



The impact of climate change disclosure on Firm Value: evidence from Egypt -An applied study

Research extracted from a PHD. thesis of accounting

By

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Abstract:

Purpose: This study aims to examine the impact of climate change disclosure on the firms value of firms listed on the Egyptian Stock Exchange. It also examines the impact of some moderating variables, such as industry type and the presence of environmental management systems, on the relationship between climate change disclosure and firm value.

Design/ Methodology: To achieve the research objective, the research analyzes previous studies presented by the accounting literature in the field of climate change disclosure, in order to benefit from scientific contributions. Then, the researcher uses the deductive approach to crystallize the impact of climate change disclosure on the firm's value, as well as the impact of the quality of environmental management systems and the type of sector on the relationship between climate change disclosure and the value of the firm, then formulating the research hypotheses, and testing this relationship through applied study. Regarding the applied study, the research hypotheses will be tested by conducting an applied study on a sample of (80) firms listed on the Egyptian Stock Exchange during the period from 2021 to 2024, and arriving at results that achieve the research objective.

Findings: The results of the applied study concluded that disclosure of information related to climate change have **a positive and significant impact** on firm value. Also the study suggests that the type of sector plays **a moderating role** in strengthening the relationship between climate change-related disclosure (DCC) and firm value. This finding implies that firms that have adopted ISO14001 environmental management systems tend to experience a **greater positive impact** of climate-related disclosure on their market value compared to firms that have not implemented such systems. The result supports the idea that environmental certifications like ISO enhance the credibility and effectiveness of climate change disclosures, thereby improving stakeholder perceptions and firm value.

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Originality/ Value: This study contributes to the accounting literature by analyzing the relationship between climate change disclosure and enterprise value and measuring the impact (type of sector and the presence of environmental management systems) on the nature of this relationship in the Egyptian business environment.

Keywords: Climate Change Disclosure (DCC), firm Value, Sector type, Environmental Management Systems (ISO 14001)

Introduction:

One of the biggest issues of our day is climate change. High social responsibility standards make an organization more appealing to the capital market since they are expected to generate higher returns during crises, like those brought on by climate change. Social responsibility can be used by organizations that are extremely vulnerable to crisis-related risks, such climate change, to enhance their climate performance, lower perceived risks, and increase their appeal (Mbanyele, W., & Muchenje, L. T. 2022).

Users of the firm's general purpose financial reports can evaluate the effects of significant climate-related risks and opportunities on the firm's value, as well as how the firm's use of resources, inputs, activities, outputs, and corresponding outcomes support the firm's response and strategy to manage significant climate-related risks and opportunities. This is in addition to requiring an entity to disclose information about its exposure to climate risks and opportunities. Additionally, it allows users to evaluate the firm's ability to adapt its planning, business model, and operations to significant climate-related risks and opportunities (ISSB, 2022). In a related context, the disclosure of climate change is one of the basic components in enhancing the efficiency of the stock market, especially with regard to the phenomenon of information asymmetry and reducing agency costs and the cost of external financing, and thus the value of the company.

1.1 Research problem:

Climate change disclosure contributes to rationalizing investment decision-makers and increasing stakeholder awareness (Kassamany et al., 2023) as it is basic information that legitimizes the firm's operations, reduces accounting information asymmetry, and improves stakeholders' understanding of performance evaluation and determining the value of the firm (ISSB, 2022; Desai, 2022) by measuring the impact of climate change risks and the firm's

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strategies on the value and timing of future operating cash flows and financing costs affected by climate change, especially when greenhouse gas emissions increase (Bui et al., 2021: ISSB, ٢٠٢٢). Also, expanding climate change disclosure positively impacts financial and market performance (Shahata, 2023).

The nature and amount of information that firms disclose varies based on the nature and standards of their industry (Habbash, M, et al, 2016). Some industries may put pressure on their subsidiaries to prepare special reports. Firms operating in polluting areas that have a negative impact on the environment and society tend to increase the level of disclosure about climate change to legitimize their activities, reduce political costs, and enhance confidence and credibility of stakeholders (Masoud, 2020).

Implementation of ISO ١٤٠٠١ affects the positive image of the firm to interested parties by reducing the impact on the environment. The study of (Machmuddah et al., 2020)confirmed that environmental management can increase the firm value.

1.2 Research objective:

The primary objective of the research is to study and analyze the impact of accounting disclosure climate change on firm value and testing the effect of sector type and the presence of environmental management systems as moderating variables on the relationship between climate change disclosure and firm value

1.3 Research Importance:

The research derives its importance from its exposure to one of the most important research fields that has generated a lot of controversy in accounting thought locally and internationally recently, which is the disclosure of climate change. Also, This study comes in line with both the National Climate Change Strategy in Egypt 2050, which aims to address the negative impacts and repercussions of climate change, and Egypt Vision 2030 with its eight goals, especially the fifth goal, "Environmental Sustainability," which seeks to achieve an integrated and sustainable ecosystem, and the guiding principles for sustainable financing issued by the Central Bank in 2021, which include managing climate change risks and working to reduce them in an effort to finance more sustainable economic activities.

1.4 Research method:

The research analyzes previous studies presented by the accounting literature in the field of climate change disclosure, in order to benefit from scientific contributions by using the inductive deductive. Then, the researcher uses the deductive approach to crystallize the impact of climate change disclosure on the firm's value, as well as the impact of the quality of environmental management systems and the type of sector on the relationship between climate change disclosure and the value of the firm

1.5 The concept of the climate disclosure as introduced in the literature and standards:

IFRS S2 requires firms to disclose information about its exposure to climate-related risks and opportunities that is useful to investors and other stakeholders in making decisions. These disclosures must relate to: Governance, strategy, risk management, and metrics and targets” used by the entity to understand, manage, and report on climate-related risks and opportunities that could reasonably be expected to affect the entity’s cash flows, access to finance, or cost of capital over the short, medium, or long term (ISSB, 2022-IFRS S2).

