

# The Impact of Climate Change Disclosure in Light of GRI-G4 on Improving Financial Performance of Companies Listed on EGX 30

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**Abstract-** The purpose of this paper is to identify the impact of disclosure of climate change in light of Global Reporting Initiative (GRI-G4) on improving the financial performance of companies listed on EGX 30. Empirical study was conducted on a sample of companies listed on EGX 30. The authors relied on the content analysis of the sustainability reports of the companies under investigation during the period from 2018 to 2020 to test the hypotheses of the study related to the presence of a significant impact of disclosing climate changes in light of GRI-G4 and financial performance of companies listed on EGX 30. The results indicated that there is a significant impact of the disclosure of climate change light of GRI-G4 on the financial performance of the companies under study, represented by return on assets (ROA) and return on equity (ROE). The authors recommended that the Financial Regulatory Authority and the Egyptian Stock Exchange should implement a number of strict procedures to limiting greenhouse gas (GHG) emissions and requiring companies listed on the stock exchange to disclose climate change in their sustainability reports in order to reduce climate change at various stages.

## Keywords:

Greenhouse Gas (GHG), Return on Assets (ROA), Return on Equity (ROE), Global Reporting Initiative (GRI-G4).

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## 1. INTRODUCTION

Climate change is regarded as one of the most ethical issues confronting companies and society today, as unsustainable commercial activities result in major imbalances in areas such as public health and exposure to climate changes that negatively affect society and the environment (Dahmann et al., 2019). As a result, the issue of climate change is currently of great importance to global development policymakers. The United Nations has held meetings on a regular basis to discuss the issue of climate change, which has become a threat to global development (IPCC, 2018).

Because of the phenomena of climate change and its effects on the worldwide economy in recent years, interest in carbon disclosure research has grown. Despite this trend, there is still a knowledge gap on how greenhouse gas (GHG) disclosures affect company's operation (Bazhair et al., 2022). The cause of these climate changes is an increase in the concentration of (GHG) in the atmosphere, and the gases concentrate solar energy within the atmosphere, raising the earth's temperature. According to the intergovernmental panel on climate change (IPCC), 90% of the increase in the concentration of these gases is caused by human activities, with only 5% due to natural causes (Tarawneh et al., 2022).

As a result, global warming caused by commercial activities is the most difficult environmental problem confronting the world. If the risks of climate change are not investigated, they may have an impact on the ecosystem and endanger future generations. In order to achieve sustainability, companies must protect the environment and society through appropriate disclosure of environmental accounting information (Emmanuel & Ifeanyichukwu, 2021).

In 2010, the US federal government required that companies with industries that emit carbon emissions above a certain limit report these emissions to the Environmental Protection Agency (EPA) on an annual basis, and the US Securities and Exchange Commission required that companies that are listed and affected by climate change disclose the nature of their carbon emissions beginning in February 2010 (Cong & Park, 2020). As a result, countries must work together to reduce the impact of these emissions, which may harm the environment in general and water and agricultural resources in particular.

It should be noted that Securities Exchange and Commission (SEC) is concerned with environmental issues, specifically (GHG) emissions, because the Egyptian Stock Exchange issued the Egyptian index for corporate responsibility (S&PEGX), which is concerned with disclosing environmental issues, social responsibility, and governance through the dissemination of the sustainability report in addition to financial reports (SEC, 2016). Global Reporting Initiative (GRI-G4) has established standards requiring companies to disclose (GHG) emissions when preparing sustainability reports.

It should be noted that one of the most harmful forms of pollution that harms the environment and companies is air pollution, which contributes to global warming, and in terms of transparency and credibility in determining carbon levels.

Financial performance is an important measure of a company's success or failure in its investment plans and decisions. Companies strive to increase their market value in order to optimize their value. Securities exchange and commission (SEC) requires financial and non-financial information represented in sustainability data to make appropriate investment decisions.

The global interest in sustainable development and the report on it, and the impact of these reports on investors' decisions and the Egyptian stock exchange's issuance of the Egyptian index for social responsibility (S&PEGX) increased interest in studies that dealt with testing the impact of the report on sustainable development on the financial performance of companies (Bakhit et al., 2019). As a result of the competitive and globalized environment, companies cannot survive without the support of various stakeholders. Stakeholders are

supposed to take into account the financial position of the company, in this context, the term “financial performance” refers to a measure of how well the company uses assets to generate revenue (Bag & Omrane, 2022). Myková, and Hájek (2017) believe that a company's financial stability is linked to its ability to make profits and increase the value of invested capital, as well as its ability to pay long and short-term obligations.

During a period of increased government pressure to manage GHG emissions, Momin et al. (2017) investigated the GHG disclosure trends, content, and strategies of the biggest emission Chinese power companies. The information was gathered from the annual reports, corporate social and environmental responsibility reports, and websites of eight Chinese energy companies from 2000 to 2009. The authors discovered an increase in GHG disclosures beginning in 2002, when China signed the Kyoto protocol and enacted strict environmental regulations. However, some expected types of GHG -related disclosures were either unavailable or scarce.

Based on the foregoing, the main objective of the paper is to identify and examine the impact of climate change disclosure in the light of the Global Reporting Initiative (GRI-G4) on improving the financial performance of companies listed on the Egyptian Stock Exchange 30.

The study explains the main causes of climate change, GHG accounting disclosure, and financial performance measurement methods, as well as environmental performance indicators in light of GRI-G4.

## **2. LITERATURE REVIEW & HYPOTHESES DEVELOPMENT**

Asare et al., (2022) sought to determine the extent of climate change disclosure among African and Asian energy companies. A quantitative approach was used to evaluate data of 31 companies in 18 African and Asian countries from 2015 to 2020. Using GRI 305: Emissions Indicators, data was collected from GRI database and an index was created to measure climate change disclosure. The study applied a regression model to investigate the relationship between climate change disclosure and its determinants, and it discovered that Asian energy companies disclose more than their African counterparts. While Rosati & Faria (2019) noted that the companies that report on sustainable development goals (SDGs) are probably located in countries that are especially exposed to climate change.

Klç & Kuzey (2018) conducted an empirical study to determine whether the characteristics of corporate governance affect the voluntary disclosure of carbon by collecting data on carbon disclosure from annual and independent sustainability reports of Turkish non-financial companies listed on the Istanbul stock exchange between 2011 and 2015. After examining the aspects of corporate governance that have an impact on carbon disclosure procedures, the authors arrived at the conclusion that companies with independent directors on their boards of directors responded better to the carbon disclosure project. It will give companies strategies and policies for carbon reduction.

El-Deeb, (2019) analyzed data from companies listed in the EGX30 index on the Egyptian stock exchange from 2012 to 2017. The information gathered from annual reports in order to emphasize important challenges, opportunities, strengths, and weaknesses that companies listed on the stock exchange market (EGX30) would face during the integrated reporting (IR) implementation process. The study also examines the relationship between IR compliance and corporate performance and value. The authors calculated company performance with profitability (ROE) and leverage level (Debt ratio), and firm value with capitalized market value. Furthermore, the authors concluded that implementing integrated reporting will improve the performance and value of the organizations.

