Audit Committee Characteristics & Carbon Emissions Disclosure Level, is Industrial Sector Moderating the nexus? Evidence from Listed Egyptian market

Presented by

Prof. Ahmed Anis

Assistant Professor of Accounting

Faculty of Commerce ,Cairo University

Prof. Moustafa Zaki Metwalli

Assistant Professor, Department of Accounting, The Applied College in Al Kharj, Prince Sattam bin Abdulaziz University, Saudi Arabia,& Assistant Professor, Department of accounting and auditing, faculty of commerce,suez Canal university

2025 - 1446

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Objective: The current study aims to evaluate the impact of audit committee's characteristics (Financial Expertise, Female Directors, Size, Meetings, Independent) on carbon emission disclosures and the impact of AC characteristics and the industrial sector on the carbon emissions disclosures.

Methodology: The statistics encompassing ACC, CED, and other financial metrics were generated over a five-year period from 2019 to 2023 for all listed Egyptian enterprises dealing in industrial sector in general. Additionally, since we aimed to employ panel data analysis, the sample includes all enterprises CED information for a minimum of three years obtained from the Mubasher database, so final shamble 70 firms over a five-year, which resulted in recording 350 firm year observations during the period under study.

Results: From statistical results , it is obvious that the (FE , SIZE , MEET , INDEP) positive effect on CED where (β = .382, 0.488, 0.875, 0.546; Sig. < 0.05), this results mean that increasing the (ACFE , ACSZE , ACMEET , ACINDEP)) as increasing the level of CED. However the results of AC. Female not significant effect on the CED where (β = -.088; Sig. > 0.05).so, there are a significant relationship between ACC and CED.

Furthermore, the independent variables of (ACINDEP$\times$ INDU.SEC; ACSZE$\times$ INDU.SEC; ACMEET$\times$ INDU.SEC;ACFE$\times$ INDU.SEC, AC.EFFEC (& moderating role of the INDU.SEC and other control variables can explain (0.537 ; 0. 528; 0.559 ;0.789 ; 0.587; 0.728) from carbon disclosure emission levels in firms. This suggests that companies engaged in activities resulting in high carbon pollution are more likely to disclose information regarding elevated CE than those that are less sensitive, indicating that industry type positively influences CED.

Value: Although considerable literature exists on sustainability reporting in both developed and developing nations, empirical investigations examining the impact of audit committees on sustainability disclosure are scarce, particularly in developing countries. Developing countries frequently have information asymmetries, and companies there ignore the need for voluntary disclosure, including

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information on sustainability for stakeholders. According to earlier studies on CE, some businesses continue to overlook this matter; this has an impact on the company's credibility and investors' lack of trust. There is currently little research on this topic with research subjects in Egypt, and this study is intriguing to do because it confirms the findings of other studies.

. Introduction

According to (Tumwebaze et al. (2021), companies are facing high pressure to participate in social responsibility (SR) in order to preserve their credibility and address information asymmetry. In order to achieve the Sustainable Development Goals (SDGs), SR is essential (Latifah & Soewarno, 2023). Only 56% of sustainability reports in Africa comply with international best practices, in contrast to 74% in the United States and 82% in the EU (Appuhami & Tashakor, 2017; Lewa et al., 2025). In Africa, 8% of sustainability performance metrics are related to the environment, 11% to social issues, and 12% to economic issues. The rise is lopsided, concentrating solely on the good aspects while disregarding the bad ones. Since the company is the primary polluter, stakeholders have been exiting pressure on it to participate in environmental projects that proactively lower its carbon footprint. Concerns about the accuracy of carbon-related disclosures, especially when businesses are exempt from the law's requirement to reveal their carbon footprint, are another factor fueling this pressure (Meqbel et al., 2025). The SDGs' accomplishment has been impeded by non-financial enterprises' failure to report on sustainability, so the climatic catastrophe, environmental damage, and pollution are the results of this (Tumwebaze et al., 2021).

One of the factors that significantly and favorably affect environmental disclosure is the type of industry (Wahyuningrum et al., 2020). There are more industry categories that are categorized as sensitive than non-sensitive when it comes to delivering environmental information. Environmentally sensitive or intensive industries are under more pressure to minimize carbon emissions through increased research and development (R&D) operations (Choi et al., 2013; Evana et al.,

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2021).In this line, businesses are increasingly more concerned about environmental issues and are revealing information about them, such as carbon gas emissions. As a result, the number of businesses that voluntarily reveal information about their carbon emissions tends to rise every year. Carbon emissions disclosure(CED) gives businesses benefits like legitimacy and protection from risks like higher operating costs, decreased demand, reputational harm, legal action, and fines. Regretfully, while this kind of disclosure is optional, only businesses with particular traits are permitted to reveal the information. Since audit committees are crucial in overseeing corporate reporting, including disclosure practices, these particular traits might be audit committees (Chariri et al., 2018).

Generally speaking, the audit committee (AC) is the corporate governance structure that keeps an eye on disclosure and assesses how much voluntary disclosure has been given by the companies. Businesses are expected to meet stakeholder expectations through sustainability reporting as part of the audit committees' supervisory role. However, organizations' corporate image tends to improve when voluntary sustainability disclosures are made (Orazalin & Mahmood, 2018). A number of studies have particularly looked at how each of these audit committee characteristics (ACC) affects the quality of financial reporting (Al-Shaer et al., 2017). In the face of increasingly complex information, such expertise ensures the quality of financial reporting and improves the quality and credibility of information supplied to the market. For instance, it can be demonstrated that expert capability promotes earnings quality and that AC expertise promotes financial disclosure. According to a meta-analysis of 27 researches by (Pomeroy & Thornton.,2008), the most widely used metric for assessing AC quality is AC independence, which is generally agreed to improve the caliber of financial reporting. The benefits of ACs' diligence, as indicated by the number of meetings, have been highlighted by another line of research. AC quality may also be indicated by independence, dedication, and knowledge. According to earlier studies, these variables' interactions are probably going to be more pronounced than their individual parts. Therefore, our study uses

composite measures of AC quality, backed by sensitivity testing of the effects of individual components, to investigate the effects of AC characteristics on CED.

Although considerable literature exists on sustainability reporting in both developed and developing nations, empirical investigations examining the impact of audit committees on sustainability disclosure are scarce, particularly in developing countries. Developing countries frequently have information asymmetries, and companies there ignore the need for voluntary disclosure, including information on sustainability for stakeholders. In light of this, (Honey et al., 2025 ;Qureshi et al., 2020) expand on the data showing how AC attributes affect the amount and quality of ESG disclosures made by Australian energy sector companies . The question of whether AC quality regulation is actually necessary is one of the primary issues raised by the literature now in publication (Okolo &Sinebe 2025). AC is essential for reducing agency expenses and aligning owners' and managers' interests (Salehi et al., 2021).