According to the accounting literature, disclosure of climate change is the process of including comprehensive and open information on the present, actual, and possible financial effects of climate change on a company in its financial reports (Atenboroug, 2022). It comprises the firm's identified climate change risks as well as the steps taken to prevent or lessen them, making it the third phase in climate risk management (Metwally & ELgareeb, 2023).

1.6 Objectives of climate change disclosure:

These climate changes in their different manifestations are the result of numerous reasons. Thus, regulations for climate disclosure can take many different forms, which are embodied in a series of strategies carried out by legislative and regulatory organizations and entities to achieve a number of goals, the most significant of which are: (IFRS S2, 2023)

- In response to demand and to produce pertinent and significant data that may be included in investor evaluations to improve the effectiveness of capital

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allocation, promote, advance, and encourage the harmonization of climate change-related disclosure requirements in mainstream reporting;

- Connecting financial and non-financial business reporting by emphasizing the ways in which climate change affects an organization's condition, strategy, and potential for value generation.
- Contributing both conceptual and practical ideas to regulatory authorities' discussions about establishing or expanding corporate climate change disclosure requirements; and
- Determine standards and requirements that can be used to assurance activities in order to support the assurance of climate change information.
- Using regulatory talks and studies to provide a conceptual, theoretical, and practical framework in order to introduce or develop climate change disclosure obligations for businesses.

1.7 Elements of the climate-related financial disclosures:

The IASB thinks that the data in sustainability-related financial disclosures is a crucial component for consumers' evaluation of a company's worth, since cash flows are required to be revealed in a firm's risk profile. As a result, a business must provide material information on all material risks and opportunities pertaining to sustainability. To present a comprehensive picture of potential climate-related financial repercussions and to draw attention to crucial factors, supplemental guidance has been produced. As a result, the presentation draft highlighted the four main components of the suggested climate-related financial disclosures, which are as follows: (ED, IFRS S1, July 2022):

- 1- Governance:** How the company handles risks and hazards associated with climate change
- 2- Strategy:** the real and possible effects of risks and hazards associated with climate change on the organization's strategy, commercial operations, and financial planning.
- 3- Management Risk:** The procedures the company employs to recognize, evaluate, and control risks associated with climate change
- 4- Targets and Metrics:** Goals and metrics for evaluating and controlling climate-related risks and opportunities

1.8 Extrapolating and analyzing previous studies and developing hypotheses:

1) Analyzing the relationship between the disclosure of climate change and the firm's market value, and deriving the first hypothesis:

Market value is an economic indicator of a company that is impacted by how shareholders view management's capacity to adapt to changes in the company's surroundings. The worth of a company is determined by how investors see its performance, which is always connected to and represented in stock prices. Additionally, it serves as a gauge of a company's total market value (Taiwo et al., 2022). Most people agree that one of the elements affecting a company's market value is disclosure. The effect of financial disclosure on climate change, one of the most significant environmental practices of our day, on a company's market value has thus been the subject of numerous prior researches. Numerous studies have demonstrated that a company's market value is concentrated since it is the outcome of its finance, operations, and investment choices. A company's management will take a number of steps to increase the firm's value as the market value of its shares rises (EL Deeb et al., 2022).

Previous studies have found a direct correlation between climate change disclosure and stock prices (Liu et al., 2024). Similarly, a study by (Lin & Wu, 2023) showed that revealing climate change information can lessen the likelihood of a stock value decline. In light of the above, the researcher can see that climate changes can affect the value of the firm. If companies do not move towards confronting the phenomenon of climate change, they may face several challenges and negative impacts on their performance and sustainability.

Since the study (Maji & Kalita, 2022) established a favorable association between climate change-related financial disclosure and the performance of Indian energy sector enterprises, several studies have demonstrated a positive relationship between climate change disclosure and firm value. Additionally, the study by Venezelli et al. (2024) demonstrated that companies with a clear disclosure of climate risks have higher valuations because investors benefit from this kind of disclosure as it eliminates confusion regarding a potential source of risk.

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The results of (Taiwo et al., 2022) support this, as stakeholders frequently see environmental reporting as a means of enhancing a firm's ethical standing, which in turn raises demand for the company's stock. Information sharing, according to signaling theory, improves a firm's reputation by sending a good signal to market participants.

According to a study by (Guo et al., 2022), companies that minimize the risks associated with climate change reveal more information about it in order to convey a positive message to the market. By eliminating doubt regarding a possible source of risk, this aids investors in evaluating the company's capacity to handle climate change threats, boosting the company's market value.

The researcher concludes from the above, the importance of disclosing climate change to stakeholders as it enables them to rationalize their decisions and determine the extent of companies' ability to create and maintain value. **Accordingly, this study states the first main hypothesis:**

H1: Disclosure of information related to climate change by Firms listed on the Egyptian Stock Exchange significantly affects its value

2) Analyzing the relationship between the disclosure of climate change and the firm's market value depending the type of sector., and deriving the second hypothesis:

The nature and amount of information that firms disclose varies based on the nature and standards of their industry (Habbash, M., et al, 2016). Some industries may put pressure on their subsidiaries to prepare special reports. Firms operating in polluting areas that have a negative impact on the environment and society tend to increase the level of disclosure about climate change to legitimize their activities, reduce political costs, and enhance confidence and credibility of stakeholders (Masoud, 2020).

In contrast, a study (Mehedi et al., 2023) examined how industrial firms listed on the Bangladesh Stock Exchange were affected by the factors of climate change disclosure as well as the mediating function of the strategic response to corporate environmental policies and governance. The study came to the conclusion that, in addition to the firm's values, there is a positive and substantial correlation between the board of directors' distribution according to independence,

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education, and experience and the disclosure of climate change. The study also discovered that this relationship is mediated by the firm's strategic reaction to environmental governance and legislation. Furthermore, the association between business characteristics (total assets, return on equity, return on assets, and financial leverage) and climate change disclosure is mediated by environmental governance and policies.