By developing a theoretical framework that links the risks and opportunities of climate change with the objectives of the company, Bui & De Villiers (2017) aimed to improve

understanding of the strategies adopted by companies to respond to risks and opportunities resulting from government climate change policies, as exposure to climate change risks increased during in the previous period due to changes in the environment change risk assessment. While Parvez et al (2019) used content analysis and the expectations gap framework to identify user expectations through evaluating city disclosure documents, the authors' purpose was to compare user expectations to the quality of GHG disclosures made by cities through the carbon disclosure project (CDP). The authors reached the conclusion that there is a need for change because the information on GHG at the local level is obsolete, and incomplete.

Rosa et al., (2022) conducted research to examine the impact of controlling non-financial information and the factors influencing non-disclosure of GHG emissions. The study was conducted on 125 Italian companies by analyzing the content of their annual reports, and the study concluded that the legislation is still shown in terms of the level of quality of information linked to the disclosure of the company's activities and the resulting GHG emissions.

Johari & Komathy, (2019) discussed the relationship between sustainability reports and the performance of public companies listed in Malaysia, and sustainability reports were measured using the weighted disclosure index according to GRI using content analysis, while the company's performance was measured through profitability ratios represented by the rate of return on assets (ROA) The rate of return on equity (ROE), earnings per share (EPS), and dividends per share (DPS). Sustainability reports had a positive relationship with the company's performance when using ROA & EPS, while using ROE & DPS; revealed an insignificant negative relationship.

In Maryani (2022), it was determined that manufacturing companies listed on the Indonesia stock exchange for the years 2018–2019 would be examined to determine the effects of corporate social responsibility (CSR) disclosure on ROA, ROE, and net profit margin. GRI-G4 Index was used to assess CSR. ROA, ROE, EPS, and net profit margin are used to determine profitability. While Digoride's et al., (2022) examined the impact of environmental performance, profitability, and efficiency on environmental disclosure in mining industry companies listed on the Indonesia Stock Exchange. The annual reports of the companies from 2014 to 2021 were collected for the sample, which consisted of 15 mining companies, and the findings indicated that environmental performance had a positive and significant impact on environmental disclosure. Moreover, in this case, profitability had a negative effect on environmental disclosure.

From here, and as a result of the climatic and environmental changes caused by recent industrial development, and companies' desire to produce large quantities in order to maximize profits, which resulted in an increase in industrial waste, which negatively affected climate changes, there has been an increased interest in disclosing sustainability reports for companies through the preparation of non-financial information represented in environmental, economic, and social data.

There are some literature review (Momin et al., 2017; Asare et al., 2022; Kılıç & Kuzey, 2018; Bui & De Villiers, 2017; Parvez et al., 2019; Rosati & Faria, 2019; Rosa et al., 2022) that dealt with the investigation of GHG disclosure trends, identifying the extent of climate change disclosure among the companies under study, or conducting empirical research by obtaining carbon disclosure data from the companies' annual and independent sustainability reports, or using the expectations gap framework to examine quality disclosure of GHG.

While (Johari & Komathy, 2019; Maryani, 2022; Digdowiseiso et al., 2022) discussed the analysis of the impact of corporate social responsibility disclosure on return on assets, return on equity, and net profit margin. The company's performance was measured through

profitability ratios represented by the rate of return on assets or the rate of return on equity (ROA & ROE) or earnings per share and dividends on shares (EPS & DPS).

Based on the foregoing, it can be noted a scarcity of literature review that discuss the impact of climate change disclosure in light of GRI-G4 on improving financial performance, so authors seek to identify the impact of climate change disclosure in light of GRI-G4 on improving financial performance by applying to companies listed in the EGX30 index.

The statistical hypothesis was formulated for the relationship between the level of disclosure of climate change in the light of GRI-G4 (as an independent variable) and financial performance indicators (as a dependent variable).

Accordingly, the hypothesis can be formulated as below:

*There is a statistically significant impact for the disclosure of climate change in the light of GRI-G4 on improving the financial performance of the listed companies in the EGX30 index.*

### **3. THE THEORETICAL BACKGROUND**

Global warming is a complex issue that represents a significant challenge to the entire world, as it may result in ocean melting and a full change in temperature. This has a significant impact on the environment and threatens the survival of many living things. The main cause of this phenomenon is the human being, particularly since the industrial revolution, which resulted in the release of humongous amounts of carbon dioxide, gases, and other gases that, if not controlled and reduced, will have disastrous consequences (Ahmed, 2020).

#### **3.1. Global Warming**

Climate change is defined as an unequal distribution in the normal climatic conditions that characterize each region of the Earth, such as temperature, wind, and rain. Rainfall and its types, in addition to increasing the likelihood of extreme climatic events (Environmental Affairs Agency, 2014).

Climate change refers to a significant change in the climate, such as rain, temperature or wind. The causes of climate changes can be divided into human and natural causes, which can be explained as follows: (Fakana, 2020; IPCC, 2018; 2020; EPA, 2010)

- **Human Causes**

Human activities have changed and continue to change the composition of the earth's surface and atmosphere. Human-caused activities that cause climate change include Deforestation which plays an important role in the Earth's climate system in a variety of ways. The reason for this is that they absorb CO<sub>2</sub> from the atmosphere and convert it to oxygen via photosynthetic process, Changes in Land use that have contributed to desertification and land degradation, GHG Emissions that has risen nearly twice the global average temperature due to the emission of greenhouse gases, Burning Fossil Fuels where the global agricultural food sector uses more than 30 percent of global energy demand for end use, which is used through fossil fuel sources, As well as, Pollutant emissions where Some industrial and agricultural processes emit pollutants other than GHG that produce tiny droplets or suspended particles in the atmosphere.

- **Natural Causes**

Although human activities are the root driver of climate change, there are some major natural factors that lead to climate changes include The Intensity of Sun where Climate is affected by natural changes that affect the amount of solar energy that reaches the earth's surface, Changes in Ocean Current Circulation, Since the 1950s, geologists and oceanographers have been gathering convincing evidence that change in ocean current circulation is a major determinant of climate change, As well as, Sea Level Rise where The

average sea level rise is projected to increase as a result of the thermal expansion of the oceans and the melting of glaciers.

Climate change and global warming are two of the most serious, difficult, and dangerous environmental issues that exist today. The reports of the intergovernmental panel on climate change (IPCC), an international organization associated with the United Nations (UN), and the World Meteorological Organization (WMO) have confirmed that GHG emissions from factories and transportation, as well as the use of fossil fuels as a source of energy and others, are the main cause of the climate change problem (Khalil, 2014).

The issue of climate change is considered one of the important and vital issues, not only because of the potential negative effects on Egypt, but also those effects extend to all political, economic, social and environmental levels. On the other hand, Egypt approved the Sustainable Development Goals (SDGs) on September 23, 2015, which included 17 goals that directly addressed climate change, including Goal No. 13, indicating the close relationship between sustainable development on the one side and climate change on the other side (COP27, 2022).

