companies listed on the BMV and BIVA for the period 2016-2022. After collecting the names of each member of the sample of 71 companies, a process was developed to determine the total number of shared directors for each company. Subsequently, the calculation of companies' centrality in Mexico's stock exchange network began.

The centrality degree is a fundamental concept in organizational network analysis, introduced by Freeman (1978). This variable measures the importance and influence of a particular node within a network, providing quantitative insight into its position relative to other nodes (Macaulay et al., 2018). Measuring centrality is essential for understanding how information, communication, and power flow through an interconnected network of actors (Takes & Heemskerk, 2016). In line with the theoretical arguments developed in H5, this measure also captures firms' exposure to shared reporting practices and reputational pressures, which may influence the quality and credibility of carbon disclosure.

4.2.2.6 Family Ownership

Family-controlled companies are those in which ownership and management are concentrated within a family unit. Specifically, a company is considered family-owned when controlling shareholders and their family, either through blood or marriage ties, own 5% or more of the company's stock, and at least one of them holds the position of CEO, chairman of the board, vice president, or registered member of the board of directors (Villalonga & Amit, 2006).

The measurement of the family ownership variable aims to identify and categorize companies in which a family unit strongly influences control and decision-making. This approach considers both shareholding and the occupation of key leadership positions in the company by members of the owning family. The choice of a 5% or higher threshold for share ownership and leadership presence is based on previous research indicating that this level of participation is indicative of significant control and influence over the company (Choi et al., 2015). This threshold is consistent with prior literature and reflects meaningful ownership influence in contexts with concentrated ownership structures, such as emerging markets.

Overall, the variables operationalize the study's theoretical framework by capturing how corporate governance mechanisms, MD, ownership structure, and network centrality jointly influence the quality of carbon disclosure.

4.2.3 Control Variables

Corporate governance, financial, and industry-related variables were used as control variables. Firstly, corporate governance mechanisms such as board size (B_size) (Cheng, 2008) and the industry to which company i belongs (Borghei et al., 2016; Zhou et al., 2018) were added. Then, within the financial variables, company size (F_size) (Córdova et al., 2018), profitability (ROA) (Ben-Amar et al., 2017), and financial leverage (Lev) (Ganda, 2018; Hahn et al., 2015) were included.

The size of the board of directors plays a crucial role in decision-making and prioritizing environmental matters (Nguyen & Faff, 2006). The various dynamics and perspectives on the board can influence the company's willingness to disclose its carbon footprint. Additionally, this willingness is influenced by disclosure demands and expectations specific to each industry. In carbon-intensive sectors, the pressure to disclose environmental information is higher (Alsaifi et al., 2020). Table 1 presents the quantification of each variable under study, along with the respective data sources (see Table 1).

Table 1. Measures of the Variables

Variable	Definition / Operationalization	Measurement	Source
DC	Carbon disclosure quality based on firms' responses to CDP questionnaires	Ordinal (F to A) according to CDLI	CDP website
DG	Managerial discretion proxied by accrual-based earnings management	Discretionary accruals (Dechow et al., 1995)	Bloomberg
CEO_Duality	CEO simultaneously holds the position of Chair of the Board	Dummy (1 = duality; 0 = otherwise)	Bloomberg
B_Ind	Proportion of independent directors on the board	% of independent directors	Bloomberg
Env_Comm	Existence of a formal environmental/ sustainability committee	Dummy (1 = exists; 0 = otherwise)	Bloomberg
Centrality	Firm's degree of centrality based on board interlocks	Number of shared directors per firm-year	Annual reports

Variable	Definition / Operationalization	Measurement	Source
F_ Ownership	Family ownership with control and managerial involvement	Dummy (1 = ≥5% ownership + family member in top management/board; 0 = otherwise)	Annual reports
F_Size	Firm size	Natural logarithm of total assets	Bloomberg
B_Size	Board size	Total number of board members	Annual report
ROA	Firm profitability	Return on assets	Bloomberg
Lev	Financial leverage	Total debt/ total assets	Bloomberg
Industry dummies	Industry classification (Industrial, Materials, Consumer Staples, Telecom, Non-basic consumer goods)	Binary variables	Annual reports

Source: Prepared by the author.

4.3 Analysis Techniques and Data Robustness

4.3.1 Multivariate Ordinal Logistic Regression

Because the dependent variable in this study (DC) is measured in an ordinal form (CDLI levels), an ordinal logistic regression model is appropriate, as it accounts for the ordered nature of the categories without assuming a continuous distribution (Hair et al., 2014).

4.3.2 Econometric Model

Based on the literature and the discussions in the previous sections, the following econometric model is used in this research to test the formulated hypotheses:

$$P(y_{it} = j) = \beta_0 + \beta_1 DG_{it} + \beta_2 CEO\_Duality_{it} + \beta_3 B\_Ind_{it} + \beta_4 Env\_comm_{it} + \beta_5 Centrality_{it} + \beta_6 F\_Ownership_{it} + \beta_7 Controls_{it} + \mu_{it}$$

5. Results

5.1 Descriptive Results

This panel descriptive table provides more detailed information than cross-sectional statistics, especially when examining variable characteristics over time, including standard deviations, minimums, and maximums for the "Between" and "Within" methods. Table 2 displays the panel descriptives for this research (see Table 2).

Table 2. Panel Descriptives of Variables

Variable	Mean	Standard Deviation	Min	Max	N	n	T-bar
DC (VD)	2.05	2.57	0.00	8.00	308	71	4.34
DG (VI)	0.03	0.03	0.00	0.14	308	71	4.34
CEO_Duality (VI)	0.24	0.43	0.00	1.00	308	71	4.34
B_Ind (VI)	0.51	0.19	0.00	1.00	308	71	4.34
Env_Comm (VI)	0.22	0.42	0.00	1.00	308	71	4.34
Centrality (VI)	7.62	5.93	0.00	25.00	308	71	4.34
F_ownership (VI)	0.89	0.32	0.00	1.00	308	71	4.34
F_Size (VC)	11.32	1.28	7.36	15.76	308	71	4.34
B_Size (VC)	12.15	3.47	3.00	21.00	308	71	4.34
ROA (VC)	4.21	6.41	-46.90	35.67	308	71	4.34
Lev (VC)	33.27	20.37	0.00	88.42	308	71	4.34
Indust (VC)	0.31	0.46	0.00	1.00	308	71	4.34
Mat (VC)	0.22	0.42	0.00	1.00	308	71	4.34
PCF (VC)	0.28	0.45	0.00	1.00	308	71	4.34
ST (VC)	0.07	0.26	0.00	1.00	308	71	4.34
SyBCNB (VC)	0.11	0.32	0.00	1.00	308	71	4.34

Notes: DV: Dependent Variable; IV: Independent Variable; CV: Control Variable; N: number of observations; n: number of panels (groups); T-bar: average years for each panel.