Accordingly, the second hypothesis of the research can be derived as follows:

H2: The effect of disclosure of information related to climate change by firms listed on the Egyptian Stock Exchange differs significantly on its value according to the type of sector.

3) Analyzing the relationship between disclosure of climate change and the firm's market value depending on implementing environmental management system., and deriving the third hypothesis:

One strategy to lessen an organization's environmental effect is to put in place an environmental management system (EMS). EMSs are structured, voluntary, and recorded systems that oversee an organization's environmental performance and responsibilities. ISO 14001 is evidence of the growing standardization of environmental management (Johnstone, 2022).

Implementation of ISO 14001 affects the positive image of the firm to interested parties by reducing the impact on the environment. The study of Machmuddah et al., 2020 confirmed that environmental management can increase the firm value. These results also support the research conducted by Song et al. (2017) that environmental management positively affects the firm value. According to the research of Verenikina & Finley (2018), if a firm implements environmental management correctly and properly, the firm will be able to manage its resources more efficiently so that the firm's performance increases. Accordingly, the third hypothesis of the research can be derived as follows:

H3: The effect of disclosure of information related to climate change by firms listed on the Egyptian Stock Exchange differs significantly on its value according to implementing environmental management system.

1.9 An applied study

1.9.1 Introduction: This research aims to achieve three main objectives. In order to achieve the first objective, the researcher investigates the influence of disclosure of information related to climate change on the firm value (FV), while to accomplish the second objective, the study investigates the moderating role of type of sector on the association between disclosure of information related to climate change and firm value. And to accomplish the third objective, the study investigates the moderating role of implementing environmental management system on the association between disclosure of information related to climate change and firm value.

1.9.2 Research method: This part discusses the selection process of the research sample, the criteria that affect the sample selection process. Also, it includes the sources of data that are used in this research. In addition, it contains the main research variables and how to measure these variables as well as the research models applied to test the hypotheses in order to achieve the research objectives.

1.9.2.1 Data and sample selection: The population of the current research contains 221 active Egyptian firms in the market, 80 companies listed on the Egyptian Stock Exchange (ESE) during 2020-2024.

1.9.2.2 Variables' measurement

1.9.2.2.1 Dependent variables: The dependent variable in this research is Firm Value (FV), in the main analysis Tobin's Q is used as an indicator for firm value, this indicator is widely used as an approximation for firm value in the previous studies. Tobin's Q is calculated as the equity market value plus the book value of liabilities over the book value of assets. The higher the value of Tobin's Q, the more investment opportunities and growth potential the firm has. (Minutolo, M., et al., 2019).

1.9.2.2.2 Independent variables: The independent variable this research is disclosure of information related to climate change (DCC), (DCC) score since it is often employed to measure environmental disclosure quality .DCC should cover the most pertinent risks and opportunities the businesses facing(Iriyadi & Antonio , 2021) .When preparing the current study, the researcher relied on measuring climate change disclosure based on four basic dimensions of the proposed framework, in accordance with what was addressed in the presentation draft of the International Sustainability Financial Reporting Standards (IFRS) issued by the International Sustainability Standards Board (ISSB) (IFRS S1-2022).

1.9.2.2.3 Moderating variables¹

1. Type of sector: Firms in highly polluting industries (or environmentally sensitive industries) are likely to disclose more environmental information than those in low polluting industries. Therefore, a positive linkage is expected between sector and DCC. Following the existing literature (Cho et al., 2014), energy, utilities, transportation pharmaceuticals, materials, mining and extractive, paper, chemicals, petroleum, metals, industrials and telecommunication industries are considered highly polluting industries.

2. Implementing environmental management system(EMS):Implementing an environmental management system (EMS) is one way to reduce an organization's environmental impact. EMSs are voluntary, documented, and structured systems that manage an organization's environmental responsibilities and environmental performance. The evidence that environmental management is increasingly standardized is ISO 14001 (Johnstone, 2022). Implementation of ISO 14001 affects the positive image of the firm to interested parties by reducing the impact on the environment. The study of (Sudiyatno et al., 2020) confirmed that environmental management can increase the firm value.

1.9.2.2.4 Control variables: The researcher control for a set of variables that have previously been found to affect firm value, namely firm size (has been one of the main variables that had a significant on firm value), firm profitability (It is an important measure of firm's financial performance because it reflects the firm's ability to generate profit that will be used to finance profitable investment opportunities thereby, enhancing the firm growth), firm leverage (shows the firm's ability to meet its long term liabilities), and audit quality (Dutta et al., 2021).

1.9.2.3 The study models: This section focuses on introducing the research models that are presented to examine the research hypotheses (illustrated in Figure 1) thus this research includes three models. The first model is developed

¹ Moderating variables are variables that influence the direction and/or strength of the relationship between the independent and dependent variables. Moderating variables differ from mediating variables, which are defined as variables that mediate the relationship between the independent and dependent variables. Moderating variables also differ from controlling variables, which directly affect the dependent variable within the context of the primary relationship under study (Mackinnon, 2011).

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to test the association between DCC and FV while, the second model focuses on testing the moderating role of type of sector on association between DCC and FV. The third model is related to test the moderating role of implementing environmental management system on the association between DCC and FV. In this study, multivariate regression analysis using the Ordinary Least Squares (OLS) method is employed. The models utilized for the main analysis are presented as follows:

First research model: The first linear regression model focuses on testing the first hypothesis H1 which investigates the association between DCC and FV. The first research model is developed as follows:

$$FV_{it} = \beta_0 + \beta_1 DCC_{it} + \beta_2 Size_{it} + \beta_3 LEV_{it} + \beta_4 ROA_{it} + \beta_5 Big4_{it} + \varepsilon_{it} \quad (\text{Model 1})$$

Where:

FV_{it} , Tobin's Q of firm (i) at year (t);

DCC_{it} , disclosure of information related to climate change of firm (i) at year (t);

ROA_{it} , profitability of firm (i) at year (t);

LEV_{it} , leverage of firm (i) at year (t);

$Size_{it}$, firm size of firm (i) at year (t);

$Big4_{it}$, audit quality of firm (i) at year (t);

ε_{it} , error term.