To illustrate Egypt's commitment to the importance and seriousness of climate change, it has formally adopted the United Nations Framework Convention on Climate Change (UNFCCC) and signed the Kyoto Protocol to ensure its people's health access to natural resources by implementing numerous appropriate measures to reduce the negative effects of this phenomenon (Environmental Protection Agency, 2017).

There are numerous international agreements and protocols concerning GHG emissions, with the United Nations Framework Convention on Climate Change (UNFCCC) being one of the most important. It is a global environmental agreement that has entered into force and establishes a general framework for intergovernmental efforts to address the challenges posed by climate change (Elmalah, 2018).

The states parties to the United Nations Convention on Climate Change (UNFCCC) approved the agreement at its third conference in Kyoto, Japan, in 1997, requiring the industrialized countries included in the agreement to reduce their GHG emissions through the so-called clean development strategy to reduce greenhouse gases GHG, which requires the developed industrial countries to implement projects that reduce GHG, and developed countries receive carbon credits in exchange for certificates of emission reduction (Allan & Kruppa, 2012).

Paris Agreement was held from November 30 to December 12, 2015, all (156) participants gathered at the United Nations Climate Change Conference in Paris and adopted Paris Financial Consensus, which aims to reduce global warming (COP21, 2015). Also, GHG Protocol that is a cooperation between multi-stakeholder corporations, non-governmental organizations (NGOs), and governments organized by the World Business Council for Sustainable Development and the World Resources Institute to develop and promote accounting standards and protocols. The GHG Protocol initiative is divided into a corporate accounting and reporting standard, and project protocol (Khalil, 2014).

The accounting and reporting standard is intended to provide companies and other types of organizations with guidance in developing greenhouse gas inventories. This standard addresses the accounting and reporting of the six Kyoto Protocol GHG: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (NO<sub>2</sub>), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur oxides (SO<sub>2</sub>) (Khalil, 2014).

A group of leading investment institutions from around the world issued global framework for climate risk disclosure, a new statement regarding the disclosure that investors expect from companies, and the opportunities resulting from climate change. The most important organizations that have disclosed climate change include **Global Climate Change Disclosure Framework**; In order to examine risks and opportunities for companies, the global climate risk disclosure framework requires that companies directly disclose

climate risks to investors and stock analysts through reports, Climate risk disclosure must include Climate change physical risk assessment investors encourage companies to disclose information climate change impacts on their operations, Analysis of legislative risks associated with the implementation of new legislation to reduce GHG emissions that may affect companies with direct or indirect emissions, Strategic climate risk evaluation and emissions management where investors are looking for strategic analysis that identifies a company's future climate change challenges, risks, and opportunities, and Emissions where companies must disclose their total GHG emissions, including direct and indirect GHG emissions from their actual and expected future historical operations (Tarawneh et al., 2022; Ceres, 2008; Bui & De Villiers, 2017). **Sustainability Accounting Standards Board (SASB)** where This board is an independent organization that establishes sustainability accounting standards that satisfy the demands of investors by raising the quality of sustainability disclosing information (Bishop, 2018). **The Institute of Chartered Accountants of Australia (ICAA)** encourages the adoption of the GHG Protocol requirements, with a particular emphasis on carbon disclosure through clean development mechanisms and carbon emissions disclosure (Tang & Hu, 2019).

### ***3.2. Accounting Disclosure of GHG and Financial Performance Measures***

Climate change is one of the biggest challenges facing humanity (Rolnick et al., 2022), which has led to interest about the problems caused by climate change and the emergence of new environmental systems, including environmental accounting, which is one of the elements that contribute to corporate governance (Nor et al., 2016), Which requires companies to pay attention to climate change and try to improve their activities in a way that maintains a clean environment free of GHG emissions.

Environmental reporting is a means of communicating environmental performance information by a company to stakeholders. Information on environmental performance includes among others the impact of company operations on climate change, the environment, performance in managing those impacts, and contribution to environmental and sustainable development (Ika et al., 2021).

Disclosure of information related to social interactions has become a contemporary feature of the corporate environment in the twenty-first century, as it is considered an important part of corporate reports as a whole, and many companies have begun to improve the disclosure of their GHG reduction strategy (Altintas, 2013), As a result, there has been an increased interest in disclosing corporate sustainability reports, especially as a result of recent economic collapses, global financial crises, and environmental and climatic changes. To meet the changing needs of users, financial reporting has evolved from simply disclosing basic financial data to including detailed information on environmental, economic, and social impacts (Deif Allah, 2021).

The following are the basic principles of accounting and reporting for GHG, which is included in the first section of accounting and reporting standard: (GHG accounting principles, 2021; Tarawneh et al., 2022)

- 1. Relevance:** Ensure that the GHG inventory clearly represents the company's emissions of these gases in a way that facilitates users' decision-making at the company's internal and external levels.
- 2. Comprehensiveness:** Accounting for and disclosing all emissions of GHG from all sources and operations that are subject to inventory restrictions, as well as any exceptions.
- 3. Consistency:** the application of simple methods that enable ongoing comparisons of emission levels, with time series clearly documenting any changes in data, stock constraints, methodology, or other relevant elements.

4. **Transparency:** the process of dealing with all relevant issues in a realistic and coordinated manner, based on a thorough assessment, disclosing any relevant assumptions, and providing references and data sources used in accounting procedures.
5. **Accuracy:** Ensure that GHG emissions are consistently measured and are not higher or lower than real emissions levels.

Financial performance is a key indicator of a company's success or failure in its investment decisions and strategies. Companies seek to increase the market value of their shares in order to optimize their value. A lot of information helps them make the right decision in the stock market, and authors in the field of investment and financial analysis have tended to develop measures to evaluate financial performance, and one of the most important factors affecting the financial performance of companies is the disclosure of sustainability reports, as sustainability is necessary for companies to succeed in the long term and increase their value (Younes, 2021).

Financial ratios are among the most important financial analysis tools commonly used in measuring and evaluating the company's financial position during a certain period of time. Financial ratios and indicators can be divided into five types, which are **Liquidity ratios**; that measure a company's ability to meet obligations in the short term. The relationship between current assets and current liabilities determines liquidity ratios. Current ratio and quick liquidity ratio are the most important of these ratios. **Profitability ratios**; that are used to assess the performance of a company. ROE, ROA, gross profit ratio, and profit margin ratio are the most important of these ratios. **Leverage ratios**; they show how much debt is used to finance the company's assets compared to how much the owners contribute. The debt-to-equity ratio and the outstanding debt ratio are the most important of these ratios. **Turnover ratios**; that refer to the company's efficiency in managing assets and contributing to higher sales and revenues. The working capital turnover rate, debtor turnover rate, and assets turnover rate are the most important of these ratios. **Ratios related to investment in stock exchange**; that refers to ratios that are directly related to the decisions of investors, and the most important of these ratios are earnings per share (EPS), ear, return per share, and cash dividend ratio (Maynard, 2017; Elmalah, 2018; Bag & Omrane, 2022; Batchimeg, 2017).