According to earlier studies on CE, some businesses continue to overlook this matter; this has an impact on the company's credibility and investors' lack of trust. There is currently little research on this topic with research subjects in Egypt, and this study is intriguing to do because it confirms the findings of other studies. Thus, the following are some ways that current study adds to the corpus of existing knowledge. First, it assesses how AC characteristics, like the percentage of independent of directors and the meetings frequency, affect the caliber of CE disclosures. Second, since this aspect of CE disclosures is especially crucial in the setting of an ecologically sensitive industry, the current study presents the influence of AC characteristics and the industrial sector on the carbon emissions disclosures. For example, research has shown that sensitive industry firms' EC disclosure increases (decreases) their company value (risk) more than that of their rivals. Alternatively, enterprises in pollution-intensive industries can be identified by their carbon emissions, which are further characterized by sensitive higher than the other industry.

Therefore, the current study aims to evaluate the impact of AC characteristics (Financial Expertise, Female Directors, Size, Meetings, Independent) on CE disclosures and the impact of AC characteristics and the industrial sector on the carbon emissions disclosures over a five-year period from 2019 to 2023 for all listed Egyptian enterprises dealing in industrial sector in general. The rest of the study is organized as follows: the literature review and hypothesis development are presented in the second section; the data and materials are described in the third section; the empirical design is outlined in the fourth section; and the paper's findings are discussed in the fifth section.

2. Literature Review& Hypotheses Development

As part of their accountability for climate change, businesses are encouraged to reveal the carbon emissions they generate (Chariri et al., 2018). CED has drawn the attention of accounting researchers. Regretfully, prior research has focused on examining the impact of internal audit on emission disclosure and the impact of corporate climate change disclosure on performance (Liesen et al., 2017), although the researches have influenced the present conclusions about disclosure of carbon emissions, they fail to acknowledge the significance of ACC .In light of the paucity of research on audit committee characteristics (ACC) and sustainability report (SR), surveys (Al-Shaer et al., 2017) suggest that ACs ought to be involved in CSR. Additionally study (Chariri et al., 2018) attempts to explore the ways in which AC characteristics such as independence, expertise, and meetings affect disclosure of carbon emissions. Businesses can incorporate low carbon emission issues into their company plans by using the study's findings. The study (Adegboye et al., 2020) looks into how ACC affects sustainability disclosure in banks that are publicly traded in Nigeria. By examining the effect of (AC) on sustainability quality, this study expands on earlier research and improves the body of knowledge on sustainability performance. The AC primary duty is to support the board of directors in overseeing the organization's reporting obligations. The empirical findings of the study (Singhania & Bhan ,2024) examine the correlation between ownership systems and CE disclosure.

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According to institutional theory, the authors assert that institutional ownership significantly affects voluntary carbon disclosure, particularly in civil law jurisdictions and nations with established emission trading schemes (ETS). Also (Saha & Maji, 2025) seeks to investigate how these intangible assets impact the efficacy of ESG disclosure in mitigating carbon intensity (CI). This analysis concludes that, in general, ESG disclosure has a substantial adverse effect on CI . Also (Khuong et al., 2025) demonstrate that CEO power positively affects Corporate Disclosure Index (CDI), suggesting that CEOs may improve transparency to increase their reputation.Astudy (Isaboke et al., 2023) connection between firm performance (FP), industry environmental sensitivity, and carbon disclosures. Environmentally sensitive sectors have higher FP during the carbon disclosure period, even if environmental disclosure requirements are becoming more stringent. Kumari et al. (2022) indicate a strong positive association between lagged and present environmental disclosure scores.

Qaderi et al., (2023) seeks to address the gap that exists in research about the correlation between ACC and the level of CSR. The study's results indicate a positive and significant association among reporting on CSR and ACC independence, expertise. Where (Akermi & Ben .,2025) seek to elucidate the correlation between CO2 emissions disclosure and ACC, including auditor effort, permanence, and independence. The findings indicate a favorable correlation between CO2 disclosure and auditor effort. Nonetheless, CO2 disclosure is adversely affected by independence of auditors and tenure. This study aims to investigate the influence of AC characteristics on carbon emissions and performance (Meqbel et al., 2025). The results show that audit committee size, independence, and financial expertise have a beneficial impact on carbon disclosure, underscoring the significance of these characteristics in improving openness and accountability in CE reporting.. The impact of different ownership arrangements on the caliber of carbon emission disclosure in Nigeria is examined by (Oyerogba et al. (2025). According to research (Seth & Saxena., 2025), ownership concentration and carbon emission disclosure are negatively correlated. This implies that attaining sustainability performance

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requires AC independence and competency.. Based on the above , Previous studies((Pozzoli et al., 2022; Seth & Saxena, 2025; Biçer & Feneir, 2019; Albawwat et al., 2020; Dwekat et al., 2022; Meqbel et al., 2024) have investigated the ACC (financial expertise, female directors, independence, meetings, size). Where the AC evaluating the methodologies employed by management to quantify and CED, there by mitigating the risk of green washing, wherein companies may distort their environmental impact.

2.2.1. AC Financial Expertise & CED

According to (Chariri et al.,2018) AC members need to be financially literate in order to understand and assess financial statements. Additionally, AC members with financial competence were able to oversee management and auditors, guaranteeing the development of superior financial reporting. This would improve corporate reporting's transparency and lessen government issues with information sharing. AC members possessing accounting or financial competence are more inclined to identify errors in financial reporting or unethical business practices, as they are obligated to maintain professional ethical standards to safeguard their reputation. Moreover, AC possessing greater financial acumen are less inclined to permit firm management to overlook substantial misstatements (Appuhami & Tashakor, 2017). According to KPMG's (2021) guideline (Lewa et al., 2025), a minimum of one member of AC must possess financial literacy. The board shall convene frequently with at least one member of the AC who demonstrates current and adequate financial expertise, as mandated by the Corporate Governance Code (CCC) (Albawwat et al., 2020).

By addressing information gaps and improving the clarity of how management and AC members sort and report SR disclosure items, ACFE raises the caliber of SRs (Velte, 2023). These arguments imply that the company's financial reporting decisions, including the disclosure of carbon emissions, are heavily influenced by the audit committee's accounting and financial experience (Chariri et al., 2018).

2.2.2 AC female & CED

The advantages of having balanced gender diversity include enhanced decision-making and surveillance, enhanced oversight, stakeholder assurance, credibility and legitimacy, adherence to regulations, and congruence with societal norms (Chijoke et al., 2020). Tijjani & Yahaya (2023) asserted that female directors are frequently regarded as more diligent and ethical in their supervisory positions, resulting in enhanced monitoring of management and financial reporting. Previous study on gender diversity indicates that women exhibit greater financial conservatism, ethical adherence, and risk aversion compared to men (Agyei-Mensah, 2019).In the line ,(Adegboye et al., 2020)state to the Female directors often hold their roles in high esteem, dedicating greater effort to their responsibilities, which may improve efficacy in information dissemination and decision-making .The SR disclosure and oversight of the AC is enhanced by the presence of diverse genders inside the AC (Appuhami & Tashakor, 2017). a combination of both men and women on the committee integrates diverse human resources with distinct expertise and abilities, thereby enhancing the firm's creativity and creative capacity.