Second research model: The second linear regression model focuses on testing the first sub - hypothesis H1a which investigate the moderating role of type of

$$FV_{it} = \beta_0 + \beta_1 DCC_{it} + \beta_2 Sector_{it} + \beta_3 DCC * Sector_{it} + \beta_4 Size_{it} + \beta_5 LEV_{it} + \beta_6 ROA_{it} + \beta_7 Big4_{it} + \varepsilon_{it} \quad (\text{Model 2})$$

Where:

$Sector_{it}$, type of sector of firm (i) at year (t);

$DCC * Sector_{it}$, the interaction term between information related to climate change and type of sector.

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Third research model: To test the second hypothesis H2 which investigate the moderating role of implementing environmental management system on the association between DCC and FV. The third research model is developed as follows:

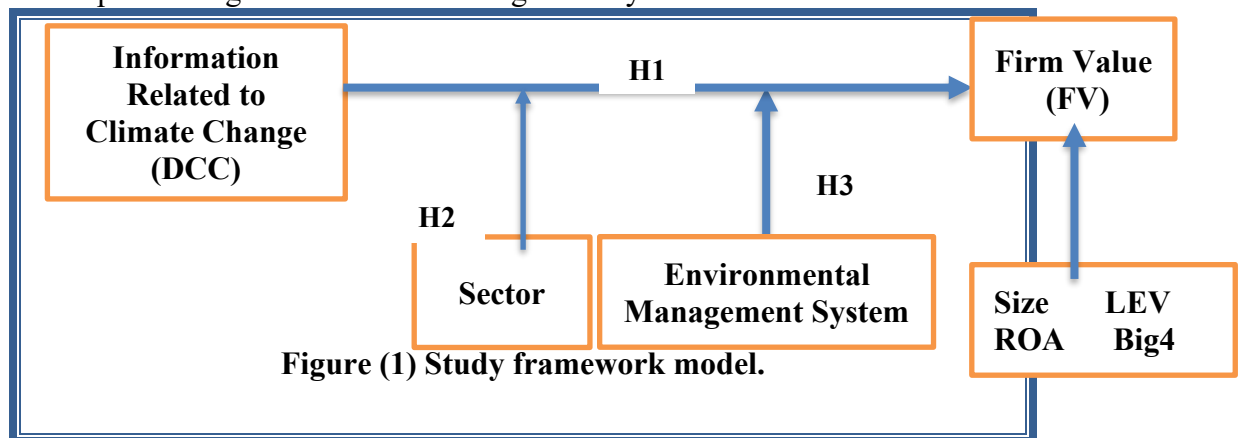
$$FV_{it} = \beta_0 + \beta_1 DCC_{it} + \beta_2 ISO_{it} + \beta_3 DCC * ISO_{it} + \beta_4 Size_{it} + \beta_5 LEV_{it} + \beta_6 ROA_{it} + \beta_7 Big4_{it} + \varepsilon_{it}$$

(Model 3)

Where:

ISO_{it} , implementing environmental management system of firm (i) at year (t);

$DCC * ISO_{it}$, the interaction term between information related to climate change and implementing environmental management system.



1.9.3 Data analysis and Hypotheses testing: This section aims to examine the validity of the developed hypotheses concerning the moderating effect of type of sector and implementing environmental management system on the association between DCC and FV. Thus, this section presents descriptive statistics, diagnostic statistics, and hypotheses testing. Moreover, SPSS 25 is used to conduct all the statistical analysis necessary to examine the Research Hypotheses.

1.9.3.1 Data preprocessing: This part shows the statistical treatment of the missing values. Moreover, it represents how extreme values are determined and treated without affecting the basic statistical properties of the data. Furthermore, the reasons why some variables are transformed from their original levels are also presented along with the applied transformation methods. Finally, determining and treating highly correlated independent variables.

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1.9.3.1.2 Missing value: The final data used in the analysis is obtained through using the following two criteria: Excluding any firm has missing values represent more than 10% the total observations for any variable. Further, the average of non-missing observations for any single variable can replace the missing values for each specific firm, only if, a specific firm has a missing values represent less than 10% of the total observations for any variable.

1.9.3.1.3 Outliers: Before conducting the descriptive analysis for the study variables, winsorization method is applied to limit the effect of outliers on the analysis of the moderating effect of type of sector and implementing environmental management system on the association between DCC and FV. Therefore, any extreme value which exceeds the upper limit is replaced by the value of the upper limit. Similarly, any extreme value less than the lower limit is replaced by the value of the lower limit. Hence, the extreme value retains its main characteristics which are the largest or the smallest value within the sampled data.

1.9.3.1.4 Transformation Methods: All the variables employed to examine the moderating effect of type of sector and implementing environmental management system on the association between DCC and FV are used at their original levels except, the firm size is transformed using the logarithm. The logarithm transformation is used because it retains the relative differences among the values of the transformed variables.

1.9.4 Descriptive statistics: The importance of descriptive statistics steams from the simplicity in presenting the basic properties of a large set of observations. Also, the appropriate statistical techniques used to analyze the data are chosen based on the underlying characteristics of the data included in the study sample.