Companies must disclose GHG and completely cooperate with professional organizations' rules for GHG disclosure as a result of social pressures. Companies' responses have begun by disclosing GHG emissions in a new way and considering the economic effects of these emissions and their impact on supply and demand for their products and services, as well as the company's reputation and what may be incurred in terms of lawsuits and operational or fines that may arise, which may raise investors' doubts about the financial risks and the desire of these investors. (Tarawneh et al., 2022), In particular, the disclosure of GHG emissions is one of the most important issues at the academic level and in practice, due to the difficulties related to measuring and how to report on these emissions.

There are many benefits that may occur as a result of disclosing GHG emissions, including; Reports help to reduce GHG emissions, increase transparency for stakeholders, reduce information asymmetry between management and stakeholders, and lower risks for investors, all of which contribute to market credibility. Disclosing GHG emissions lead to increasing stakeholder awareness of the risks and potential future consequences of climate change, improving the company's brand and reputation. Also, separate report on GHG emissions provides a more comprehensive picture and strengthens the company's strategy (Nicholls & Moolla, 2013; Tarawneh et al., 2022; Khalil, 2014).

Sustainability reporting is the process by which companies disclose the economic, environmental, and social impacts of their operations (GRI, 2019), The sustainability report focuses on disclosing GHG emissions within environmental issues, as emissions are reflected



in company's financial performance and value, and rebuilding confidence for all stakeholders in making rational decisions (Elmalah, 2018).

There are several indicators and initiatives for sustainability reporting, such as the Dow Jones Index, the Global Reporting Initiative Standards (GRI-G4) and the Egyptian Index for Social Responsibility (EGX).

The Global Reporting Initiative (GRI-G4) includes standards for measuring the environmental dimension and is called (300) group, as well as indicators for measuring social issues and is called the (400) group. These are basic indicators applicable to most companies, and they have been implemented since July 2018.

The indicators for measuring the environmental dimension include indicators related to the impact of companies on the environment in general, which leads to GHG emissions. The emissions side of the environmental dimension contains seven criteria according to (GRI-G4), and includes the following: (GRI, 2016)

- **G4-EN15:** Direct Greenhouse Gas Emissions.
- **G4-EN16:** Indirect Greenhouse Gas Emissions from Energy Consumption.
- **G4-EN17:** Other indirect greenhouse gas emissions.
- **G4-EN18:** Intensity of greenhouse gas emissions.
- **G4-EN19:** Reduction of greenhouse gas emissions.
- **G4-EN20:** Emissions of substances that deplete the ozone layer.
- **G4-EN21:** Nitrogen oxides, sulfur oxides and other significant air emissions.

It should be noted that the EGX 30 index requires companies to disclose greenhouse gas emissions, climate change risks, nitrogen oxide emissions, ozone-depleting substance emissions, and other emissions (SEC, 2016), and a number of local companies seek to adhere by the principles of this declaration to maintain its reputation and image in front of stakeholders including shareholders, customers, and suppliers.

Ranges of GHG emissions are **Scope 1**; Companies disclose GHG emissions caused by their operations, such as chemical processing, transportation of raw materials, products, waste, employees, electricity or heat generation, which results in air pollution from truck gas emission. **Scope 2**; Electricity's Indirect GHG emissions purchased electricity is one of the largest sources of GHG emissions when companies disclose emissions from the generation of electricity purchased and consumed in equipment. There are numerous reasons why companies should report this type of emissions, including; Companies can reduce their use of electricity by investing in energy efficient and energy conservation technologies, and Scope 2 emissions accounting and reporting allows companies to assess the risks and opportunities associated with changing electricity costs and GHG emissions. **Scope 3**; all other indirect emissions from the company's activities that may occur from sources that the company does not own or control. Scope 3 for other indirect GHG emissions is optional, but it provides an opportunity for companies to innovate in GHG management by focusing on accounting and disclosure of activities that are relevant to their company and objectives and for which they have reliable information (Liebsch, 2023; Tarawneh et al., 2022; GHG, 2012; GRI, 2016).

#### **4. RESEARCH METHOD**

The companies listed in the sustainability index, which contains (30) companies that are more committed to following the sustainable development standards (GRI-G4) than the other companies listed on the Egyptian Stock Exchange, represent the study population Between (2018 & 2020), The study's sample consists of (10) financial and non-financial companies chosen based on their obligation to publish sustainability reports during the study period and their publication on the webpages.

The independent variable in the study model is climate change disclosure in light of GRI-G4; the dependent variable is financial performance of companies listed on the EGX 30.

Climate change disclosure in light of GRI-G4 (independent variable) measured through content analysis based on an index consisting of 6 axes prepared by the authors to measure disclosure of GHG emissions GHG for companies under study, whereas financial performance of companies listed on EGX 30 (dependent variable) measured through financial performance indicators represented in ROA and ROE.

In order to achieve the research objectives, the authors conducted a content analysis of the sustainability reports published by the companies in the sustainability index between (2018 & 2020). Nvivo 11 program was used as an innovative method in this field, specifically in comparing non-financial information on environmental issues to determine whether polluting companies disclosed for more information than those working in other sectors (Artene, et al., 2020).

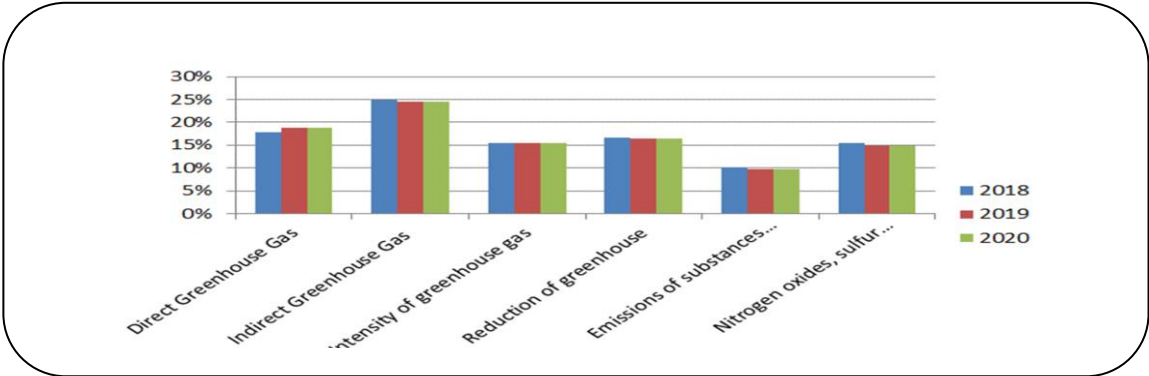
Data is handled by gathering and entering data into Excel for calculation, then entering the collected information into the Statistical Package for Social Sciences Software (SPSS) to analyses the obtained information about the sample for hypothesis testing. Multiple linear regression is used to ascertain the impact of independent factors on the dependent variables, whereas Pearson Correlation Matrix is used to demonstrate the association between all variables, whether it be positive or negative, and to check for multicollinearity.

**5. DATA ANALYSIS & DISCUSSION OF RESULTS**

Throughout the study period, a descriptive analysis was carried out by gathering and analyzing information from various sources using the NVivo 11 program (Elsayed, & Ammar, 2020), at the same way, The authors used NVivo 11 program to carry out a content analysis for sustainability to measure disclosure of GHG emissions companies under study. The findings of the content analysis of the companies under study are as follows:

**Abu Qir Fertilizers**

According to GRI-G4, the majority of the disclosure rates related to the climate change disclosure index ranged from 15% to 24% for the Abu Qir Fertilizer Company, while the disclosure rates related to emissions of substances that deplete the ozone layer decreased to 10% compared to the rest of the disclosure index.