CD: Carbon Disclosure, MG: Managerial Discretion; CEO_Duality: CEO Duality; B_Ind: Board Independence; Env_Comm: Environmental Committee; Centrality: Network Centrality; F_Ownership: Family Ownership; F_Size: Firm Size; B_Size: Board Size; ROA: Return on Assets; Lev: Financial Leverage; Indust: Industrial; Mat: Materials; PCF: Fast-Moving Consumer Goods; ST: Telecommunications Services; SyBCNB: Non-Basic Consumer Goods and Services

Source: Prepared by the author.

As shown in Table 2, most variables have 308 observations, with 71 groups (companies) per year. Regarding the normality assumption for the data, it is important to note that it is optional in ordinal logistic regression. This is due to the inherent peculiarities of the variables involved and the estimation methodology employed. In this sense, the variables do not need to be normally distributed to conduct an ordinal logistic regression analysis appropriately (Hair et al., 2014).

5.2 Statistical Analysis and Model Robustness

Following the methodology proposed by Dahlmann et al. (2019) for endogeneity, the first stage involved estimating the probability that organizations implement practices related to MD, CEO duality, corporate governance, network centrality, and family ownership. Preliminary findings from the model suggest that the quality of carbon emissions disclosure is not a statistically significant predictor in three of the six analyzed models ($\beta = -0.049$, $P > z = 0.539$). Multicollinearity was also tested using the variance inflation factor (VIF) method, which indicated no multicollinearity among these variables ($VIF < 3.3$). Finally, tests for heteroscedasticity and serial autocorrelation were conducted using the Breusch-Pagan and Wooldridge tests (Wooldridge, 2010), respectively (Breusch & Pagan, 1980; Greene, 2018). Both tests provided evidence of heteroscedasticity and serial autocorrelation.

Given that the dependent variable (DC) is ordinal, the primary estimation approach in this study is the ordinal logistic regression model. However, to address heteroscedasticity and serial autocorrelation and to assess the robustness of the results, the Feasible Generalized Least Squares (FGLS) technique is additionally employed as a complementary estimation strategy. In this context, FGLS treats the dependent variable as continuous, thereby correcting these econometric issues and providing a robustness check for the main findings.

By transforming the original data, the FGLS method seeks to eliminate or reduce the effects of heteroscedasticity and autocorrelation, resulting in a model that satisfies the classical regression assumptions and yields more reliable and efficient estimators (Greene, 2018).

The results from both the ordinal logistic regression and FGLS models are consistent in direction and statistical significance, supporting the robustness of the empirical findings.

Seven regression models were constructed using the Feasible Generalized Least Squares (FGLS) method. Table 3 and Table 3a present the results from the models analyzed (see Table 3 and Table 3a). Regarding the developed models, Model 1 was developed to corroborate the effect of control variables on the dependent variable (DC).

Table 3. Regression Models using the Feasible Generalized Least Squares Method (FGLS)

	Model 1			**Model 2**			**Model 3**			**Model 4**		
DC	β	S.E.	P>z	β	S.E.	P>z	β	S.E.	P>z	β	S.E.	P>z
DG				-1.038	4.681		-0.842	4.698		0.975	4.708	
CEO_Duality							-0.138	0.290		-0.253	0.291	
B_Ind										1.668	0.672	**
Env_Comm												
Centrality												
F_ownership												
F_Size	0.811	0.102	***	0.807	0.103	***	0.808	0.103	***	0.829	0.102	***
B_Size	0.147	0.039	***	0.147	0.039	***	0.149	0.039	***	0.162	0.039	***
ROA	0.034	0.020	*	0.034	0.020	*	0.034	0.020	*	0.032	0.020	
Lev	0.016	0.007	**	0.016	0.007	**	0.016	0.007	**	0.013	0.007	**
Indust	0.241	0.427		0.237	0.427		0.205	0.432		0.174	0.428	
Mat	0.660	0.458		0.649	0.460		0.620	0.464		0.637	0.460	
PCF	0.352	0.444		0.332	0.453		0.307	0.456		0.394	0.453	
ST	0.272	0.592		0.257	0.596		0.231	0.598		0.234	0.592	
SyBCNB (omitted)												
_cons	-9.927	1.147	***	-9.847	1.203	***	-9.823	1.203	***	-11.027	1.286	***
N° obs	308			308			308			308		
N° groups	71			71			71			71		
Obs per group	1-7			1-7			1-7			1-7		
Wald Chi2(8) =	139.44			139.51			139.84			148.81		
Prob > chi2 =	0.0000			0.0000			0.0000			0.0000		

Source: Prepared by the author.

Table 3a. Extension of Regression Models using the Feasible Generalized Least Squares Method (FGLS)

	Model 5			**Model 6**			**Model 7**		
DC	β	S.E.	P>z	β	S.E.	P>z	β	S.E.	P>z
DG	1.288	4.592		0.060	4.575		0.925	4.555	
CEO_Duality	-0.162	0.285		-0.379	0.295		-0.236	0.300	
B_Ind	1.344	0.660	**	1.839	0.684	**	1.797	0.679	**
Env_Comm	1.188	0.297	***	0.977	0.307	***	0.884	0.307	**
Centrality				-0.072	0.029	**	-0.056	0.030	*
F_ownership							-0.956	0.430	**
F_Size	0.866	0.100	***	0.925	0.102	***	0.846	0.107	***
B_Size	0.148	0.039	***	0.213	0.047	***	0.218	0.046	***
ROA	0.024	0.020		0.021	0.020		0.018	0.019	
Lev	0.008	0.007		0.012	0.007	*	0.008	0.007	
Indust	0.117	0.418		0.097	0.414		-0.002	0.413	
Mat	0.550	0.449		0.709	0.449		0.665	0.446	
PCF	0.357	0.441		0.161	0.444		0.127	0.441	
ST	0.503	0.581		0.537	0.576		0.611	0.572	
SyBCNB									
_cons	-11.168	1.255	***	-12.269	1.321	***	-10.538	1.525	***
N° obs	308			308			308		
N° groups	71			71			71		
Obs per group	1-7			1-7			1-7		
Wald Chi2(8) =	172.49			181.9			189.76		
Prob > chi2 =	0.0000			0.0000			0.0000		

Note: ***p<0.01 **p<0.05 *p<0.1

Source: Prepared by the author.