Table 1 Descriptive statistics

Variables	N	Min.	Max.	Mean	Std. Dev
FV	400	0.301	2.805	0.811	0.335
DCC	400	0.00	1.00	0.544	0.385
Size	400	11.500	24.100	18.335	1.681
LEV	400	0.040	1.201	0.505	0.247
ROA	400	-0.261	0.432	0.068	0.187
Big4	400	0.00	1.00	0.425	0.495
ISO	400	0.00	1.00	0.553	0.498
Sector	400	0.00	1.00	0.679	0.467

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Table 1 presents the descriptive statistics for the examined variables. The average of **firm value (FV)**, for the full sample is (0.811), with a range from (0.301) to (2.80) and has a standard deviation of (0.335). The average level of **disclosure of information related to climate change (DCC)** for the full sample is 54.4%, with values ranging from 0.00 to 1.00 and a standard deviation of 0.385. This indicates that, on average, firms disclose just over half of the possible climate-related information. The full range from no disclosure (0.00) to complete disclosure (1.00) suggests significant variability among firms in terms of their transparency regarding climate change issues. The relatively high standard deviation implies a substantial dispersion around the mean, reflecting differing levels of commitment or regulatory pressure among firms.

The **firm size** shows a standard deviation of (1.681) which is very small relative to the mean (18.33) due to the use of logarithm which caused smoothing in firm size among firms. The firm size shows a small range between the minimum value (11.50) and the maximum value (24.10), reflecting the high concentration around the mean and the homogeneity in firm size among the sampled firms. The average **leverage ratio** is approximately 0.505, indicating that, on average, firms finance about 50.5% of their assets through debt. The leverage values range from 0.040 to 1.201, suggesting a considerable variation in debt usage across firms. The standard deviation of 0.247 reflects a moderate level of dispersion around the mean, implying differences in capital structure strategies among the sampled firms. The average **return on assets** is 0.068, or 6.8%, indicating that, on average, firms generate a modest return on their total assets. The ROA values range from -0.261 to 0.432, showing a widespread in profitability levels, The standard deviation of 0.187 confirms this variability, highlighting differences in operational efficiency and profitability among the firms in the sample.

Table 1 also presents the mean values of the study's categorical variables. The mean of **audit quality (BIG4)** is 0.425, indicating that 42.5% of the sampled firms (172 observations) were audited by one of the Big Four audit firms. The variable **Sector** has a mean of 0.679, which suggests that 67.9% of the firms (275 observations) operate within the industrial sector. Additionally, the mean value for **ISO certification** is 0.553, meaning that 55.3% of the firms (224 observations) have adopted an environmental management system.

1.9.5 Diagnostic statistics:

1.9.5.1 Pearson's Correlation Test:

The Pearson's correlation coefficient shows the direction and the strength of the linear association between any two variables included in this research. Moreover, the Pearson's correlation coefficients are used to detect the multicollinearity between any two independent variables included in the same regression model. Table (2) shows the Pearson's correlation coefficients for all the study variables.

The correlation coefficients in the Pearson correlation matrix presented in table (2) are used to detect the multicollinearity between any two independent variables. Where the multicollinearity exists if the Pearson correlation coefficient is greater than 70% between any two independent variables. Hence, there is no multicollinearity detected between independent variables used to test the moderating effect of type of sector and implementing environmental management system on the association between DCC and FV. Because the highest correlation coefficient is (0.366) which is found between the audit quality and disclosure of information related to climate change as shown in table (2).

Table 2 Pearson's correlation Matrix

Variables	FV	DCC	Size	LEV	ROA	Big4	ISO	Sector
FV	1							
DCC	0.214***	1						
Size	0.245***	0.081	1					
LEV	-0.124**	0.093*	0.048	1				
ROA	0.364***	0.079	0.154***	-0.127**	1			
Big4	0.175***	0.366***	0.222***	0.102**	-0.006	1		
ISO	0.155**	0.348***	0.067	-0.025	0.183***	0.342***	1	
Sector	0.075	0.146***	0.056	-0.231***	-0.038	0.279***	0.261***	1
Notes: ***, **, and * denote statistical significance at the 1, 5, and 10 % levels, respectively.								

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Table 2 displays the findings of the Pearson correlation analysis for the models' variables. Firm value has a significant positive correlation with disclosure of information related to climate change (DCC) $R=0.214$, at 1% significance level. This indicates that firms with higher disclosure of information related to climate change are expected to have higher firm value. Similarly, firm value (FV) exhibits significant positive correlations with Size, ROA, Big4, and ISO, with correlation coefficients of 0.245, 0.364, 0.175, and 0.155, respectively, all significant at the 1% level. Also, the independent variables exhibited a lower correlation, indicating the absence of multicollinearity issues in the sample.

1.9.5.2. Normality Test:

The Kolmogorov-Smirnov and Shapiro Wilk normality tests are conducted to examine the normal distribution of all variables. The null hypothesis states that the data are following a normal distribution, while the alternative hypothesis states that the data are not normally distributed. The null hypothesis is accepted when the p-value is greater than 5%. However, the alternative hypothesis is accepted when the p-value is less than 5%.

Table 3 Kolmogorov-Smirnov and Shapiro-Wilk tests for normal data

Variables	Kolmogorov-Smirnov		Shapiro-Wilk	
	Statistic	P-value	Statistic	P-value
FV	0.152	0.000	0.877	0.000
DCC	0.213	0.000	0.816	0.001
Size	0.106	0.000	0.938	0.000
LEV	0.041	0.104	0.977	0.000
ROA	0.150	0.000	0.879	0.000
Big4	0.380	0.000	0.628	0.000
ISO	0.368	0.000	0.632	0.000
Sector	0.433	0.000	0.588	0.000

Table (3) it shows that the null hypothesis of data being normally distributed is rejected because the p-values are less than 5%. Therefore, the alternative hypothesis is accepted. Although, the data of all variables are not normally distributed yet, the parametric procedures can still be used whenever the sample size is large.

1.9.6 Empirical results and Hypotheses Testing:

1.9.6. 1 First hypothesis: Disclosure of information related to climate change and firm value (Model 1):

To testing the validity of the first research hypothesis (H1) concerning the association between DCC and FV, which states that “*Disclosure of information related to climate change by Firms listed on the Egyptian Stock Exchange significantly affects its value*”. begins by conducting a Multivariate OLS regression model as shown in table (4).