**Figure (1) The level of Disclosure of Abu Qir Fertilizers Company about the Items of Climate Change in Accordance with GRI-G4**

**Alexandria Mineral Oils**

With regard to the Alexandria Mineral Oils Company, most of the disclosure rates ranged from 18% to 31%, which is a high percentage compared to the disclosure rates for

emissions of substances that deplete the ozone layer, nitrogen oxides, sulfur and other important air emissions, which ranged from 3% to 9%.

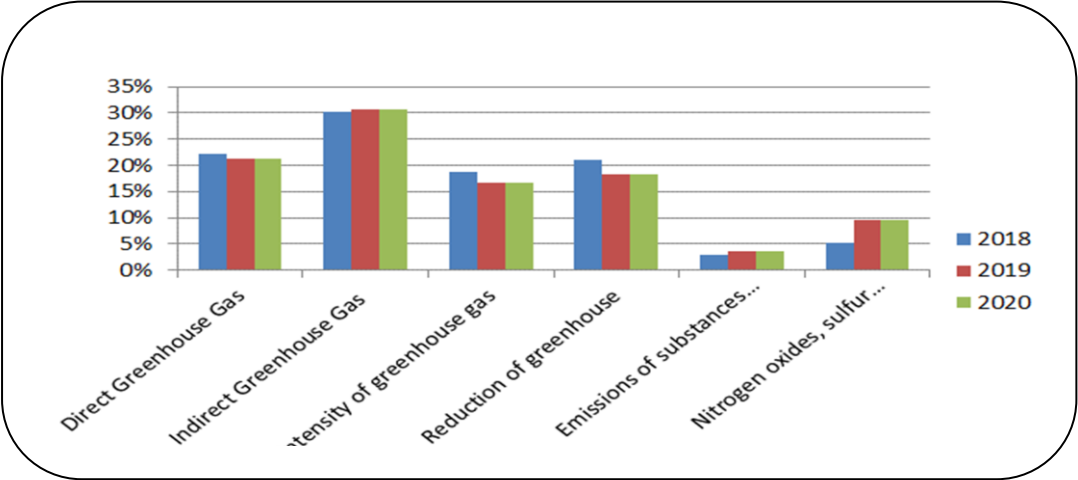


Figure (2). The Level of Disclosure of Alexandria Mineral Oils Company about the Items of Climate Change in Accordance with GRI-G4

**Dana Gas**

By conducting a content analysis according to the disclosure index of Dana Gas Company, it is noted that the percentage of disclosure of emissions of substances that deplete the ozone layer, nitrogen oxides, sulfur and other important air emissions, which ranged between 2% to 5%, was low, while the disclosure rates for the rest of the disclosure index items ranged between 22% to 25%.

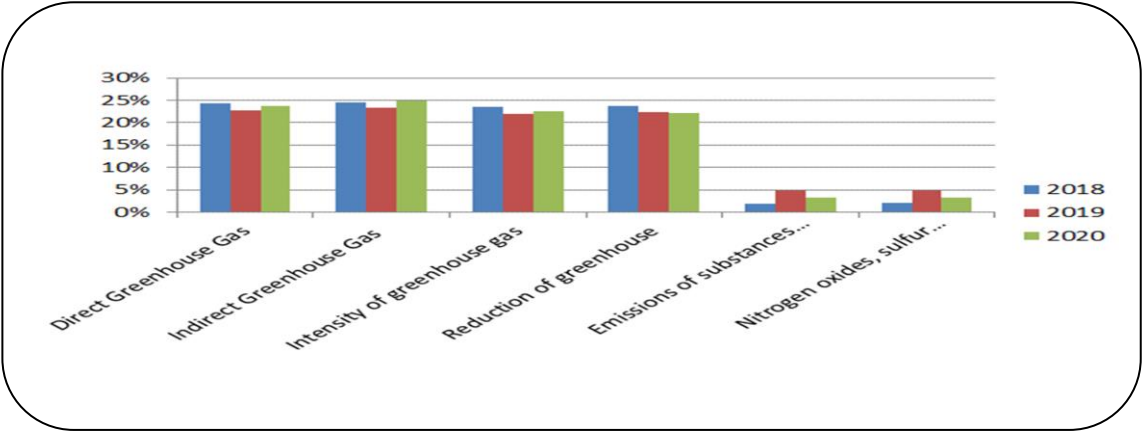
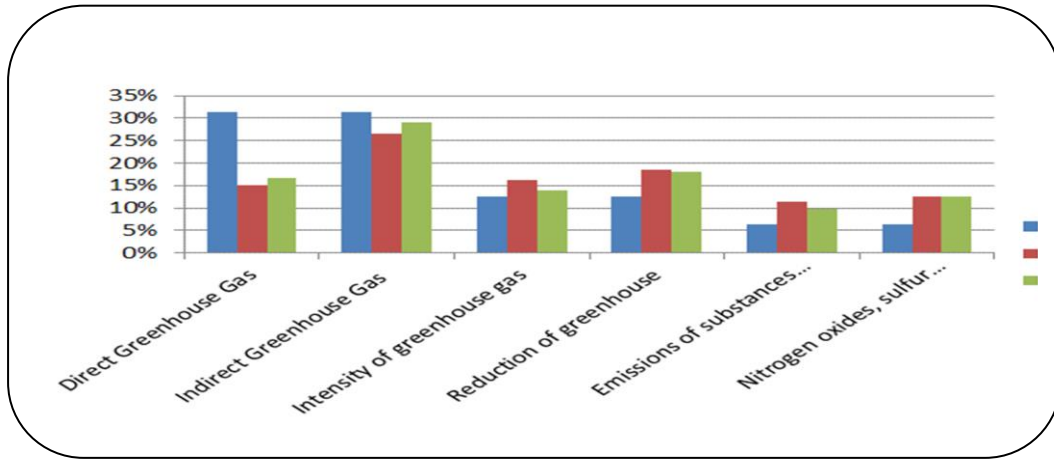


Figure (3). The Level of Disclosure of Dana Gas Company about the Items of Climate Change in Accordance with GRI-G4

**Edita Food Industries**

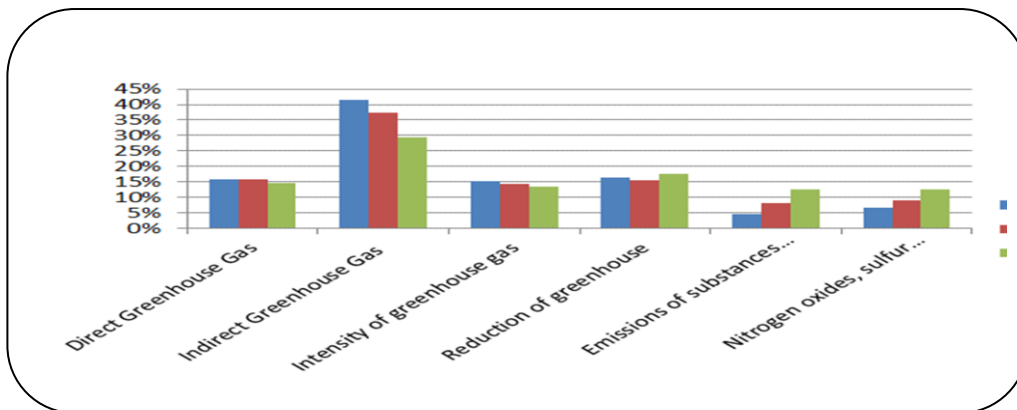
Most of the disclosure rates for Edita Food Industries Company ranged between 14% and 31%, with the exception of items related to disclosure of emissions of substances that deplete the ozone layer, nitrogen oxides, sulfur and other important air emissions, the disclosure rates of which ranged between 6% and 13%.