Empirical studies (Dilling & Caykoylu, 2019; Qaderi et al., 2023) have demonstrated a favorable correlation between AC gender diversity (ACGD) and sustainability reporting (SR), positing that ACGD enhances information symmetry and strengthens monitoring of social and environmental disclosures. Additionally (Alodat et al. ,2023) identified a positive correlation between (ACCG) and (SR)reporting, asserting that the efficacy of the audit committee is contingent upon the committee chairman, who facilitates the exchange of pertinent information and the approval of significant strategic decisions for the company. The responsibility for drafting financial statements rests with the chairwoman of the audit committee, making the ACCG integral to TBL disclosure (McLaughlin et al., 2021). On the opposite a negative association was identified between female AC members, where (Awen & Yahaya ,2023) observed that gender diversity may include possible

drawbacks, including tokenism, conflicts of interest, and ambiguous effects on performance related to sexual orientation.

2.2.3 AC Size & CED

AC size denotes the quantity of its members; it contributes a diverse array of talents, experiences, and vigor, hence enhancing the probability of addressing potential issues in the financial reporting process and completing the assignment in a timely manner (Biçer & Feneir, 2019). Olabisi (2022) asserted that larger committees can improve monitoring, identifying and resolving intricate financial issues, offering benefits such as more supervision, varied skills, and diminished CEO authority. They can also alleviate agency issues, ensuring that CEO remuneration is congruent with corporate success and shareholder value. Larger audit committees encounter difficulties in coordination, decision-making, and responsibility dilution, while also incurring elevated costs related to compensation, training, and administrative expenses, thereby aligning executive remuneration more closely with firm performance and shareholder interests (Hassan et al., 2022; Tijjani et al., 2023).In this line (Biçer & Feneir, 2019) posits that a larger AC is seen as an effective monitoring mechanism linked to more dependable and superior quality reporting and Large audit committees enhance supervisory roles and ethical disclosures, as indicated by (Appuhami & Tashakor .,2017; Buallay &AlDhaen .,2018; Qaderi et al. 2023; Tumwebaze et al. 2021) The balance between shareholder interests and social responsibility can be attained by increasing the number of advisory committees. A substantial and varied AC committee guarantees voluntary SR disclosure .Conversely, (Al-Shaer & Zaman .,2018) identified a negative causal association between AC and SR, contending that a substantial AC results in a diffusion of accountability, which yields suboptimal outcomes; a large AC is reluctant to embrace SEE disclosures and (Adegboye et al. ,2020) asserts that a minimum of three directors should be present on an audit committee to improve voluntary ethical disclosure.

2.2.4 AC Meeting & CED

Regular meetings between the committee and auditors are essential for effective communication, enabling the evaluation of financial statements and audit processes, as well as the enhancement of internal accounting controls and systems (Okolo & Sinebe, 2025). Measuring actual AC activity directly presents challenges, leading existing literature to predominantly rely on the frequency of AC meetings per year as a proxy for such activity or diligence (Sinebe & Edirin, 2023). Studies (Ha ,2022; Blay et al. ,2024) indicated that the frequency of meetings is perceived as an indicator of diligence and an engaged audit committee. This commitment allows the committee to concentrate on urgent matters and provide improved evaluations, thereby facilitating the identification of various misstatements in financial reporting, whether material or otherwise, also (Iheyen ,2021) asserted that the possession of knowledge and independence alone does not guarantee effectiveness; rather, it is contingent upon the diligence and activity of the audit committee .One important indicator of the effectiveness and engagement of AC directors in their duties is the frequency of meetings (Almarayeh et al., 2022)

Also regular meetings facilitate the timely provision of financial data to investors, thereby reducing information asymmetry and agency conflicts between owners and managers (Altin, 2024). Subsequent meetings of an AC should identify an improved monitoring tool that can motivate executives to perform their responsibilities effectively. Users require timely information to enable prompt reviews, which assist in making investment decisions; therefore, financial reports should be published immediately following the conclusion of the accounting period. Financial reports are regarded by market participants as a crucial tool for reducing information asymmetries among business stakeholders (Mili, et al., 2025). So, the frequency of AC meetings enhances directors' capacity to fulfill their monitoring responsibilities and improve corporate disclosures, including CSR. Moreover, prior studies indicated the significance of active audit committees and identified a positive correlation between the frequency of meetings and

increased voluntary disclosure (Biçer & Feneir, 2019). The findings of (Arif et al. , 2021) present a novel perspective on the relationship between ESG disclosures and AC attributes within sensitive industry firms. Findings indicate that AC, specifically meeting frequency, significantly impacts on CED for industrial sensitive firms.

2.2.5 AC Independence & CED

The independence of AC members has garnered attention in research because of its influence on monitoring effectiveness (Kushubakova & Strakhova, 2020). In response to ongoing corporate scandals and fraud, regulatory agencies established corporate governance rules to oversee activities and enhance best practices within firms (Hasan et al., 2020). The audit committee of firms is expected to maintain a high level of independence to ensure a reliable, unbiased audit and financial report. AC can significantly improve the reliability and transparency of financial reporting through the assurance of independence, experience, attentive oversight, effective communication, and a commitment to continuous improvement (Amahalu & Obi, 2020), this enhances investor trust, ensures regulatory compliance, and contributes to the overall stability and efficiency of financial markets . Compliance with regulations is closely linked to the audit committee's independence (Velte, 2023). By improving information symmetry, encouraging efficient corporate governance, and enabling a thorough assessment of the business's internal controls, ACI increases the firm's accountability (Al-Shaer & Zaman, 2018). Previous study (Lewa et al., 2025) on SR and ACI has produced contradictory empirical results. Additionally, when audit committee members remain impartial and free from management interference, sustainability and environmental disclosure gain credibility.

According to (Chariri et al. ,2018) AC independent are essential for keeping an eye on management, especially when it comes to the release of corporate data. Therefore, it is expected that efficient supervision by an impartial audit committee will increase management's incentive to provide correct and additional information. Particularly when it comes

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to the CED, AC independent shows a strong correlation with voluntary disclosure.

From the literature reviewed, the first hypothesis will be tested:

> *H1. There is a significant relationship between ACC and CED*

2.2.6 The Moderating Role of the Industrial Sector in the relationship between ACC and CED

Industries sensitive to carbon pollution are expected to have a significant impetus to their CED. This suggests that companies engaged in activities resulting in significant carbon pollution are more likely to disclose information regarding elevated CE than those that are less sensitive to such issues. This finding further substantiates the hypothesis that industry type positively influences CED (Evana et al., 2021). Kusumah ., et al. (2019) similarly indicates that industry type negatively affects the disclosure of CE. The study (Choi et al., 2013) reveals that industry type influences CED, where emission-intensive industries face stricter government oversight and are often politically sensitive, leading entities within these sectors to be more inclined to offer voluntary disclosures, including CE information. Prior studies (Andersen & Bams, 2022; Isaboke et al., 2023) indicates that industry classification and firm size are determinants that may lead to potential public pressure concerning environmental issues. Additionally, the research conducted by (Isaboke et al. ,2023) attention has been directed on industries recognized for their considerable pollution potential, as they are perpetually governed by environmental regulations.