Table (4) The relationship between DCC and FV - Model 1

Dependent variable: FV (Tobin’s Q) (Model 1)				
Predictor	Coefficient	t-value	P-value	VIF
DCC	0.151***	3.165	0.002	1.170
Size	0.169***	3.675	0.000	1.082
LEV	-0.116**	-2.577	0.010	1.035
ROA	0.312***	6.866	0.000	1.055
Big4	0.095*	1.952	0.052	1.216
Constant	0.407***	5.124	0.000	-----
R ²	0.219			
Adjusted R ²	0.209			
F-value	22.312 p=0.000			
Durbin-Watson	1.847			
Notes: ***, **, and *denote statistical significance at the 1, 5, and 10 percent levels.				

Before accepting the OLS firm value model as a reliable model, there is some goodness of fit tests that should be conducted to confirm that the statistical techniques applied in this study best fit the sample data. These tests are the multicollinearity and auto- correlation.

If any of the aforementioned problems (multicollinearity and auto-correlation) are evidenced, they should be considered while estimating the final firm value model. Thus, the goodness of fit should be proved first before accepting the final firm value model.

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Table (4) shows that there is no multicollinearity among the regressors of the firm value model. As, the multicollinearity exists when the variance inflation factor (VIF) of any independent variable exceeds 10. Therefore, there is no multicollinearity among the explanatory variables included in the audit quality model because, all explanatory variables show a VIF coefficient ranges from 1: 2 it was less than 10. Table (4) illustrates also the statistic of Durbin-Watson test that is used to test the presence of autocorrelation in the residuals. The Durbin-Watson statistic ranges between 0 and 4. A statistic value near to 2 reflects that there is no autocorrelation detected in the sample. A value approaching zero reflects positive autocorrelation, while values toward 4 indicate negative autocorrelation. Table (5) shows that the value of Durbin-Watson is (1.847) which is close to 2, indicating that there is no serial correlation in the residuals of the model. Therefore, the null hypothesis is accepted which states that the residuals from the regression are not auto-correlated.

Table 4 shows the findings of the OLS regression analysis to examine the association between disclosure of information related to climate change and firm value. From the above table (table 5), the value of calculated F was 22.312 at a significant level 0.000 less than the approved level of significant 0.05 which indicated that the model was deemed fit and statistically significant. This value suggested that the firm value model was statistically valid, was suitable for interpreting the relationship between dependent variable (FV) and independent variables (DCC) and Control Variables (Firm size, profitability, Financial Leverage, and audit quality).

And Adjusted R^2 (20.9%) was used to measure the ability of independent variables to interpret the dependent variable, which indicated that the variations in the independent variables explain almost 21% of the variation in the dependent variable (Firm Value).

The results in table (4) indicate **a positive significant** relationship between disclosure of information related to climate change and firm value, where (β) value of the DCC is positive and equals to 0.151, the value of (t) = 3.165 at a significance level (**Sig**) = 0.002 less than the approved level of significance 5%. This result means that disclosure of information related to climate change has a positive and significant impact on firm value. Consequently, these results support the study's first research hypothesis (H1), we can accept the first hypothesis (H1) suggesting a significant positive association between disclosures of information related to climate change and firm value.

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The present finding is consistent with previous studies suggesting that firm value increases with higher disclosure of information related to climate change. Where that greater DCC improves market value by lowering investor uncertainty. (Vestrelli et al., 2024; Sanjaya & Yoelencia, 2024).

For the control variables, firm value is significantly positively associated with firm size, profitability, and audit quality at the 1% and 10% level. However, firm value has a significant and negative relationship with leverage (LEV) at the 5% level.

1.9.6. 2 second hypothesis: the moderating effect of type of sector on the association between DCC and FV (Model 2):

To testing the validity of second hypothesis research (H2) concerning the association DCC, Sector, and firm value, which states That “*The effect of disclosure of information related to climate change by firms listed on the Egyptian Stock Exchange differs significantly on its value according to the type of sector.*” begins by conducting a Multivariate OLS regression model as shown in table (5).

Table (5) The moderating role of sector type in the relationship between DCC and FV- Model 2

Dependent variable: FV (Tobin’s Q) (Model 2)				
Predictor	Coefficient	t-value	P-value	VIF
DCC	0.160***	3.342	0.001	1.185
Sector	0.016	0.330	0.741	1.219
DCC*Sector	0.196**	2.267	0.024	1.080
Size	0.162***	3.530	0.000	1.087
LEV	-0.140***	-2.917	0.004	1.187
ROA	0.309***	6.803	0.000	1.063
Big4	0.094*	1.861	0.063	1.307
Constant	0.442***	5.246	0.000	-----
R ²	0.228			
Adjusted R ²	0.215			
F-value	16.797 p=0.000			
Durbin-Watson	1.846			
Notes: ***, **, and *denote statistical significance at the 1, 5, and 10 percent levels.				

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Before accepting the OLS audit quality model as a reliable model, there are some goodness of fit tests that should be conducted to confirm that the statistical techniques applied in this study best fit the sample data. These tests are the multicollinearity and auto- correlation.

If any of the aforementioned problems (multicollinearity and auto-correlation) are evidenced, they should be considered while estimating the final audit fees model. Thus, the goodness of fit should be proved first before accepting the final audit fees model.

Table (5) shows that there is no multicollinearity among the regressors of the audit quality model. As, the multicollinearity exists when the variance inflation factor (VIF) of any independent variable exceeds 10. Therefore, there is no multicollinearity among the explanatory variables included in the audit quality model because, all explanatory variables show a VIF coefficient ranges from 1: 2 it was less than 10.

Table (5) illustrates also the statistics of Durbin-Watson test that is used to test the presence of autocorrelation in the residuals. The Durbin-Watson statistic ranges between 0 and 4. A statistic value near to 2 reflects that there is no autocorrelation detected in the sample. A value approaching zero reflects positive autocorrelation, while values toward 4 indicate negative autocorrelation. Table (6) shows that the value of Durbin-Watson is (1.846) which is close to 2, indicating that there is no serial correlation in the residuals of the model. Therefore, the null hypothesis is accepted which states that the residuals from the regression are not auto-correlated.