Next, the first independent variable (DG) is included in Model 2. In this case, including only the first predictor variable yielded a negative coefficient (β = -1.038) with no significant effect (P> z = 0.825). This value changes from Model 4 onwards, with a positive sign in subsequent models. In Model 3, the second predictor variable (CEO_ Duality) was included, with a coefficient (β = -0.138) and p-value (P > z = 0.633), indicating

no statistical significance for the dependent variable. Unlike Model 1, the previous predictor variable, CEO_Duality, shows a consistently negative effect in the remaining models. For Model 4, the variable B_Ind was added, which showed a positive and significant relationship with DC (β = 1.669, P > z = 0.013). As with the previous variable, B_Ind did not lose significance or change sign in subsequent models.

Moving to Model 5, the Env_Comm variable was added, which has the most significant value for DC in these models (β = 1.189, P > z = 0.000). Similarly, its results remained consistent. Subsequently, Model 6 was analyzed, including the Centrality variable. This variable showed a significant but contrary-to-expected effect, negatively impacting DC. Finally, to test the hypotheses, Model 7 was analyzed, which includes all the study variables, including family ownership. The findings of this model allow decisions to be made about the rejection or non-rejection of the hypotheses. Given the ordinal logistic specification, coefficients can be interpreted in terms of odds ratios (exp(β)), indicating the change in the likelihood of moving to a higher category of the dependent variable.

Starting with H1, it is observed that the direction of the effect is positive, contrary to what was proposed in the hypothesis development, and its p-value does not show adequate significance (β = 0.925 and P>z = 0.839). Continuing with H2, Model 7 shows an effect consistent with the hypothesis developed in the hypothesis development section; as with the previous variable, it lacks statistical significance (β = -0.235, P > z = 0.432), so H2 is rejected. Regarding H3, B_Ind showed a significant effect in the theoretically predicted direction (β = 1.797, P > z = 0.008), supporting H3. In odds-ratio terms, this implies that firms with higher board independence are approximately six times more likely to achieve higher levels of carbon disclosure quality. Similarly, for H4, Env_Comm showed a positive and significant effect on the quality of carbon disclosure (β = 0.883, P > z = 0.004), supporting H4. This suggests that firms with environmental committees are about 2.4 times more likely to achieve higher disclosure levels.

Moving on to H5, the analysis yielded an interesting result for centrality since, although it showed a significant effect on the dependent variable, it was in the opposite direction (negative effect) (β = -0.055 and P>z = 0.066) to what was proposed in the theoretical section, which is why H5 was rejected. This indicates a slight reduction (5%) in the likelihood of reaching higher disclosure categories. Similarly, F_Ownership showed a significant effect but was inconsistent with the hypothesis development (β = -0.955, P > z = 0.026), so H6 had to be rejected. This result implies a substantial reduction (around 62%) in the likelihood of achieving higher disclosure quality.

6. Discussion

Through the theoretical lenses of agency theory and institutional theory, this research aimed to shed light on the mechanisms and underlying forces that shape decisions and practices regarding the quality of carbon disclosure in the Mexican business context. Thus, the first hypothesis suggested that MD, as measured by earnings management, would diminish the quality of companies' carbon disclosure listed on the Mexican stock market. However, the results obtained do not support this expectation. Although the relationship shows a positive sign, contrary to expectations, no significant effect is observed between earnings management and the quality of carbon disclosure, so H1 is rejected.

The second hypothesis is related to CEO duality, for which, in line with agency theory, a negative effect on the quality of carbon disclosure was proposed, appealing to phenomena inherent to the CEO duality phenomenon, such as power concentration in one person, lack of checks and balances (Walls & Hoffman, 2013), as well as a potential risk of conflicts of interest between management and shareholders or interest groups (Khlif et al., 2021).

However, similar to the first hypothesis, this paper's findings show results in the expected direction (negative), but they do not reach statistical significance, leading to the rejection of H2. In the literature, studies in developed countries, specifically the United States, such as Walls and Hoffman (2013), have found no statistically significant effect between these two variables. They argue that this concentration of power may affect decision-making and organizational behavior, thereby limiting the influence of independent directors. Similarly, in developing countries, a non-significant relationship can be found both in Latin America (Briano-Turrent & Saavedra-García, 2015) and in Malaysia (Ahmad et al., 2017), attributing it mainly to the lack of separation between the roles of CEO and chairperson, which may lead to less attention to CSR reporting, as the CEO's focus is primarily on operational and financial performance.

These results should be interpreted with caution, as the lack of statistical significance does not provide sufficient evidence to draw definitive theoretical implications about governance dynamics. These first two hypotheses have significant implications for agency theory, particularly for the "principal-principal" approach (Husted & Sousa-Filho, 2019). Rather than indicating a confirmed shift in theoretical frameworks, these findings may suggest a potential context-specific dynamic in which traditional monitoring mechanisms do not strongly influence disclosure quality.

The lack of pressure on managers to improve carbon disclosure could be cautiously interpreted as an alignment of interests between key corporate players (shareholders and managers) with short-term goals. However, this relationship is not directly tested in the empirical model. This could contribute to the literature on agency theory by suggesting that, in specific contexts, such as the Mexican one, the "principal-principal" approach may offer a complementary perspective to the traditional "principal-agent" conflict, which focuses more on the long term (Peng & Sauerwald, 2013), rather than implying its substitution.

The results for H3 reveal that board independence positively and significantly affects the quality of carbon disclosure by Mexican companies listed on the stock market, so this hypothesis is not rejected. This positive relationship between board independence and the quality of carbon disclosure supports the formulated hypothesis. It suggests that having an independent board of directors can foster more transparent disclosure practices and a commitment to environmental issues (García-Sánchez *et al.*, 2018).