It is hypothesized that firms responsible for toxic pollutants provide disclosures that exceed mandatory requirements. Toxic pollutants are regarded as superior environmental performers, particularly within the industrial sector, due to their greater transparency in disclosing information that is challenging for lower-performing firms to replicate. Consequently, they are positively perceived in the market (Isaboke et al., 2023). According to empirical data presented (Choi et al. (2013),

the kind of industry has an impact on carbon emission disclosure. Evana et al,(2021) study tackles the paucity of evidence on how R&D directly affects carbon emissions. In order to advance earlier talks on environmental performance, it attempts to investigate the relationship between R&D intensity and CE, taking industry type into account as a moderating component. In the line (Asmeri et al. ,2023) examine the impact of industry type on CED .The findings indicate that companies with operations sensitive to carbon pollution tend to report higher CE, and conversely, those less sensitive report lower emissions. The findings suggest that companies demonstrating greater sensitivity are more inclined to seek legitimacy from stakeholders than their less sensitive counterparts, with industry type significantly influencing CE. Literature has empirically demonstrated that ACC plays a crucial role in enhancing the quality of information and disclosures accessible to all stakeholders. Several studies, however, have identified an inverse effect or no effect of the industrial sector on the quality of disclosures over the medium and long term (Kumari et al., 2022).

 AC traditional role of monitoring financial behavior and reporting has expanded to include making sure that companies take a long-term, holistic approach to decision-making, considering how their operations and business practices affect ESG factors (Arif et al., 2021). Additionally, ACs are especially important for sensitive industry companies since their operations have a higher chance of creating environmental concerns, which can result in significant fines and penalties (Nazari et al., 2015). Exxon Mobil Corporation was required to pay US$5 billion to rebuild the impacted ecosystems and US$287 million in compensatory damages after the Exxon Valdez oil spill (Nelson, 2017).

Consequently, the essential function of an Audit Committee requires adequate autonomy and involvement to attain equilibrium between managerial objectives and stakeholder interests concerning CE disclosure in sensitive industry organizations. AC characteristics influence the CED of enterprises in sensitive industries. The findings reveal a discrepancy between SI and NSI, with SI exhibiting enhanced environmental performance (Garcia et al., 2017; Arif et al., 2021),

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Whereas current study expect that sensitive industry firms effect on relation between ACC (Financial Expertise, Female Directors, Size, Meetings, Independent) and CED, The second hypothesis will be examined in light of this conversation.

> *H2. There is a significant impact of industrial sector in relationship between ACC and CED*

3- Data and Material

3.1 Sample

Given that the industry sector produces waste that significantly affect the surrounding environment, industrial sector companies listed on the Egypt Stock Exchange are important subjects. The environmental report, which is included in the annual reports of these companies, explains how carbon emissions are disclosed. The current study aims to assess how ACC (Financial Expertise, Female Directors, Size, Meetings, Independent) effect on CED and we present the influence of ACC and the industrial sector on the CED in listed Egyptian companies .According to a study by Choi et al. (2013), CEs are produced by two different categories of industries: intense and non-intensive. Compared to non-intensive businesses, intensive industries are thought to be more environmentally responsible. However, non-intensive businesses like banking, real estate development, and retail are thought to be less vulnerable to carbon emissions (Choi et al., 2013; Evana et al., 2021), which means they engage in less research and development and disclose less carbon emissions.

The statistics were extracted from Mubasher database, utilized by academics, professionals, and practitioners worldwide. The statistics encompassing ACC, CED, and other financial metrics were generated over a five-year period from 2019 to 2023 for all listed Egyptian enterprises dealing in industrial sector in general. Additionally, since we aimed to employ panel data analysis by using (SPSS.26), the sample includes all enterprises CED information for a minimum of three years obtained from the Mubasher database, so final shamble 70 firms over a

five-year, which resulted in recording 350 firm year observations during the period under study.

3.2 control variables

1. *Independent variables*: To construct our *independent variables* of interest we follow Previous studies that investigated *the ACC*, including (AC.FE, AC.female , AC.size ,AC. meeting and AC.indep) . From this literature, current study illustrate this Characteristics, as following in table (2)

2. *Dependent variable* : Our *dependent variable* measure by using the CD Project Index checklist created by (Choi et al.,2013) the index carbon disclosure number elements serve as the basis for the count variable (Carbon Emission Disclosure). It consisted of 18 disclosure elements that were divided into five groups (Budiharta & Kacaribu, 2020).

Table(1): CED Checklist

Categories	Items
Climate change (CC): Risk and opportunity	1. CC1 - Evaluation/characterization of risk associated with climate change and measures implemented to mitigate risk.
	2. CC2 - Current and prospective evaluations/descriptions of the financial, economic, and opportunity ramifications of climate change
Accounting for greenhouse gas emissions (GHG)	3. GHG1: Describes the process used to measure greenhouse gas emissions. 4. GHG2: The existence of outside verification of the amount of greenhouse gas emissions, along with the criteria used and the verifying institution. 5. Total greenhouse gas emissions, or GHG3, are measured in metric tons of CO2-equivalent. 6. GHG4: Direct emissions of greenhouse gases for scope 1 and scope 2 or scope 3 disclosure. 7. GHG5: Source-by-source disclosure on greenhouse gas emissions. 8. Greenhouse Gas Emissions Disclosure (GHG6) by Facility or Class Level. 9. GHG7: Evaluation of GHG Emissions in Relation to the Previous Year
Accounting of energy consumption (EC)	10. EC1 — Aggregate energy consumption 11. EC2 – The energy computations derived from renewable sources. 12. EC3 - Disclosure categorized by type, facility, or class
Reduction of GHG emissions and costs (RC)	13. RC1 - Specifications of a strategy plan to mitigate GHG emissions 14. RC2 - Specification of level targets and annual greenhouse gas emission reductions. 15. RC3 – Decreases in emissions and expenditures or savings resulting from the reduction plan 16. RC4 - Future emission costs as a component of capital

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	expenditure planning
Carbon emission accountability (ACC)	17. ACC1 - A designation indicating that the committee board (or other governmental body) holds comprehensive accountability for actions pertaining to climate change. 18. ACC2 – Explanation of the process by which the board (or alternative governmental entity) evaluates the company's advancements in addressing climate change.

Source :(Choi et al., 2013 ; Budiharta& Kacaribu.,2020)

3. ***Mediator Variable****: the mediator Variable is Industrial Sector*, we use a dummy variable which takes 1 for the firms that operate in industrial sector and 0 otherwise (Jardak, & Ben Hamad, (2022).

4. ***Control variables***: Our model incorporates several ***control variables*** pertaining to firm characteristics, including (firm size; return on assets; leverage ratio; return on equity; board members and independent directors). Current study illustrate all variable in table (2).