Table 5 shows the findings of the Multiple regression analysis to examine the sector influences the association between DCC and a firm's value. **From above table (table 5)**, the value of calculated F was 16.797 at a significant level 0.000 less than the approved level of significant 0.05 which indicated that the model was deemed fit and statistically significant. This value suggested that the firm value (FV) model was statistically valid, was suitable for interpreting the relationship between dependent variable (FV), independent variables (DCC), moderating variable (Sector), and Control Variables (size, ROA, LEV, and Big4).

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And Adjusted R^2 (21.5%) was used to measure the ability of independent variables to interpret the dependent variable, which indicated that the variations in the independent variables explain almost 21.5% of the variation in the dependent variable (FV).

The researcher addressed the moderating influence of type of sector (Sector) on the relationship between disclosure of information related to climate change and firm value. According to this model, the interaction term between disclosure of information related to climate change (DCC) and type of sector (Sector) is represented as (DCC*Sector). The results in table (6) indicate a **positive significant** effect of the interactional variable (DCC*Sector) on the association between the disclosure of information related to climate change and firm value, where (β) value of the interactional variable (DCC*Sector) is positive and equals to 0.196, the value of (t) = 2.267 at a significance level (**Sig**) = 0.024 less than the approved level of significance 5%. Consequently, these results support the study's Second research hypothesis (H2). We can accept the second hypothesis (H2).

This finding suggests that the type of sector plays a **moderating role** in strengthening the relationship between climate change-related disclosure (DCC) and firm value. In other words, firms operating in specific sectors—such as those more exposed to environmental risks or more heavily regulated regarding sustainability practices (e.g., energy, manufacturing, or utilities)—tend to derive greater value from disclosing climate change information compared to firms in other sectors. This result aligns with stakeholder theory and legitimacy theory, which emphasize that firms in environmentally sensitive sectors face higher expectations from stakeholders and regulatory bodies, thus benefiting more from enhanced transparency and proactive environmental reporting. Therefore, the significant interaction effect confirms that sectoral characteristics should be taken into account when assessing the economic implications of sustainability disclosures. Firms in high-impact sectors may signal stronger environmental responsibility through such disclosures, thereby enhancing their market valuation and investor confidence.

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The present finding is consistent with previous studies suggesting that Firms in high-impact sectors may signal stronger environmental responsibility through such disclosures, thereby enhancing their market valuation and investor confidence (Masoud, 2020).

1.9.6.3 Third hypothesis: the moderating effect of implementing environmental management system on the association between DCC and FV (Model 3): To testing the validity of third hypothesis research (H3) concerning the association DCC, ISO, and firm value, which states That “*The effect of disclosure of information related to climate change by firms listed on the Egyptian Stock Exchange differs significantly on its value according to implementing environmental management system.*” begins by conducting a Multivariate OLS regression model as shown in table (6).

Table (6) The moderating role of implementing environmental management system in the relationship between DCC and FV- Model 3

Dependent variable: FV (Tobin's Q) (Model 3)				
Predictor	Coefficient	t-value	P-value	VIF
DCC	0.161***	3.282	0.001	1.246
ISO	0.086*	1.885	0.061	1.347
DCC*ISO	0.221**	2.570	0.011	1.084
Size	0.171***	3.738	0.000	1.085
LEV	-0.122***	-2.720	0.007	1.039
ROA	0.331***	7.192	0.000	1.097
Big4	0.118**	2.352	0.019	1.312
Constant	0.443***	5.503	0.000	-----
R ²	0.233			
Adjusted R ²	0.221			
F-value	17.272 <i>p=0.000</i>			
Durbin-Watson	1.855			
Notes: ***, **, and *denote statistical significance at the 1, 5, and 10 percent levels.				

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Before accepting the OLS audit quality model as a reliable model, there is some goodness of fit tests that should be conducted to confirm that the statistical techniques applied in this study best fit the sample data. These tests are the multicollinearity and auto- correlation.

If any of the aforementioned problems (multicollinearity and auto-correlation) are evidenced, they should be considered while estimating the final audit fees model. Thus, the goodness of fit should be proved first before accepting the final audit fees model.

Table (6) shows that there is no multicollinearity among the regressors of the audit quality model. As, the multicollinearity exists when the variance inflation factor (VIF) of any independent variable exceeds 10. Therefore, there is no multicollinearity among the explanatory variables included in the audit quality model because, all explanatory variables show a VIF coefficient range from 1: 2 it was less than 10.

Table (6) illustrates also the statistics of Durbin-Watson test that is used to test the presence of autocorrelation in the residuals. The Durbin-Watson statistic ranges between 0 and 4. A statistic value near to 2 reflects that there is no autocorrelation detected in the sample. A value approaching zero reflects positive autocorrelation, while values toward 4 indicate negative autocorrelation. Table (6) shows that the value of Durbin-Watson is (1.855) which is close to 2, indicating that there is no serial correlation in the residuals of the model. Therefore, the null hypothesis is accepted which states that the residuals from the regression are not auto-correlated.

Table 6 shows the findings of the Multiple regression analyse to examine the implementing environmental management system influences the association between DCC and a firm's value. **From the above table (table 6)**, the value of calculated F was 17.272 at a significant level 0.000 less than the approved level of significant 0.05 which indicated that the model was deemed fit and statistically significant. This value suggested that the firm value (FV) model was statistically valid, was suitable for interpreting the relationship between dependent variable (FV), independent variables (DCC), moderating variable (ISO), and Control Variables (size, ROA, LEV, and Big4).

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And Adjusted R^2 (22.1%) was used to measure the ability of independent variables to interpret the dependent variable, which indicated that the variations in the independent variables explain almost 22.1% of the variation in the dependent variable (FV).