**Figure (4). The Level of Disclosure of Edita Food Industries Company about the Items of Climate Change in Accordance with GRI-G4**

### El Sewedy Electric

El Sewedy Electric Company's disclosure rates for the index axes ranged from 13% to 41%, with the exception of the disclosure rates for substances that deplete the ozone layer and nitrogen oxides in 2018 and 2019, which decreased and ranged from 5% to 9%.



**Figure (5). The Level of Disclosure of El Sewedy Electric Company about the Items of Climate Change in Accordance with GRI-G4**

### GB Auto

The disclosure rates of GB Auto have increased with regard to the indications of GHG emissions, whether direct or indirect, and the reduction of these emissions, which ranged from 15% to 29%, while the disclosure of sulfur oxides and emissions of substances that deplete the ozone layer, which ranged from Between 10% and 13%.

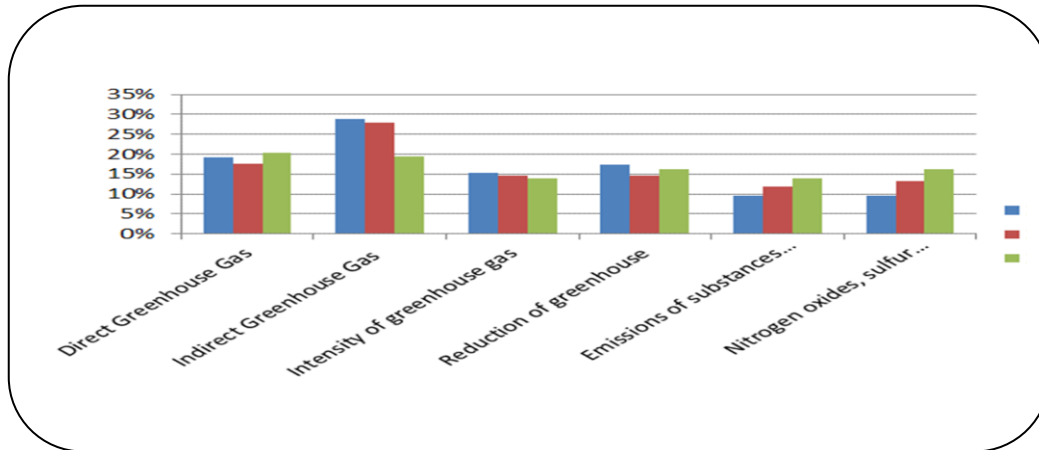


Figure (6). The Level of Disclosure of GB Auto Company about the Items of Climate Change in Accordance with GRI-G4

### Hermes Holding

According to the content analysis results for Hermes Holding Company, the percentage of disclosure of GHG emissions, whether direct or indirect, resulting from energy consumption has increased, with disclosure rates ranging from 50% to 67%, and the percentage of disclosure of some indicators, such as nitrogen oxides and spent material emissions, was absent. In most study years.

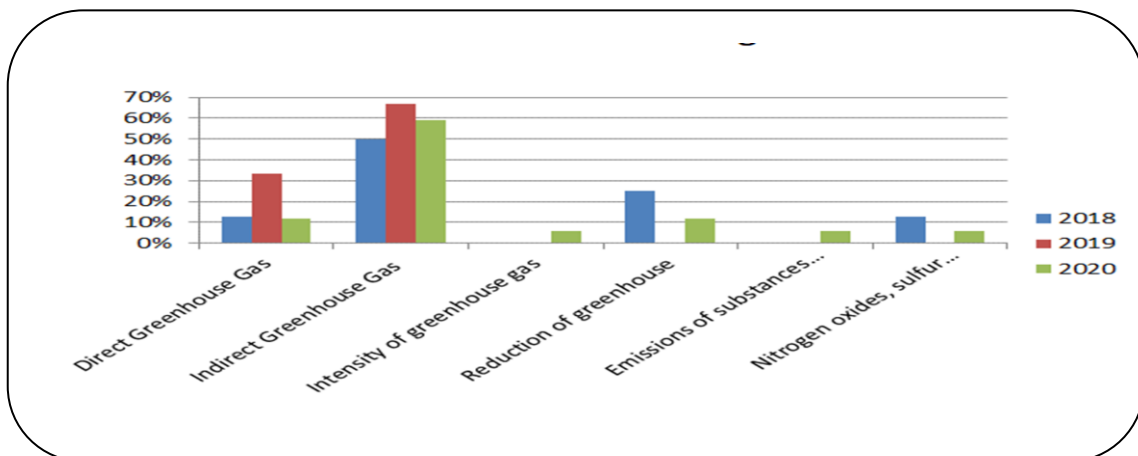


Figure (7). The Level of Disclosure of Hermes Holding Company about the Items of Climate Change in Accordance with GRI-G4

### Juhayna

The results of Juhayna Company's content analysis revealed relatively close percentages at the level of all disclosure index items, ranging from 10% to 33%. While the disclosure rate for indirect GHG emissions increased in 2018 that exceeded 40% when compared to other disclosure rates.

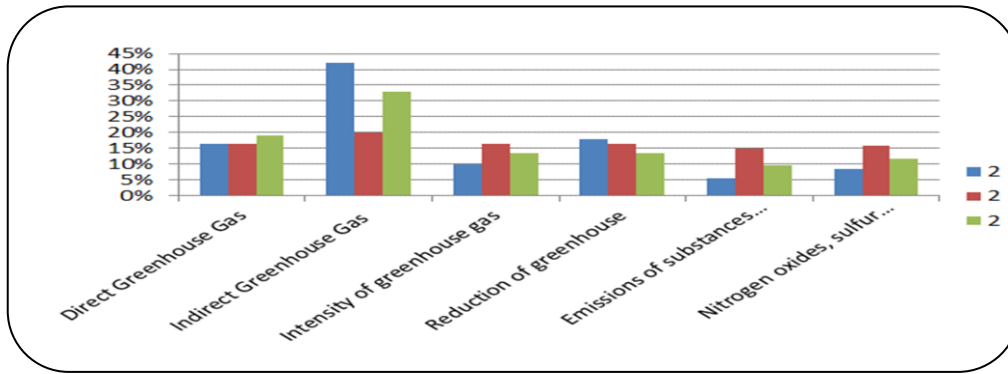


Figure (8). The Level of Disclosure of Juhayna Company about the Items of Climate Change in Accordance with GRI-G4

### Raya for Call Center Services

With regard to Raya Call Center Services Company, most of the index items ranged between 13% to 33%, while the percentage of disclosure of direct GHG emissions increased to 67%, but most of the index items came with a value of zero in 2019.