Table (2): Variables definition

Variables	Type	Abbreviation	Definition	Reference
Audit committee financial expertise	Independent Variable	AC.FE	Count of members possessing a finance-related postgraduate degree or pertinent professional body membership	Zalata et al., 2018; Al-Shaer & Zaman, 2018; Elmaghri et al., 2019; Abbasi, et al,2024; Jibril, et al,2024). Lewa, et al,2025; Budiharta & Kacaribu.,2020).
female directors		*AC.female*	Number of female directors on ACs	
audit committee size		*AC.size*	Number of AC member	
audit committee meetings		*AC.meet*	Total number of meetings during the reporting period	
Audit committee independence		*AC.independent*	Number of independent nonexecutive directors	

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Level of carbon emissions disclosure	dependent Variable	Carbon_ Disc	Utilizing the CD Project Index checklist formulated by Choi et al. (2013). Seventeen disclosure elements were classified into five groups, as illustrated in Table 2. • Zero if carbon emissions are undisclosed. • Each item included in the financial report of the sample firm is assigned a score of 1.	Budiharta & Kacaribu, (2020)
Industrial Sector	Moderator Variable	Indust.Sec	The features of the company sector affect business performance. A dummy variable is employed, assigning a value of 1 to enterprises operating in the industrial sector and 0 to all others.	Jardak, & Ben Hamad, (2022).
company size	*CONTROL VARIABLES*	SIZE	quantified as the logarithm of total assets	Abbasi, et al,2024; Lewa, et al,2025; Al-Shaer, et al,2017; Jibril, et al,2024; Seth& Saxena, .,2025)
Leverage		LEV	total debt over total assets	
Return on Equity		ROE	The proportion of net income to equity held by shareholders.	
Return on Assets		ROA	net profit divided by total assets	
Board Size		BSIZE	measured by the total number of board members	
Board Independent		BIND	the proportion of independent directors on the board	

3.3 Models

To test our hypotheses, we use the following regression analysis models:

To predict the effect of ACC on CED Level, we can construct the Equations from (1) to (5) as following:

Carbon_Disc = α + β_1 AC.FE + β_2*Fsize* + β_3*ROA* + β_4 ROE +β_5 LEV + β_6 BSIZE + β_7 BIND + ϵt (1)

Carbon_Disc = α + β_1 *AC.female* + β_2*Fsize* + β_3*ROA* + β_4 ROE +β_5 LEV + β_6 BSIZE + β_6 BIND + ϵt (2)

Carbon_Disc = α + β_1 *AC.size* + β_2*Fsize* + β_3*ROA* + β_4 ROE +β_5 LEV + β_6 BSIZE + β_6 BIND + ϵt (3)

Carbon_Disc = α + β_1 *AC.meet* + β_2*Fsize* + β_3*ROA* + β_4 ROE +β_5 LEV + β_6 BSIZE + β_6 BIND + ϵt (4)

Carbon_Disc = $\alpha + \beta_1$ *AC.independent* $+ \beta_2$*Fsize* $+ \beta_3$*ROA* $+ \beta_4$ ROE $+\beta_5$ LEV $+ \beta_6$ BSIZE $+ \beta_6$ BIND $+ \mathcal{E}t$ (5)

Furthermore, to predict the effect of Industrial Sector on the relation between ACC and CED Level, we can construct the Equations from (6) to (10) as the following:

Carbon_Disc = $\alpha + \beta_1$ AC.FE $\times$ Indust.Sect $+ \beta_2$ AC.FE $+ \beta_3$ Indust.Sect $+\beta_4$*Fsize* $+ \beta_5$*ROA* $+ \beta_6$ ROE $+\beta_7$ LEV $+ \beta_8$ BSIZE $+ \beta_9$ BIND $+ \mathcal{E}t$ (6)

Carbon_Disc = $\alpha + \beta_1$ *AC.female* $\times$ Indust.Sect $+ \beta_2$ *AC.female* $+ \beta_3$ Indust.Sect $+\beta_4$*Fsize* $+ \beta_5$*ROA* $+ \beta_6$ ROE $+\beta_7$ LEV $+ \beta_8$ BSIZE $+ \beta_9$ BIND $+ \mathcal{E}t$ (7)

Carbon_Disc = $\alpha + \beta_1$ *AC.size* $\times$ Indust.Sect $+\beta_2$ *AC.size* $+ \beta_3$ Indust.Sect $+\beta_4$*Fsize* $+ \beta_5$*ROA* $+ \beta_6$ ROE $+\beta_7$ LEV $+ \beta_8$ BSIZE $+ \beta_9$ BIND $+ \mathcal{E}t$ (8)

Carbon_Disc = $\alpha + \beta_1$ *AC.meet* $\times$ Indust.Sect $+ \beta_2$ *AC.meet* $+ \beta_3$ Indust.Sect $+\beta_4$*Fsize* $+ \beta_5$*ROA* $+ \beta_6$ ROE $+\beta_7$ LEV $+ \beta_8$ BSIZE $+ \beta_9$ BIND $+ \mathcal{E}t$ (9)

Carbon_Disc = $\alpha + \beta_1$ *AC.independent* $\times$ Indust.Sect $+ \beta_2$ *AC.independent* $+ \beta_3$ Indust.Sect $+\beta_4$*Fsize* $+ \beta_5$*ROA* $+ \beta_6$ ROE $+\beta_7$ LEV $+ \beta_8$ BSIZE $+ \beta_9$ BIND $+ \mathcal{E}t$ (10)

4. Baseline results& Discussions
4.1 Data Validity Test
4.1.1 Multicollinearity

This issue occurs when there is a connection among the independent variables, leading to instability in the regression model coefficients and, subsequently, the inapplicability of the linear model. The variance inflation factor (VIF) was employed, as illustrated in Table (3), to ascertain the absence of multicollinearity. The findings demonstrate that the variables are not affected by multicollinearity. The permissible variance (tolerance) for all model variables, as indicated in the tables, is below one, ranging from (0.826 - 0.997). Furthermore VIF for all model variables is under 10, varying between (1.003 - 1.211) indicating the absence of multicollinearity issues in these models (O'brien, 2007).

Model	Model (1)		Model (2)		Model (3)		Model (4)		Model (5)	
Table (3) :Collinearity Statistics										
	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF	Tolerance	VIF
ACFE	.981	1.020			--	--	--	--	--	--
AC Female	--	--	.932	1.073	--	--	--	--	--	--
ACSZE	--	--	--	--	.973	1.027	--	--	--	--
ACMEET	--	--	--	--	--	--	.969	1.032	--	--
ACINDEP	--	--	--	--	--	--	--	--	.953	1.050
F size	.962	1.040	.954	1.048	.961	1.040	.962	1.039	.962	1.039
ROA	.996	1.004	.997	1.003	.996	1.004	.992	1.008	.996	1.004
ROE	.985	1.015	.955	1.047	.978	1.022	.977	1.024	.954	1.048
LEV	.990	1.010	.990	1.010	.982	1.018	.984	1.016	.984	1.016
BSIZE	.848	1.179	.836	1.196	.853	1.172	.854	1.172	.852	1.173
BIND	.833	1.200	.829	1.206	.829	1.206	.826	1.211	.832	1.202
a. Dependent Variable: CARDISC										

4.1.2 Normal distribution test

Table 4 reveals that the p-value (Prob > z) is 0.000, which is beneath the standard significance level of 0.05; hence, the null hypothesis is rejected. This signifies that the CAR.DISC variable significantly diverges from a normal distribution. The validity of the study models will remain unaffected by the issue of non-normally distributed data, as the sample size of 350 observations exceeds the threshold of 50 observations (Verbeek, 2017; Wooldridge, 2016).