As for H4, a positive effect was hypothesized between the presence of an environmental committee and the quality of carbon disclosure. The results of this study showed a positive and significant effect, which does not invalidate H4. It is worth noting that the studies in the literature were all conducted on companies in developed countries. To the best of this author's knowledge, this study contributes to the limited literature examining the presence of an environmental committee and the quality of environmental disclosure, specifically carbon disclosure, in the context of a developing country. The most similar study is by Martínez-Ferrero et al. (2021), which finds that establishing a CSR committee is crucial for managing CSR-related opportunities and risks, ensuring the achievement of corporate objectives, and meeting stakeholders' needs and demands.

Regarding the fifth hypothesis, which posits that companies' centrality would positively affect the quality of carbon disclosure, the results yielded an unexpected conclusion. It was found that firm centrality has a significant but negative effect on the quality of carbon disclosure, so the hypothesis is rejected. This implies that, contrary to the initial hypothesis (H5), more central companies in the Mexican business network tend to provide lower-quality carbon disclosure. These results, which differ from expected theoretical relationships, should be interpreted with caution. While previous literature generally suggests that network centrality may facilitate the dissemination of practices, its specific effect on disclosure quality remains less clear, which may help explain the observed divergence.

Several alternative explanations should be considered in this particular context, including measurement limitations in capturing network centrality or model specification effects that may influence the observed relationship. Therefore, these findings highlight the need for further research on the role of interorganizational networks in shaping disclosure quality. Although it is possible to consider that network position may interact with managerial behavior, such as discretion in disclosure practices, this mechanism is not directly tested in this study and should be interpreted as exploratory.

Finally, the results for H6 contradicted expectations, indicating a significant negative effect on the quality of carbon disclosure; thus, H6 is rejected. These results are surprising, primarily because most of the study's subject companies are family-owned and have long been present in the Mexican market (San Martin-Reyna & Duran-Encalada, 2012). Therefore, it was expected that firms would demonstrate a strong commitment to social welfare and normative pressures, taking actions to benefit the environment, such as improving the quality of carbon disclosure. However, the results showed the opposite: family-owned companies reduced the quality of carbon disclosure. These findings may reflect competing theoretical mechanisms in which socioemotional wealth considerations coexist with incentives for opacity and for the preservation of control. Consequently, the negative relationship should be interpreted as context-dependent rather than as definitive evidence of a single underlying explanation.

7. Conclusions

This study reveals significant findings on the determinants of carbon disclosure quality among Mexican companies involved in the CDP and listed on the Mexican stock market. Firstly, it has been determined that MD and duality do not significantly affect the quality of carbon disclosure. The results should be interpreted with caution, as the absence of statistical significance does not imply the absence of underlying governance dynamics; rather, it suggests that their effects may be context-dependent or influenced by other organizational factors.

In contrast, the findings demonstrate that board independence and the presence of an environmental committee have a positive and significant impact on the quality of carbon disclosure. This suggests that having an independent board and forming committees dedicated to environmental issues fosters greater accountability and transparency regarding carbon emissions and sustainability. More broadly, these

results highlight a pattern in which internal governance mechanisms play a more consistent role in enhancing disclosure quality.

Furthermore, the results show that network centrality and family ownership negatively affect the quality of carbon disclosure among the companies studied. These findings highlight the importance of considering context and ownership structure when analyzing environmental disclosure quality. Rather than suggesting an inherent limitation, these results may reflect differences in incentives, monitoring effectiveness, and strategic priorities associated with ownership, concentration, and network positioning.

Overall, the study contributes to the literature by integrating corporate governance, MD, and network perspectives in an emerging-market context, thereby providing a more comprehensive understanding of the determinants of carbon disclosure quality. From a practical perspective, the findings suggest that strengthening governance mechanisms may be more effective than relying solely on ownership structures or network position to improve disclosure practices. From a policy perspective, these results indicate that regulatory efforts to enhance transparency may benefit more from promoting governance mechanisms than from relying exclusively on mandatory disclosure requirements.

Finally, some limitations should be acknowledged, including the use of earnings management as a proxy for MD, the ordinal nature of the dependent variable, and the complementary use of alternative estimation techniques. Additionally, the focus on firms involved in CDP may limit the generalizability of the findings, as these companies are more likely to exhibit greater transparency and stakeholder engagement. Future research could explore different measures and contexts to further validate and extend these findings.

References

Ahmad, N. B., Rashid, A., & Gow, J. (2017). CEO Duality and Corporate Social Responsibility Reporting: Evidence from Malaysia. Corporate Ownership and Control, 14(2), 69–81. https://doi.org/10.22495/cocv14i2art7

Alsaifi, K., Elnahass, M., & Salama, A. (2020). Market Responses to Firms' Voluntary Carbon Disclosure: Empirical Evidence from the United Kingdom. Journal of Cleaner Production, 262, 121377. https://doi.org/10.1016/j.jclepro.2020.121377

Al-Shaer, H., Albitar, K., & Liu, J. (2023). CEO Power and CSR-Linked Compensation for Corporate Environmental Responsibility: UK Evidence. Review of Quantitative Finance and Accounting, 60(3), 1025–1063. https://doi.org/10.1007/s11156-022-01118-z

Amiraslani, H., Deller, C., Ittner, C. D., & Keusch, T. (2025). Board Risk Oversight and Environmental and Social Performance, Journal of Accounting and Economics, 79(2-3), 101754. https://doi.org/10.1016/j.jacceco.2024.101754

Ammer, M. A., Aliedan, M. M., & Alyahya, M. A. (2020). Do Corporate Environmental Sustainability Practices Influence Firm Value? The Role of Independent Directors: Evidence from Saudi Arabia. Sustainability, 12(22), 1–21. https://doi.org/10.3390/su12229768

Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board Gender Diversity and Corporate Response to Sustainability Initiatives: Evidence from the Carbon Disclosure Project. Journal of Business Ethics, 142(2), 369–383. https://doi.org/10.1007/s10551-015-2759-1

Beneish, M. D. (2001). Earnings Management: A Perspective. Managerial Finance, 27(12), 3–17. https://doi.org/10.1108/03074350110767411

Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. (2010). Socioemotional Wealth and Corporate Responses to Institutional Pressures: Do Family-Controlled Firms Pollute Less? Administrative Science Quarterly, 55(1), 82–113. https://doi.org/10.2189/asqu.2010.55.1.82