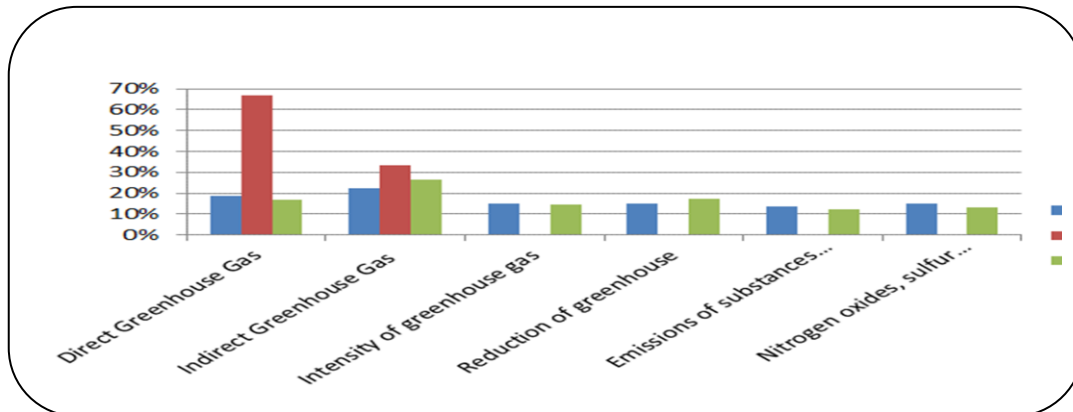


Figure (9). The Level of Disclosure of Raya for call center services Company about the Items of Climate Change in Accordance with GRI-G4

### The Egyptian Kuwaiti Holding

The results of the Kuwaiti Egyptian Holding Company's content analysis revealed that the disclosure rates for most index items ranged between 22% and 29%, while the disclosure rates for ozone-depleting substances and nitrogen oxides decreased significantly across all years of the study.

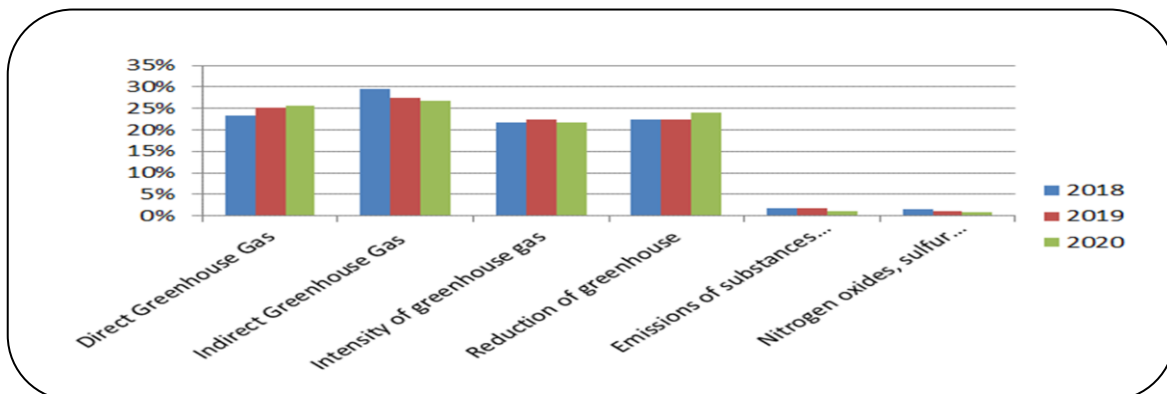


Figure (10). The Level of Disclosure of the Egyptian Kuwaiti Holding Company about the Items of Climate Change in Accordance with GRI-G4

The authors used statistical analysis represented in Pearson Correlation to test the study's hypothesis, which states that "there is a statistically significant impact for the disclosure of climate change in the light of GRI-G4 on the financial performance of the listed companies in the EGX30 index".

**Table (1). Correlation Coefficient Matrix between Climate Change Disclosure & ROA**

Variables	ROA	Direct Greenhouse	Indirect Greenhouse	Intensity of greenhouse gas emissions	Reduction of greenhouse gas emissions	Emissions of substances	Nitrogen oxides	Firm Size	Heavy Industry
ROA	1								
Direct Greenhouse	-0.04	1							
Indirect Greenhouse	-0.35	0.031	1						
Intensity of greenhouse gas	0.128	-0.281	-0.714	1					
Reduction of greenhouse gas	-0.01	-0.561	-0.443	0.698	1				
Emissions of substances	0.274	-0.468	-0.472	0.117	-0.044	1			
Nitrogen oxides	0.404	-0.568	-0.351	-0.061	0.079	0.848	1		
Firm Size	0.272	-0.191	0.438	-0.429	-0.252	0.043	0.204	1	
Heavy Industry	0.08	-0.121	-0.391	0.63	0.451	-0.111	-0.111	-0.226	1

**Table(2). Correlation Coefficient Matrix between Climate Change Disclosure & ROE**

Variables	ROE	Direct Greenhouse	Indirect Greenhouse	Intensity of greenhouse gas emissions	Reduction of greenhouse gas emissions	Emissions of substances	Nitrogen oxides	Firm Size	Heavy Industry
ROE	1								
Direct Greenhouse	-0.02	1							
Indirect Greenhouse	-0.39	0.031	1						
Intensity of greenhouse gas	0.093	-0.281	-0.714	1					
Reduction of greenhouse gas	-0.06	-0.561	-0.443	0.698	1				
Emissions of substances	0.364	-0.468	-0.472	0.117	-0.044	1			
Nitrogen oxides	0.448	-0.568	-0.351	-0.061	0.079	0.848	1		
Firm Size	0.292	-0.191	0.438	-0.429	-0.252	0.043	0.204	1	
Heavy Industry	0.096	-0.121	-0.391	0.63	0.451	-0.111	-0.111	-0.226	1

The matrix of correlation coefficients between climate change disclosures in light of GRI-G4 and financial performance (ROA & ROE) for the companies under study is displayed in Tables No. (1) & (2).

The previous table shows that there is a correlation between financial performance and climate change disclosures, which are represented in the items of the content analysis index, in either a direct or inverse relationship (ROA & ROE).

In order to determine the impact of using the content analysis indicator items to evaluate GHG emissions disclosure on financial performance for the companies under study in light of GRI-G4, the authors employed multiple linear regression analysis.