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Table (4):Tests of Normality						
	Statistic	df	Sig.	Statistic	df	Sig.
CARDISC	.236	350	.000	.825	350	.000
a. Lilliefors Significance Correction						

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4.2. Descriptive statistics

Table No. (5) presents the descriptive statistics for all variables, based on these findings, the means of ACC (financial expertise ,committee size, frequency of meetings, and independence) equal (2.77,3.46,4.93,2.06) respectively ,which are mediate the values of minimum and maximum to   but the mean of female directors equal 0.24 is low compared by the maximum .Moreover, the mean of dependent variable CARDISC is 5.36 , so its mediate the values of minimum and maximum . The mean of mediator variable Indus.Sect is .83 , so its mediate the values of minimum and maximum. Additionally, it clear that the mean value of (SIZE, ROA, ,ROE, LEV , BSIZE and BIND)and equal 20.28,0.129,0.16,1.041,8.01,0.755 .

ACC reveal that the mean number of finance experts (FE) is almost 3 members, with a minimum of 1 person and a maximum of 3 members constituting the majority of FEs. An examination of the committee's gender diversity reveals that the average female representation is restricted to a single individual, underscoring the dominance of male members. The average committee size (AC.SIZE) is 3 members, signifying that the typical committee comprises a minimum of 3 members and a maximum of 5 members. AC typically convenes four times year. The average of the independent members on the committee is 2, signifying that at least one individual maintains independence inside the group. Moreover, the mean of CAR.DISC suggests that the majority of the industrial sector demonstrates significant sensitivity. These results are consistent with (Adegboye et al. (2020).

Table (5): Descriptive Statistics					
	N	Mini	Max	Mean	Std. Deviation
ACFE	350	1	3	2.77	.553
AC. Female	350	0	1	.24	.429
AC.SIZE	350	3	5	3.46	.828
AC.MEET	350	3	7	4.93	1.308
AC.INDEP	350	1	3	2.06	.675
CAR.DISC	350	0	9	5.36	3.473
INDUS.SECTOR	350	0	1	.83	.377
FSIZE	350	16.08	25.015	20.281	1.829
ROA	350	.1834-	5.130	.12969	.3947
ROE	350	1.446-	2.865	.16145	.3028
LEV	350	.000269	30.380	1.041	3.080

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BSIZE	350	3	15	8.01	2.633
BIND	350	.3333	1.000	.755	.141
Valid N (listwise)	350				

4.3 Correlation Matrix

Table 6 displays a correlation matrix for the dependent variable and the independent variables incorporated in the study. It indicates a positive link between (ACFE, ACSZE, ACMEET, ACINDEP) and carbon emission disclosures. The table demonstrates a weak association between the independent variable (AC. Female) and CED. As illustrated in Table (6). This table's results show the initial validity of statistical hypotheses; on the other hand, when the Pearson correlation coefficients between all variables are less than 0.8, the reliability of hypotheses testing models is confirmed (Blanca et al., 2013).

Table (6):Correlations Matrix												
	AC.FE	AC. Female	AC. SZE	AC. MEET	AC. INDEP	CAR. DISC	INDUSSECTOR	F.SIZE	ROA	ROE	LEV	B.SIZE	B.IND
AC.FE													
AC.Female	.023	1											
AC.SIZE	.175**	-.220**	1										
AC.MEET	.359**	-.150**	.523**	1									
AC.INDEP	.205**	-.177**	.609**	.553**	1								
CARDISC	.380**	-.082	.476**	.761**	.524**	1							
INDUS.SECTOR	.219**	.258**	.255**	.627**	.309**	.675**	1						
F.SIZE	-.063	.119*	-.042	-.038	-.047	.007	.108*	1					
ROA	-.022	-.003	-.029	-.061	-.031	-.029	.023	-.009	1				
ROE	-.063	.190**	-.105*	-.103	-.190**	-.042	.053	.083	.020	1			
LEV	.027	-.012	-.091	.075	-.082	.100	.058	-.073	.020	.034	1		
B.SIZE	-.109*	-.111*	-.012	-.004	-.036	-.023	.042	.066	.029	.029	-.050	1	
B.IND	-.075	.051	.053	.077	.018	.061	.131*	.161**	.046	.066	-.038	.380**	1
**. significant at the 0.01.													
*. significant at the 0.05													

4.4 Regression results

Firstly, we analyses whether CED levels is affected by (ACFE, AC female, ACSZE, ACMEET, ACINDEP) ,To test the impact of ACC on CED , we estimate equations (1) to (5), respectively. The results

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are reported in Table 7, with Columns (1) to (5) reporting results for (ACFE , AC female , ACSZE , ACMEET , ACINDEP) , respectively. Based on the results of table (7) , It is obvious that R2 for the models equal 0.146 , 0.007, 0.236, 0.757 ,0.289 , 0.658 respectively, where independent variables of ACC& the other control variables can explain (0.146 , 0.007, 0.236, 0.757 ,0.289 , 0.658) from CED in firms . So, from results of models (1, 3,4,5), it is obvious that the (FE , SIZE , MEET , INDEP) positive effect on CED where (β = .382, 0.488, 0.875, 0.546; Sig. < 0.05), this results mean that increasing the (ACFE , ACSZE , ACMEET , ACINDEP)) as   increasing the level of CED. However the results of model (2) obvious that the AC. Female not significant effect on the CED where (β = -.088; Sig. > 0.05).

The statistics analyses results accepted with (Al-Shaer & Zaman .,2018; Chalevas et al. ,2021;Pucheta-Martínez et al. ,2021;Tauringana .,2020; Velte .,2023) where a positive correlation between ACFE and CED, asserting that ACFE enhances CED oversight and ethical disclosure, thereby balancing shareholder interests with CED and fostering improvement. Also these results can be anticipated that ACs comprising a greater share of expert members will demonstrate increased efficacy in overseeing the board and improving the degree of disclosure compliance. Moreover, previous (Biçer & Feneir, 2019) state to audit committee experience would enhance the committee's expertise and confidence in talks with the external auditor and in resolving conflicts between corporate management and the external auditor, hence diminishing the total audit report delay.

And results of statistics analyses agree with Research (Agada et al. 2024 ; Anthonio et al. 2024;Gambo et al. ,2018 ; Buallay & AlDhaen .,2018), where (Agada et al. 2024 ; Anthonio et al. 2024) conducted shown that AC size influences business disclosures and disclosure practices, and that larger ACs improve the monitoring of external auditors by other sub-committees within specified timeframes, and (Gambo et al. ,2018; Agada & Lazarus .,2024) indicates that diligent ACs that convene regularly demonstrate increased commitment and engagement, thereby enhancing their effectiveness as monitors, moreover (Buallay &AlDhaen .,2018) assert that an impartial audit committee effectively oversees management and ensures accountability, which enhances voluntary sustainability and environmental disclosure. The results indicate that an independent

audit committee enhances impartiality, transparency, and accountability in sustainability reporting disclosure and results of statistics analyses agree with (Pucheta & Gallego.,2019) that found the participation of the audit committee female not effect on sustainability and environmental disclosure. *Based on the above the results are obvious that the AC positive effect on CED in Egyptian firms. Accordingly, the first hypothesis supported by the models' findings in .So we can accept the first hypothesis as following; There are a significant relationship between ACC and CED.*