Berrone, P., & Gomez-Mejia, L. R. (2009). Environmental Performance and Executive Compensation: An Integrated Agency-Institutional Perspective. Academy of Management Journal, 52(1), 103–126. https://doi.org/10.5465/amj.2009.36461950

Bolsa Institucional de Valores (BIVA). (s.f.). Emisoras inscritas. https://www.biva.mx/empresas/emisoras_inscritas/emisoras_inscritas

Borghei, Z. (2021). Carbon Disclosure: A Systematic Literature Review. Accounting & Finance, 61(4), 5255–5280. https://doi.org/10.1111/acfi.12757

Borghei, Z., Leung, P., & Guthrie, J. (2016). The Nature of Voluntary Greenhouse Gas Disclosure: An Explanation of the Changing Rationale: Australian Evidence. Meditari Accountancy Research, 24(1), 111–133. https://doi.org/10.1108/MEDAR-02-2015-0008

Breusch, T. S., & Pagan, A. R. (1980). The Lagrange Multiplier Test and Its Applications to Model Specification in Econometrics. The Review of Economic Studies, 47(1), 239–253. https://doi.org/10.2307/2297111

Briano-Turrent, G. del C., & Saavedra-García, M. L. (2015). La composición del consejo de administración y la estructura accionaria como factores explicativos de la transparencia en el gobierno corporativo en Latinoamérica: evidencia en empresas cotizadas de Argentina, Brasil, Chile y México. Estudios Gerenciales, 31, 275–286. https://www.elsevier.es/es-revista-estudios-gerenciales-354-articulo-la-composicion-del-consejo-administracion-S012359231500011X

Briseño-García, A., William Husted, B., & Arango-Herera, E. (2022). Do Birds of a Feather Certify Together? The Impact of Board Interlocks on CSR Certification Homophily. Journal of Business Research, 144, 336–344. https://doi.org/10.1016/j.jbusres.2022.01.080

Callery, P. J., & Perkins, J. (2021). Detecting False Accounts in Intermediated Voluntary Disclosure. Academy of Management Discoveries, 7(1), 40–56. https://doi.org/10.5465/amd.2018.0229

Carbon Disclosure Project (CDP). (s.f.). https://cdp.net/en/data/scores

Charumathi, B., & Rahman, H. (2019). Do Women on Boards Influence Climate Change Disclosures to CDP? Evidence from Large Indian Companies. Australasian Accounting, Business and Finance Journal, 13(2), 5–31. https://doi.org/10.14453/aabfj.v13i2.2

Chavarín-Rodríguez, R. (2011). Los grupos económicos en México a partir de una tipología de arquitectura y gobierno corporativos. Una revisión de sus explicaciones teóricas. El Trimestre Económico, 78(309), 193–234. https://doi.org/10.20430/ete.v78i309.31

Chavarín-Rodríguez, R., & Ríos, J. G. (2018). Los diez mayores grupos económicos de México y su impacto económico. CIMEXUS, 13(2), 175–199. https://cimexus.umich.mx/index.php/cimexus/article/view/295

Cheng, S. (2008). Board Size and the Variability of Corporate Performance. Journal of Financial Economics, 87(1), 157–176. https://doi.org/10.1016/j.jfineco.2006.10.006

Choi, Y. R., Zahra, S. A., Yoshikawa, T., & Han, B. H. (2015). Family Ownership and R&D Investment: The Role of Growth Opportunities and Business Group Membership. Journal of Business Research, 68(5), 1053–1061. https://doi.org/10.1016/j.jbusres.2014.10.007

Clarkson, P. M., Li, Y., Richardson, G. D., & Vasvari, F. P. (2008). Revisiting the Relation Between Environmental Performance and Environmental Disclosure: An Empirical Analysis. Accounting, Organizations and Society, 33(4–5), 303–327. https://doi.org/10.1016/j.aos.2007.05.003

Comyns, B., & Figge, F. (2015). Greenhouse Gas Reporting Quality in the Oil And Gas Industry. Accounting, Auditing & Accountability Journal, 28(3), 403–433. https://doi.org/10.1108/AAAJ-10-2013-1498

Córdova, C., Zorio-Grima, A., & Merello, P. (2018). Carbon Emissions by South American Companies: Driving Factors for Reporting Decisions and Emissions Reduction. Sustainability, 10(7), 1–16. https://doi.org/10.3390/su10072411

Cumpean-Luna,J., Briseño, A., & Arango, E. (2021). Gestión de ganancias en el riesgo de quiebra de las empresas públicas mexicanas. Revista de Ciencias Sociales, 27(1), 127-143. https://doi.org/10.31876/rcs.v27i1.35302

Cumpean-Luna, J., Briseño, A., & Zorrilla Del Castillo, A. L. (2022). To Disclose or Not to Disclose? A Bibliometric Analysis of Carbon Disclosure [¿Divulgar o no divulgar? Un análisis bibliométrico de la divulgación de carbono]. Trascender: Contabilidad y Gestión, 7(21), 143-165. https://doi.org/10.36791/tcg.v7i21sept-dic.178

Dahlmann, F., Branicki, L., & Brammer, S. (2019). Managing Carbon Aspirations: The Influence of Corporate Climate Change Targets on Environmental Performance. Journal of Business Ethics, 158(1), 1–24. https://doi.org/10.1007/s10551-017-3731-z

Datt, R. R., Luo, L., & Tang, Q. (2019). The Impact of Legitimacy Threat on the Choice of External Carbon Assurance. Accounting Research Journal, 32(2), 181–202. https://doi.org/10.1108/ARJ-03-2017-0050

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1995). Detecting Earnings Management. The Accounting Review, 70(2), 193–225. https://www.jstor.org/stable/248303

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. American Sociological Review, 48(2), 147–160. https://doi.org/10.2307/2095101

Eisenhardt, K. M. (1989). Agency Theory: An Assessment and Review. Academy of Management Review, 14(1), 57–74. https://doi.org/10.2307/258191

Elsayih, J., Datt, R., & Hamid, A. (2021). CEO Characteristics: Do They Matter for Carbon Performance? An Empirical Investigation of Australian Firms. Social Responsibility Journal, 17(8), 1279–1298. https://doi.org/10.1108/SRJ-04-2020-0130

Elsayih, J., Tang, Q., & Lan, Y.-C. (2018). Corporate Governance and Carbon Transparency: Australian Experience. Accounting Research Journal, 31(3), 405–422. https://doi.org/10.1108/ARJ-12-2015-0153