The researcher addressed the moderating influence of implementing environmental management system (ISO) on the relationship between disclosure of information related to climate change and firm value. According to this model, the interaction term between disclosure of information related to climate change (DCC) and implementing environmental management system (ISO) is represented as (DCC*ISO). The results in table (6) indicate **a positive significant** effect of the interactional variable (DCC*ISO) on the association between the disclosure of information related to climate change and firm value, where (β) value of the interactional variable (DCC*ISO) is positive and equals to 0.221, the value of (t) = 2.570 at a significance level (Sig) = 0.011 less than the approved level of significance 5%. Consequently, these results support the study's third research hypothesis (H3), we can accept the third hypothesis (H3).

This finding implies that firms that have adopted ISO14001 environmental management systems tend to experience a **greater positive impact** of climate-related disclosure on their market value compared to firms that have not implemented such systems. The result supports the idea that environmental certifications like ISO enhance the credibility and effectiveness of sustainability disclosures, thereby improving stakeholder perceptions and firm valuation.

This finding is consistent with prior studies, which suggest that firms implementing environmental management systems experience a stronger positive impact of climate-related disclosure on their market value (Sudiyatno et al., 2020).

1.10 Results of the study:

The study concluded that whether the information from climate disclosure is sufficiently reliable or credible to affect investor expectations, or how such information would affect firm value. The researcher concludes that the importance of disclosing climate change to stakeholders enables them to rationalize their decisions and determine the extent of firms' ability to create and maintain value. In addition, the proposed framework contributes to improving the quality of financial reports and the market value of firms.

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This finding suggests that the type of sector plays a **moderating role** in strengthening the relationship between climate change-related disclosure (DCC) and firm value. In other words, firms operating in specific sectors—such as those more exposed to environmental risks or more heavily regulated regarding sustainability practices (e.g., energy, manufacturing, or utilities)—tend to derive greater value from disclosing climate change information compared to firms in other sectors. This result aligns with stakeholder theory and legitimacy theory, which emphasize that firms in environmentally sensitive sectors face higher expectations from stakeholders and regulatory bodies, thus benefiting more from enhanced transparency and proactive environmental reporting. Therefore, the significant interaction effect confirms that sectoral characteristics should be taken into account when assessing the economic implications of sustainability disclosures. Firms in high-impact sectors may signal stronger environmental responsibility through such disclosures, thereby enhancing their market valuation and investor confidence.

1.11 Recommendations:

The need to work on developing an accounting standard for climate change accounting, in light of Egypt's commitment to the Paris Climate Agreement, its adoption of climate change issues, and the holding of the Climate Summit on its soil in November 2022.

The researcher recommends that the Financial Regulatory Authority (FRA) require companies listed on the Egyptian Stock Exchange, regardless of the nature of their activity, to disclose climate change and their performance in this regard through their annual report prepared by their board of directors and attached to the annual financial statements, or through a climate change disclosure report, in accordance with the Egyptian Corporate Responsibility Index and listing on the index.

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ملخص البحث:

هدف البحث: تهدف هذه الدراسة إلى اختبار أثر الإفصاح عن التغيرات المناخية على قيمة المنشأة للشركات المقيدة بالبورصة المصرية. وكذلك أثر بعض المتغيرات المعدلة مثل نوع الصناعة ووجود نظم ادارة بيئية على العلاقة بين الإفصاح عن التغيرات المناخية وقيمة المنشأة .

منهجية البحث: لتحقيق هدف البحث، قام الباحث بتحليل الدراسات السابقة التي قدمتها الأدبيات المحاسبية في مجال الإفصاح عن تغير المناخ، وذلك للاستفادة من الإسهامات العلمية. ثم استخدم الباحث المنهج الاستنباطي لبلورة أثر الإفصاح عن تغير المناخ على قيمة الشركة، وكذلك أثر جودة نظم الإدارة البيئية ونوع القطاع على العلاقة بين الإفصاح عن تغير المناخ وقيمة الشركة، ثم صياغة فرضيات البحث، واختبار هذه العلاقة من خلال دراسة تطبيقية. أما الدراسة التطبيقية، فسيتم اختبار فرضيات البحث من خلال إجراء دراسة تطبيقية على عينة من (٨٠) شركة مدرجة في البورصة المصرية خلال الفترة من ٢٠٢١ إلى ٢٠٢٤، والتوصل إلى نتائج تحقق هدف البحث.

نتائج البحث: خلصت نتائج الدراسة التطبيقية إلى أن الإفصاح عن المعلومات المتعلقة بتغير المناخ له تأثير إيجابي ومعنوي على قيمة الشركة. كما تشير الدراسة إلى أن نوع القطاع يلعب دوراً مُعدلاً في تعزيز العلاقة بين الإفصاح المتعلق بتغير المناخ وقيمة الشركة. تشير هذه النتيجة إلى أن الشركات التي اعتمدت أنظمة إدارة بيئية ISO14001 تميل إلى تحقيق تأثير إيجابي أكبر للإفصاح المتعلق بالمناخ على قيمتها السوقية مقارنةً بالشركات التي لم تطبق هذه الأنظمة. تدعم هذه النتيجة فكرة أن الشهادات البيئية، مثل ISO، تعزز مصداقية وفعالية إفصاحات التغيرات المناخية، مما يحسّن تصورات أصحاب المصلحة وقيمة الشركة.

الإضافة العلمية: تسهم هذه الدراسة في الأدب المحاسبي من خلال تحليل العلاقة بين الإفصاح عن التغيرات المناخية وقيمة المنشأة وقياس أثر (نوع القطاع ووجود نظم ادارة بيئية) على طبيعة هذه العلاقة في بيئة الاعمال المصرية.

الكلمات المفتاحية: الإفصاح عن التغيرات المناخية، قيمة الشركة، نوع القطاع، نظم الادارة البيئية (ISO 14001) .