	Table(7) :regression analysis to H1(AC &CED)														
	Model(1)			Model (2)			Model(3)			Model(4)			Model(5)		
	Beta	t	Sig.	Beta	t	Sig.	Beta	t	Sig.	Beta	t	Sig.	Beta	t	Sig.
(Constant)		-1.725	.085		1.735	.084		-1.790	.074		-6.566-	.000		-1.382	.168
ACFE	.382	7.650	.000												
A AC Female				-.088-	-1.592-	.112									
ACSZE							.488	10.285	.000						
ACMEET										.875	32.605	.000			
ACINDEP													.546	11.796	.000
Fsize	.025	.499	.618	.016	.296	.767	.032	.679	.498	.042	1.558	.120	.031	.666	.506
ROA	-.026	-.520	.604	-.033	-.620	.536	-.019-	-.399-	.690	.024	.904	.367	-.018	-.390	.697
ROE	-.028	-.567	.571	-.033	-.613	.540	.000	.001	.999	.044	1.657	.099	.052	1.120	.263
LEV	.096	1.936	.054	.102	1.911	.057	.148	3.129	.002	.034	1.284	.200	.147	3.230	.001
BSIZE	-.013	-.245	.807	-.062	-1.061	.289	-.029	-.565	.572	-.019	-.653	.514	-.020	-.415	.678
BIND	.097	1.789	.074	.094	1.596	.111	.047	.912	.362	-.009	-.313	.754	.057	1.144	.254
N	350			350			350			350			350		
R	.404[a]			.164[a]			.501[a]			.873[a]			.551[a]		
Adj(R2)	.146			.007			.236			.757			.289		
a. Dependent Variable: CARDISC															

Secondly , current study analyses whether the ACC& moderating role of the INDU.SEC is affected on the CED levels , we estimate equations (6) to (10),Based on the results in table (8), the independent variables of (ACINDEP× INDU.SEC; ACSZE× INDU.SEC;ACMEET× INDU.SEC;ACFE× INDU.SEC, AC.EFFEC) & moderating role of the INDU.SEC and other control variables can

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explain (0.537 ; 0. 528; 0.559 ;0.789 ; 0.587; 0.728) from carbon disclosure emission levels in firms**.** From table(8), the independent variables(ACINDEP× INDU.SEC; AC female ×INDU.SEC; ACSZE× INDU.SEC;ACMEET× INDU.SEC;ACFE× INDU.SEC)   is significant and positive (β = .187, -.241, .618,.869.498; Sig. < 0.05), this result mean increases the level(ACFE, AC female ,ACSZE, ACMEET,ACINDEP) & moderating role of INDU.SEC increasing the level of CED levels. based in this results (ACC) & moderating role of INDU.SEC positive effect on CED levels where independent variable is significant and positive (Sig. < 0.05). *So we can accept the second hypothesis as following, there is a significant impact of industrial sector in relationship between ACC and CED*. This results accepted with (Asmeri et al. ,2023; Garcia et al., 2017; Kumari et al., 2022; Choi et al. ,2013), where industries with operations sensitive to carbon pollution are expected to have a significant impetus to CED. This suggests that companies engaged in activities resulting in high carbon pollution are more likely to disclose information regarding elevated CE than those that are less sensitive, indicating that industry type positively influences CED.

Table(8): Regression Analysis to H2(INDU.SEC , ACC & CED)														
	Model (6)			Model (7)			Model (8)			Model (9)			Model (10)		
	Beta	t	Sig.	Beta	t	Sig.	Beta	t	Sig.	Beta	t	Sig.	Beta	t	Sig.
(Constant)		4.390	.000		2.042	.042		4.668	.000		4.617	.000		4.474	.000
ACFE × INDU.SEC	.187	4.521	.000												
AC. Female × INDU.SEC				-.241	-4.691	.000									
ACSZE × INDU.SEC							.618	15.84	.000						
ACMEET × INDU.SEC										.869	3.667	.000			
ACINDEP × INDU.SEC													.498	4.149	.000
F. size	-.036	-.966	.334	.059-	-.057	.955	-.030-	-.831	.407	.012	.485	.628	-.026-	-.739	.460
ROA	-.029	-.788	.431	.037-	-1.172	.242	-.033	-.922	.357	.013	.532	.595	-.031-	-.896	.371
ROE	-.050	-1.348	.179	.098	-.718	.474	-.037	-1.032	.303	.022	.879	.380	.009	.247	.805

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LEV	.057	1.549	.122	-.066	1.962	.051	.093	2.588	.010	.028	1.141	.255	.093	2.666	.008
BSIZE	-.023-	-.572	.568	.069	1.202-	.230	-.031	-.797	.426	-.021	-.801	.424	-.021	-.565	.572
BIND	.014	.347	.728		1.250	.212	-.011-	-.277	.782	-.024	-.895	.371	-.007	-.184	.854
N	350			350			350			350			350		
R	.741[a]			.154			.754[a]			.891[a]			.773[a]		
Adj(R2)	.537			.131			.559			.789			.587		

a. Dependent Variable: CARDISC

4.5 Robustness check

To enhance the robustness of the investigation, we further refine our regression model by categorizing CED into high and low quality. We subsequently assign a dummy variable, where a value of 1 indicates any measurement beyond 5 elements, denoting high-quality CED, and a value of 0 signifies any measurement below 5 elements, representing low-quality CED. Given that the dependent variable is denoted by a dummy variable, we subsequently utilize logistic analysis for the robustness verification. The results from Table (9) validate the robustness of the primary test, as the intended variables maintain their outcomes. So, we adjust hypotheses H1 and H2 after controlling for CED effects in order to investigate the relationship between sector industrial carbon disclosure and AC features. The results, which are shown in Table 9, show that the regression coefficients of the important variables are still in agreement with the earlier findings from Tables 7 and 8, as following

Firstly, we analyses whether CED levels is affected by (ACFE, AC female, ACSZE, ACMEET, ACINDEP) by Logistics regression analysis, where results of from models (1,2 3,4,5), table (9) obvious that the ACC (ACFE , AC. Female ,ACSZE , ACMEET , ACINDEP) positive effect on CED where (Sig. < 0.05), this results mean that increasing the independent variables as increasing the level of CED and consistent with the previous results, there is a significant impact to ACC on CED