Fernández-Gago, R., Cabeza-García, L., & Nieto, M. (2018). Independent Directors' Background and CSR Disclosure. Corporate Social Responsibility and Environmental Management, 25(5), 991–1001. https://doi.org/10.1002/csr.1515

Freeman, L. C. (1978). Centrality in Social Networks Conceptual Clarification. Social Networks, 1(3), 215–239. https://doi.org/10.1016/0378-8733(78)90021-7

Ganda, F. (2018). The Effect of Carbon Performance on Corporate Financial Performance in a Growing Economy. Social Responsibility Journal, 14(4), 895–916. https://doi.org/10.1108/SRJ-12-2016-0212

García, E. A. da R., Carvalho, G. M. de, Boaventura, J. M. G., & Souza Filho, J. M. de. (2020). Determinants of Corporate Social Performance Disclosure: a Literature Review. Social Responsibility Journal, 17(4), 445–468. https://doi.org/10.1108/SRJ-12-2016-0224

García-Sánchez, I. M., Martínez-Ferrero, J., & García-Benau, M. A. (2018). Integrated Reporting: The Mediating Role of the Board of Directors and Investor Protection on Managerial Discretion in Munificent Environments. Corporate Social Responsibility and Environmental Management, 26(1), 29–45. https://doi.org/10.1002/csr.1655

García-Sánchez, I. M., & Noguera-Gámez, L. (2017). Integrated Information and the Cost of Capital. International Business Review, 26(5), 959–975. https://doi.org/10.1016/j.ibusrev.2017.03.004

Garcia-Sanchez, I. M., Raimo, N., & Vitolla, F. (2020). CEO Power and Integrated Reporting. Meditari Accountancy Research, 29(4), 908-942. https://doi.org/10.1108/MEDAR-11-2019-0604

Gold, N. O., Taib, F. M., & Ma, Y. (2022). Firm-Level Attributes, Industry-Specific Factors, Stakeholder Pressure, and Country-Level Attributes: Global Evidence of What Inspires Corporate Sustainability Practices and Performance. Sustainability, 14(20). https://doi.org/10.3390/su142013222

Greene, W. H. (2018). Econometric Analysis (6th ed). Prentice Hall.

Hahn, R., Reimsbach, D., & Schiemann, F. (2015). Organizations, Climate Change, and Transparency: Reviewing the Literature on Carbon Disclosure. Organization and Environment, 28(1), 80–102. https://doi.org/10.1177/1086026615575542

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2014). Multivariate Data Analysis (7th ed.). Pearson Education Limited.

Hambrick, D. C., & Abrahamson, E. (2017). Assessing Managerial Discretion Across Industries: A Multimethod Approach. Academy of Management Journal, 38(5), 1427–1441. https://doi.org/10.5465/256864

Haque, F., & Ntim, C. G. (2020). Executive Compensation, Sustainable Compensation Policy, Carbon Performance and Market Value. British Journal of Management, 31(3), 525–546. https://doi.org/10.1111/1467-8551.12395

He, R., Luo, L., Shamsuddin, A., & Tang, Q. (2022). Corporate Carbon Accounting: A Literature Review of Carbon Accounting Research from the Kyoto Protocol to the Paris Agreement. Accounting & Finance, 62(1), 261–298. https://doi.org/10.1111/acfi.12789

Henriques, I., Husted, B. W., & Montiel, I. (2012). Spillover Effects of Voluntary Environmental Programs on Greenhouse Gas Emissions: Lessons from Mexico. Journal of Policy Analysis and Management, 32(2), 296-322. https://doi.org/10.1002/pam.21675

Herrero, M., Escoto, C., Manzo, L., & Ramírez, G. (2026). Environment & Climate Change Laws and Regulations Report 2026 Mexico. In D. Abrahams & T. Gillett (Eds.), Environment and Climate Change Law 2026: A Practical Cross-Border Resource to Inform Legal Minds (23rd ed.). International Comparative Legal Guides. https://iclg.com/practice-areas/environment-and-climate-change-laws-and-regulations/mexico

Hopwood, A. G. (2009). Accounting and the Environment. Accounting, Organizations and Society, 34(3–4), 433–439. https://doi.org/10.1016/j.aos.2009.03.002

Hossain, M., & Farooque, O. (2019). The Emission Trading System, Risk Management Committee and Voluntary Corporate Response to Climate Change: A CDP Study. International Journal of Accounting & Information Management, 27(2), 262–283. https://doi.org/10.1108/IJAIM-04-2017-0050

Hsueh, L. (2019). Opening up the Firm: What Explains Participation and Effort in Voluntary Carbon Disclosure by Global Businesses? An Analysis of Internal Firm Factors and Dynamics. Business Strategy and the Environment, 28(7), 1302–1322. https://doi.org/10.1002/bse.2317

Husted, B. W., & Sousa-Filho, J. M. de. (2019). Board Structure and Environmental, Social, and Governance Disclosure in Latin America. Journal of Business Research, 102, 220–227. https://doi.org/10.1016/j.jbusres.2018.01.017

Ienciu, I.-A., Popa, I. E., & Ienciu, N. M. (2012). Environmental Reporting and Good Practice of Corporate Governance: Petroleum Industry Case Study. Procedia Economics and Finance, 3, 961–967. https://doi.org/10.1016/S2212-5671(12)00258-4

International Financial Reporting Standards (IFRS®) Foundation. (2025). IFRS Sustainability Disclosure Standards (ISSB Standards): Application Around the World: Jurisdictional Profile: Mexico. https://www.ifrs.org/content/dam/ifrs/publications/sustainability-jurisdictions/pdf-profiles/mexico-ifrs-profile.pdf

Jaggi, B., Allini, A., Macchioni, R., & Zagaria, C. (2018). The Factors Motivating Voluntary Disclosure of Carbon Information: Evidence Based on Italian Listed Companies. Organization and Environment, 31(2), 178–202. https://doi.org/10.1177/1086026617705282

Jensen, M. C., & Meckling, W. H. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. Journal of Financial Economics, 3(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Jeswani, H. K., Wehrmeyer, W., & Mulugetta, Y. (2008). How Warm is the Corporate Response to Climate Change? Evidence from Pakistan and the UK. Business Strategy and the Environment, 17(1), 46–60. https://doi.org/10.1002/bse.569