**Table 3. Multiple Linear Regression Models for the Impact of Content Analysis Indicator Items on ROA**

Variables	Regression Coefficient B	Standard Regression Coefficient, Beta	T Value Calculated	P-Value	Sig.	VIF
Constant	-.034-		-.216-	.831	Not-sig.	
Direct Greenhouse Gas Emissions.	-2.692	-.433-	-2.924-	.012	Sig.	3.853
Indirect Greenhouse Gas Emissions from Energy Consumption.	-.372-	-.433-	-4.524-	.043	Sig	3.853
Intensity of greenhouse gas emissions.	1.220	.826	3.941	.035	Sig	8.617
Reduction of greenhouse gas emissions.	-1.209-	-.746-	-2.585-	.017	Sig	3.972
Emissions of substances that deplete the ozone layer.	-2.251-	-1.141-	-2.728-	.012	Sig	8.332
Nitrogen oxides, sulfur oxides and other significant air emissions.	2.136	1.231	2.803	.010	Sig	9.192
Firm Size	.031	.386	2.136	.044	Sig	1.555
Heavy Industry	-.033-	-.176-	-.862-	.398	Not-sig.	1.979
<b>General Indicators of the Model:</b>						
<b>Multiple Correlation Coefficient R</b>	<b>.391</b>					
<b>Coefficient of Determination R<sup>2</sup></b>	<b>.538</b>					
<b>Calculated value of F</b>	<b>3.662</b>					
<b>Degree of Freedom (N-1)</b>	<b>29</b>					
<b>p-value</b>	<b>.009</b>					

Based on the above Table, it can be concluded that the coefficient of determination ( $R^2$ ) is (.538), which shows that 53.8% of the change in ROA for companies under study can be attributed to the items of content analysis connected to disclosing about climate change in light of GRI-G4, was used to confirm the accuracy of the model reconciliation. The multiple correlation coefficient (R) value was (.391), and these findings show that the correlation coefficient is significant at a level that is significant (0.05%). Using the multiple regression analysis method, it was possible to measure the impact of climate change disclosure in light of GRI-G4 on (ROA) for companies under study. It was discovered that there was a statistically significant relationship between climate change disclosure and ROA for companies under study, with a significance value of .009 (p-value 0.05). As shown in Table (3), the model is significant overall because the P-Value is less than 5%, and it also makes it clear that there is a significant relationship between all variables except for the variable related to Heavy Industry. Therefore, the hypothesis, which states that "there is a statistically significant impact for the disclosure of climate change in light of GRI-G4 on the financial performance specifically (ROA) for companies under study., can be accepted. The results of



the statistical analysis are in compliance with the results of Ahmed (2020) and Bakhit et al., (2019).

Table (4) shows the impact of content analysis indicator items on ROE; where the coefficient of determination ( $R^2$ ) is (.540), which states that 54% of the change in ROE for companies under study can be attributed to the items of content analysis connected to disclosing about climate change in light of GRI-G4, was used to confirm the accuracy of the model reconciliation.

**Table (4). Multiple Linear Regression Model for the Impact of Content Analysis Indicator Items on ROE**

Variables	Regression Coefficient B	Standard Regression Coefficient, Beta	T Value Calculated	P-Value	Sig.	VIF
Constant	.024		.098	.923	Not-Sig.	
Direct Greenhouse Gas Emissions.	2.055	2.445	3.460	.032	Sig.	1.555
Indirect Greenhouse Gas Emissions from Energy Consumption.	-.800-	-.612-	-2.156-	.042	Sig.	3.853
Intensity of greenhouse gas emissions.	.875	.389	3.915	.037	Sig.	8.617
Reduction of greenhouse gas emissions.	-1.420-	-.575-	-2.997-	.038	Sig.	3.972
Emissions of substances that deplete the ozone layer.	-2.083-	-.693-	-1.660-	.111	Sig.	8.332
Nitrogen oxides, sulfur oxides and other significant air emissions.	2.107	.797	1.819	.083	Sig.	9.192
Firm Size	.055	.445	2.470	.022	Sig.	1.555
Heavy Industry	-.004-	-.016-	-.077-	.939	Not-Sig.	1.979
<b>General Indicators of the Model:</b>						
<b>Multiple Correlation Coefficient R</b>	<b>.735</b>					
<b>Coefficient of Determination <math>R^2</math></b>	<b>.540</b>					
<b>Calculated value of F</b>	<b>3.690</b>					
<b>Degree of Freedom (N-1)</b>	<b>29</b>					
<b>p-value</b>	<b>.009</b>					

The multiple correlation coefficient (R) value was (.735), and these findings show that the correlation coefficient is significant at a level that is significant (0.05%). Using the multiple regression analysis method, it was possible to measure the impact of climate change disclosure in light of GRI-G4 on ROE for companies under study. It was discovered that there was a statistically significant relationship between climate change disclosure and ROE for companies under study, with a significance value of .009 (p-value 0.05). The results reveal that the model is significant overall because the P-Value is less than 5%, and it also makes it clear that there is a significant relationship between all variables except for the variable related to Heavy Industry. Therefore, the hypothesis, which states that "there is a statistically significant impact for the disclosure of climate change in light of GRI-G4 on the financial performance specifically ROE for companies under study., can be accepted.

## 6. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

The main objective of this paper is to identify and examine the impact of climate change disclosure light of the Global Reporting Initiative (GRI-G4) on improving the financial performance of companies listed on the EGX 30. The paper discussed the causes of climate change, the accounting disclosure of GHG, and methods for measuring financial performance, in addition to indicators for measuring environmental performance in light of GRI-G4.

Scientific research methodology requires objectivity, access to logical conclusions, and control within the framework of analysis related to the nature of the study. The limitations of this study are represented in the methodological limits, as the study was limited to examining the various aspects related to the disclosure of climate change in the light of the standards of GRI-G4 without addressing the rest of the disclosure standards of GRI-G4, while the place limits were represented in the companies listed on the EGX 30, and finally the time limits were represented by analyzing a time series during the period from 2018 to 2020.

In light of the results of the empirical study, the authors recommend the following:

- Establishing specialist committees from the finance and investment ministries and organizations to explore the prospect of increasing the disclosure of GHG emissions in light of GRI-G4.
- The requirement that the Financial Regulatory Authority and the Egyptian Stock Exchange implement a number of strict procedures that restrict GHG emissions (GHG) and require companies listed on the stock exchange to disclose climate change in their sustainability reports to reduce climate change at different stages.
- Holding conferences periodically in light of the accelerating climate changes in recent decades in order to increase the awareness of stakeholders of the importance of disclosing climate changes and GHG. It should be noted that the Egyptian state is interested in the issue of climate change through the holding of the Sharm el-Sheikh conference, which concluded with many important recommendations.
- The need for Egypt's professional and regulatory authorities to issue a standard requiring companies to disclose climate change while specifying disclosure requirements that benefit all stakeholders, in addition to raising awareness of the role of companies and their responsibilities to the environment.
- The Financial Regulatory Authority implements mechanisms that require companies to disclose the cost of greenhouse gas emissions in sustainability reports or corporate annual reports, with the goal of improving investors' ability to identify alternative investment opportunities and make sound decisions.

The authors believe that the following areas need more investigation in the future research:

- The role of artificial intelligence systems in activating the disclosure of climate change and its impact on financial reporting quality.
- A proposed accounting approach for the accounting disclosure of climate change in the light of GRI-G4.
- The impact of climate change disclosure in green finance technology companies on stakeholders' decisions.

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