	Model (1)				Model (2)				Model(3)				Model (4)				Model (5)			
	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.
Constant	6.903-	1.97	12.30	.000	-.705	1.326	.282	0.003	-4.446	1.53	8.433	.004	7.554-	1.855	16.584	.000	5.433-	1.655	10.781	.001
ACFE	2.025	.451	20.12	.000																
AC Female					-.948	.288	10.85	.001												
ACSZE									1.048	.154	46.46	.000								
ACMEET													1.288	.131	96.897	.000				
ACINDEP																	2.002	.244	67.221	.000
Fsize	-.003	.066	.002	.962	.001	.063	.000	.990	.005	.066	.005	.942	.025	.080	.095	.758	.009	.072	.016	.898
ROA	-.139	.291	.230	.631	-.179	.301	.353	.552	-.137	.330	.171	.679	.137	.328	.174	.676	-.073-	.309	.056	.813
ROE	-.448	.459	.950	.330	-.399	.457	.760	.383	-.337-	.450	.560	.454	-.020-	.503	.002	.968	.121	.529	.052	.819
LEV	.079	.048	2.769	.096	.078	.046	2.860	.091	.104	.046	5.191	.023	.051	.052	.969	.325	.134	.053	6.497	.011
BSIZE	.013	.048	.074	.786	-.037	.047	.618	.432	.000	.049	.000	.995	.011	.059	.037	.848	.012	.054	.048	.826
BIND	1.007	.892	1.276	.259	1.160	.885	1.718	.190	.479	.933	.264	.607	-.035-	1.105	.001	.974	.585	1.007	.337	.561
-2 Log likelihood	426.004[a]				457.243[a]				413.622[a]				319.451[a]				370.340[a]			
Cox & Snell R Square	.134				.053				.164				.361				.261			
Nagelkerke R Square	.180				.071				.220				.486				.351			

Secondly , we analyses whether CED levels is affected by (ACFE, AC female, ACSZE, ACMEET, ACINDEP) and moderating role of the INDU.SEC by Logistics regression analysis, where results of from table (10) obvious that the (ACFE×INDU.SEC , AC. Female ×INDU.SEC,ACSZE×INDU.SEC,ACMEET×INDU.SEC , ACINDEP×INDU.SEC) have appositive effect on CED where (Sig. < 0.05), this results mean that increasing the independent variables as increasing the level of CED and consistent with the previous results, there is a significant impact to industrial sector in relationship between ACC and CED

Table (10):Logistics Regression Analysis (INDU.SEC , ACC & CED)																			
	Model (1)				Model (2)				Model (3)				Model (4)				Model (5)		
	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.	B	S.E.	Wald	Sig.
Constant	3.095-	935.242	.000	.997	2.201-	886.469	.000	.998	2.597-	887.968	.000		4.031-	4795.487	.000	.999	3.303-	1216.100	.000	.998
ACFE × INDU.SEC	.423	1347.043	.000	.000																
AC Femal × INDU.SEC					1.422-	.282	25.497	.000												
ACSZE × INDU.SEC									1.818	.343	28.02	.000								
AC MEET × INDU.SEC													.426	5760.453	.000	.000				
ACINDEP × INDU.SEC																	.610	3988.539	.000	.000
Fsize	-.048-	.072	.440	.507	-.048	.071	.461	.497	-.046-	.071	.413	.520	.002	.080	.001	.975	-.033-	.077	.178	.673
ROA	-.124-	.284	.191	.662	-.210-	.290	.528	.467	-.158-	.311	.257	.612	.088	.321	.075	.784	-.112-	.300	.139	.709
ROE	-.527-	.460	1.313	.252	-.357-	.452	.624	.430	-.467-	.446	1.096	.295	-.130-	.502	.068	.795	-.021-	.500	.002	.967
LEV	.067	.050	1.789	.181	.061	.051	1.434	.231	.083	.046	3.224	.073	.048	.051	.893	.345	.105	.051	4.271	.039
BSIZE	.006	.052	.015	.902	-.061-	.053	1.349	.245	-.003-	.052	.003	.956	.009	.058	.025	.873	.013	.056	.054	.817
BIND	.344	.976	.125	.724	.571	.997	.329	.567	-.037-	.979	.001	.970	-.155-	1.098	.020	.888	.038	1.051	.001	.971
-2 Log likelihood	362.044a				366.156a				362.481a				331.123a				308.061a			
Cox & Snell R Square	.278				.270				.277				.339				.381			
Nagelkerke R Square	.374				.363				.373				.456				.513			

Building on these conclusions, our research shows a connection between ACC and industry sector responsiveness to CED, which leads to higher levels of carbon disclosure and improved carbon performance. Due to their significant environmental impact, industries categorized as industrial-sensitive are subject to heightened ACC.

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5. Conclusions

The current study aims to evaluate the impact of audit committee's characteristics (Financial Expertise, Female Directors, Size, Meetings, Independent) on carbon emission disclosures and the impact of AC characteristics and the industrial sector on the carbon emissions disclosures. From statistical results , it is obvious that the (FE , SIZE , MEET , INDEP) positive effect on CED where (β = .382, 0.488, 0.875, 0.546; Sig. < 0.05), this results mean that increasing the (ACFE , ACSZE , ACMEET , ACINDEP)) as increasing the level of CED. However the results of AC. Female not significant effect on the CED where (β = -.088; Sig. > 0.05).so, there are a significant relationship between ACC and CED. Furthermore, the independent variables of (ACINDEP× INDU.SEC; ACSZE× INDU.SEC; ACMEET× INDU.SEC;ACFE× INDU.SEC, AC.EFFEC (& moderating role of the INDU.SEC and other control variables can explain (0.537 ; 0. 528; 0.559 ;0.789 ; 0.587; 0.728) from carbon disclosure emission levels in firms. This suggests that companies engaged in activities resulting in high carbon pollution are more likely to disclose information regarding elevated CE than those that are less sensitive, indicating that industry type positively influences CED. So we can accept hypotheses as following; there are a significant relationship between ACC and CED and, there is a significant impact of industrial sector in relationship between ACC and CED in Egyptian firms.

Additionally, to enhance the robustness of the investigation, we further refine our regression model by categorizing CED into high and low quality. Firstly, we analyses whether CED levels is affected by (ACFE, AC female, ACSZE, ACMEET, ACINDEP) by Logistics regression analysis, this results mean that increasing the independent variables as increasing the level of CED and consistent with the previous results, there is a significant impact to ACC on CED. whereas we analyses whether CED levels is affected by (ACFE, AC female, ACSZE, ACMEET, ACINDEP) and moderating role of the INDU.SEC by Logistics regression analysis, where results of from table (10) obvious that the (ACFE×INDU.SEC , AC.Female×INDU.SEC,ACSZE×INDU.SEC,ACMEET×INDU.SEC, ACINDEP×INDU.SEC) have appositive effect on CED where (Sig. < 0.05), this results mean that increasing the independent variables as increasing the level of CED and consistent with the previous results, there is a significant impact to industrial sector in relationship between ACC and CED in Egyptian firms.

The results of this study concluded that the impact of (ACC) and the industrial sector of Egyptian enterprises may continue to be a crucial aspect to take into account when measuring CED. The results varied depending on how the firm's performance was evaluated. Additional

studies on other corporate governance methods, such as disclosure and transparency, board diversity and composition, and ownership structure, are still welcome. When all of these are taken into account, a company's disclosure of carbon emissions may be impacted. Furthermore, the moderating variables the demographic traits of the directors must also be taken into account. Finally, this study adds a great deal to the field of financial reporting and corporate performance, especially when it comes to the board of directors and audit committee issues. The elements that affect a company's CED among Egyptian industrial listed businesses are the specific topic of this study. Since the topic in question obviously still needs a great deal of research, it is hoped that this endeavor would encourage future studies on corporate governance ACC on CED in the context of other sectors. Additionally, decision-makers, lawmakers, and investors find value in the results produced.

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