Jiang, Y., Luo, L., Xu, J., & Shao, X. (2021). The Value Relevance of Corporate Voluntary Carbon Disclosure: Evidence from the United States and BRIC Countries. Journal of Contemporary Accounting & Economics, 17(3), 100279. https://doi.org/10.1016/j.jcae.2021.100279

Khan, M. K., Ammar Zahid, R. M., Saleem, A., & Sági, J. (2021). Board Composition and Social & Environmental Accountability: A Dynamic Model Analysis of Chinese Firms. Sustainability, 13(19). https://doi.org/10.3390/su131910662

Khlif, H., Samaha, K., & Amara, I. (2021). Internal Control Quality and Voluntary Disclosure: Does CEO Duality Matter? Journal of Applied Accounting Research, 22(2), 286–306. https://doi.org/10.1108/JAAR-06-2020-0114

Kılıç, M., & Kuzey, C. (2019). 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

Kolk, A., Levy, D., & Pinkse, J. (2008). Corporate Responses in an Emerging Climate Regime: The Institutionalization and Commensuration of Carbon Disclosure. European Accounting Review, 17(4), 719–745. https://doi.org/10.1080/09638180802489121

Krishnamurti, C., & Velayutham, E. (2018). The Influence of Board Committee Structures on Voluntary Disclosure of Greenhouse Gas Emissions: Australian Evidence. Pacific-Basin Finance Journal, 50, 65–81. https://doi.org/10.1016/j.pacfin.2017.09.003

Lewis, B. E. N. W., Walls, J. L., & Dowell, G. W. S. (2014). Difference in Degrees: CEO Characteristics and Firm Environmental Disclosure. Strategic Management Journal, 35(5), 712–722. https://doi.org/10.1002/smj.2127

Liao, L., Luo, L., & Tang, Q. (2015). Gender Diversity, Board Independence, Environmental Committee and Greenhouse Gas Disclosure. British Accounting Review, 47(4), 409–424. https://doi.org/10.1016/j.bar.2014.01.002

Litz, R. A. (1995). The Family Business: Toward Definitional Clarity. Family Business Review, 8(2), 71–81. https://doi.org/10.1111/j.1741-6248.1995.00071.x

Liu, N., Hu, H., & Wang, Z. (2022). The Relationship Between Institutional Pressure, Green Entrepreneurial Orientation, and Entrepreneurial Performance: The Moderating Effect of Network Centrality. Sustainability, 14(19), 12055. https://doi.org/10.3390/su141912055

Lu, J., Yu, D., Mahmoudian, F., Nazari, J. A., & Herremans, I. M. (2021). Board Interlocks and Greenhouse Gas Emissions. Business Strategy and the Environment, 30(1), 92–108. https://doi.org/10.1002/bse.2611

Luo, L. (2019). The Influence of Institutional Contexts on the Relationship Between Voluntary Carbon Disclosure and Carbon Emission Performance. Accounting & Finance, 59(2), 1235–1264. https://doi.org/10.1111/acfi.12267

Macaulay, C. D., Richard, O. C., Peng, M. W., & Hasenhuttl, M. (2018). Alliance Network Centrality, Board Composition, and Corporate Social Performance. Journal of Business Ethics, 151(4), 997–1008. https://doi.org/10.1007/s10551-017-3566-7

Martínez-Ferrero, J., Lozano, M. B., & Vivas, M. (2021). The Impact of Board Cultural Diversity on a Firm's Commitment Toward the Sustainability Issues of Emerging

Countries: The Mediating Effect of a CSR Committee. Corporate Social Responsibility and Environmental Management, 28(2), 675–685. https://doi.org/10.1002/csr.2080

Martínez-Ferrero, J., Villarón-Peramato, Ó., & García-Sánchez, I. M. (2017). Can Investors Identify Managerial Discretion in Corporate Social Responsibility Practices? The Moderate Role of Investor Protection. Australian Accounting Review, 27(1), 4–16. https://doi.org/10.1111/auar.12138

Matisoff, D. C., Noonan, D. S., & O'Brien, J. J. (2013). Convergence in Environmental Reporting: Assessing the Carbon Disclosure Project. Business Strategy and the Environment, 22(5), 285–305. https://doi.org/10.1002/bse.1741

Nguyen, H., & Faff, R. (2006). Impact of Board Size and Board Diversity on Firm Value: Australian Evidence. Corporate Ownership and Control, 4(2 A), 24–32. https://doi.org/10.22495/cocv4i2p2

Nguyen, B. D., & Nielsen, K. M. (2010). The Value of Independent Directors: Evidence from Sudden Deaths. Journal of Financial Economics, 98(3), 550–567. https://doi.org/10.1016/j.jfineco.2010.07.004

O'Donovan, G. (2002). Environmental Disclosures in the Annual Report: Extending the Applicability and Predictive Power of Legitimacy Theory. Accounting, Auditing & Accountability Journal, 15(3), 344–371. https://doi.org/10.1108/09513570210435870

Orazalin, N. (2020). Do Board Sustainability Committees Contribute to Corporate Environmental and Social Performance? The Mediating Role of Corporate Social Responsibility Strategy. Business Strategy and the Environment, 29(1), 140–153. https://doi.org/10.1002/bse.2354

Palmer, D. (1983). Broken Ties: Interlocking Directorates and Intercorporate Coordination. Administrative Science Quarterly, 28(1), 40. https://doi.org/10.2307/2392384

Peng, M. W., & Sauerwald, S. (2013). Corporate Governance and Principal–Principal Conflicts. Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199642007.013.0029

Peters, G. F., & Romi, A. M. (2014). Does the Voluntary Adoption of Corporate Governance Mechanisms Improve Environmental Risk Disclosures? Evidence from Greenhouse Gas Emission Accounting. Journal of Business Ethics, 125(4), 637–666. https://doi.org/10.1007/s10551-013-1886-9

Pitrakkos, P., & Maroun, W. (2020). Evaluating the Quality of Carbon Disclosures. Sustainability Accounting, Management and Policy Journal, 11(3), 553–589. https://doi.org/10.1108/SAMPJ-03-2018-0081

Prior, D., Surroca, J., & Tribó, J. A. (2008). Are Socially Responsible Managers Really Ethical? Exploring the Relationship between Earnings Management and Corporate Social Responsibility. Corporate Governance: An International Review, 16(3), 160–177. https://doi.org/10.1111/j.1467-8683.2008.00678.x

Pucheta-Martínez, M. C., & Gallego-Álvarez, I. (2019). An International Approach of the Relationship Between Board Attributes and the Disclosure of Corporate Social Responsibility Issues. Corporate Social Responsibility and Environmental Management, 26(3), 612–627. https://doi.org/10.1002/csr.1707

Radu, C., & Maram, S. (2020). The Value Relevance of Reported Carbon Emissions. Journal of Management and Governance, 25, 347-377. https://doi.org/10.1007/s10997-020-09547-5

Raimo, N., Vitolla, F., Marrone, A., & Rubino, M. (2020). The Role of Ownership Structure in Integrated Reporting Policies. Business Strategy and the Environment, 29(6), 2238–2250. https://doi.org/10.1002/bse.2498

Rashid, A., Shams, S., Bose, S., & Khan, H. (2020). CEO Power and Corporate Social Responsibility (CSR) Disclosure: Does Stakeholder Influence Matter? Managerial Auditing Journal, 35(9), 1279-1312. https://doi.org/10.1108/MAJ-11-2019-2463

Roychowdhury, S., Shroff, N., & Verdi, R. S. (2019). The Effects of Financial Reporting and Disclosure on Corporate Investment: A Review. Journal of Accounting and Economics, 68(2–3), 1–27. https://doi.org/10.1016/j.jacceco.2019.101246

San Martin-Reyna, J. M., & Duran-Encalada, J. A. (2012). The Relationship Among Family Business, Corporate Governance and Firm Performance: Evidence from the Mexican Stock Exchange. Journal of Family Business Strategy, 3(2), 106–117. https://doi.org/10.1016/j.jfbs.2012.03.001

Shen, Y., Su, Z. W., Huang, G., Khalid, F., Farooq, M. B., & Akram, R. (2020). Firm Market Value Relevance of Carbon Reduction Targets, External Carbon Assurance and Carbon Communication. Carbon Management, 11(6), 549–563. https://doi.org/10.1080/17583004.2020.1833370

Shropshire, C. (2019). Board Interlocks and Diversification Strategies. In D. D. Bergh (Ed.), Oxford Research Encyclopedia of Business and Management. Oxford University Press. https://doi.org/10.1093/acrefore/9780190224851.013.149

Suchman, M. C. (1995). Managing Legitimacy: Strategic and Institutional Approaches. Academy of Management Review, 20(3), 571–610. https://doi.org/10.2307/258788

Takes, F. W., & Heemskerk, E. M. (2016). Centrality in the Global Network of Corporate Control. Social Network Analysis and Mining, 6(1), 97. https://doi.org/10.1007/s13278-016-0402-5

Tang, S., & Demeritt, D. (2018). Climate Change and Mandatory Carbon Reporting: Impacts on Business Process and Performance. Business Strategy and the Environment, 27(4), 437–455. https://doi.org/10.1002/bse.1985

Velte, P. (2021). Environmental Performance, Carbon Performance and Earnings Management: Empirical Evidence for the European Capital Market. Corporate Social Responsibility and Environmental Management, 28(1), 42–53. https://doi.org/10.1002/csr.2030

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

Villalonga, B., & Amit, R. (2006). How Do Family Ownership, Control and Management Affect Firm Value? Journal of Financial Economics, 80(2), 385–417. https://doi.org/10.1016/j.jfineco.2004.12.005

Walls, J. L., & Hoffman, A. J. (2013). Exceptional Boards: Environmental Experience and Positive Deviance from Institutional Norms. Journal of Organizational Behavior, 34(2), 253–271. https://doi.org/10.1002/job.1813

Wang, Y., & Oliver, J. (2009). Board Composition and Firm Performance Variance: Australian Evidence. Accounting Research Journal, 22(2), 196–212. https://doi.org/10.1108/10309610910987510

Wangrow, D. B., Schepker, D. J., & Barker, V. L. (2015). Managerial Discretion: An Empirical Review and Focus on Future Research Directions. Journal of Management, 41(1), 99–135. https://doi.org/10.1177/0149206314554214

Wooldridge, J. M. (2010). Econometric Analysis of Cross Section and Panel Data (2nd ed). The MIT Press. http://www.jstor.org/stable/j.ctt5hhcfr

Wu, K., Sorensen, S., & Sun, L. (2019). Board Independence and Information Asymmetry: Family Firms Vs Non-Family Firms. Asian Review of Accounting, 27(3), 329–349. https://doi.org/10.1108/ARA-05-2018-0110

Yang, H., Yao, D. (Troy), & Qu, X. (2022). How Does Independent Directors' Reputation Influence Pay-For-Performance? Evidence from China. Accounting & Finance, 62(1), 959–1007. https://doi.org/10.1111/acfi.12815

Yu, H.-C., Kuo, L., & Ma, B. (2020). The Drivers of Carbon Disclosure: Evidence from China's Sustainability Plans. Carbon Management, 11(4), 399–414. https://doi.org/10.1080/17583004.2020.1796142

Zhou, Z., Zhou, H., Peng, D., Chen, X., & Li, S. (2018). Carbon Disclosure, Financial Transparency, and Agency Cost: Evidence from Chinese Manufacturing Listed Companies. Emerging Markets Finance and Trade, 54(12), 2669–2686. https://doi.org/10.1080/1540496X.2018.1428796

The Anáhuac Journal, **Vol. 26, núm. 1, 2026.**
https://doi.org/10.36105/theanahuacjour.2026v26n1.3233
e3233 (pp. 147-180)

About the Author

Joel Cumpean holds a Ph.D. in Administrative Sciences from the Universidad Autónoma de Tamaulipas, where he currently serves as a research professor. His research focuses on corporate governance, business networks, and sustainability disclosure in organizations within emerging markets. He has published scientific articles in national and international indexed journals, including *Sustainability* and *Contaduría y Administración*. Doctor Cumpean has presented papers at various conferences such as the Academy of Management, the International Social Networks Conference (SUNBELT), and the ACACIA International Congress. Additionally, he is a member of the Sustainability and Social Finance Academic Group at the Universidad Autónoma de Tamaulipas (UAT-CA-150), recognized by the Teacher Professional Development Program (PRODEP).