ACCOUNTING FOR CARBON EMISSIONS UNDER ESG STANDARDS AND ITS REFLECTION ON COST MANAGEMENT FOR ECONOMIC UNITS

Nawfal Hussein Abdullah

University of Wasit, Kut, Wasit Governorate, 52001, Iraq
*Corresponding author, email: nawfalaljawhari@uowasit.edu.iq

doi: 10.17977/um066.v6.i5.2026.4

Keywords
Carbon emission accounting
Cost management
ESQ standard

Abstract
The research aims to explain the knowledge pillars of carbon emission accounting and its role in cost management under ESG standards In view of the development in the business environment, it has become necessary for companies to estimate reports that include information describing the economic unit, as well as identifying and evaluating emission limits, in addition to optional information related to the performance and procedure of reducing carbon emissions, which makes companies either challenging in disclosing carbon emissions within the scope in order to avoid paying the costs of fines as well as adopting responsibility. In order to achieve the goal of the research, the research was applied in the Dijlah Animal Production Company in Baghdad, Iraq, where the indicators of ESG standards were employed and the extent of compatibility of these indicators with the accounting of carbon emissions and the reflection of this on cost management in the economic unit.

1. Introduction

The modern business environment has witnessed rapid changes in the field of corporate responsibility towards the environment and society, as well as the existence of standards and indicators that oblige companies to meet, measure and disclose these indicators, which has put companies in front of the search for new methods and techniques capable of providing adequate lists and reports, and the most important modern topics related to the environment are carbon emissions, and carbon emissions accounting relying on the foundations of traditional accounting complemented it, as it has become a tool aimed at achieving a wider scope that includes energy conservation and Reducing pollution and supporting sustainable development as well as the green transition, and ESG indicators come as a framework that includes three environmental, social and governance axes that show the extent of companies' commitment and responsibility towards society and the environment, and the research came with three axes, the first axis included the research methodology, while the second axis included the knowledge foundations for carbon emission accounting and ESG standards and the extent of its reflection on cost management.

The research problem is that there is a clear weakness by companies in their responsibility towards the environment and society, as well as not adopting their financial and non-financial reports, the extent of emissions and wastes that harm the environment and the extent of their impact on society, which caused challenges for companies, which is the payment of fines as a result of non-compliance with acceptable percentages, and it has an impact on the cost structure in the company, as well as the inability to keep pace with companies that meet the desires and trends of the modern business environment, which weakens the competitiveness of companies. Therefore, according to the above, the following questions can be asked: Is there compatibility between carbon accounting and ESG standards? Furthermore, does accounting for carbon emissions under ESG standards reflect on the company's cost management?

The research aims to explain the knowledge and scientific foundations of carbon emission accounting and what is its importance for companies under ESG standards , as well as the role of the relationship between carbon emission accounting and ESG standards and the extent of its

impact on cost management in companies, as well as the extent to which carbon emission accounting is able to provide the relevant institutions and stakeholders with financial reports that include the environment and society and what is its impact on the company's cost structure.

The importance of the research comes as a result of the development that occurred in the traditional business environment that was concerned only with the economic aspect and the extent of the company's ability to compete and enhance its market share, and in the last decade, companies have become required to be responsible towards the environment, society, governance, protection of resources and reducing pollution in the air, water and soil, and these axes of interest have reached as if they are going in parallel with the economic axis, but are an auxiliary factor for it and the accounting of carbon emissions is one of the modern topics that study these axes in addition to the basis in Traditional Accounting.

The research is based on the hypothesis that carbon accounting in light of the adoption of ESG standards helps in cost management for companies and ensures the provision of financial reports that show the extent of the company's commitment to environmental and community regulations and standards.

1.1. Cognitive Foundations of Research Variables

1.1.1. Carbon Accounting Concept

Many terms have been mentioned in the studies to describe carbon emission accounting, such as: carbon accounting, carbon emission accounting, carbon dioxide accounting, as well as the term climate change accounting, and thus carbon emission accounting is considered one of the branches of environmental accounting, and it was first introduced as a concept by (Stewart Jones) in 2008, and this field focused mainly on issues such as tracking carbon footprints and then working to regulate carbon trading (Tarkh & Ibrahim, 2024) The scope of carbon emission accounting has been expanded based on the foundations of traditional accounting, thus becoming a tool aimed at achieving broad goals that include energy conservation, pollution reduction, and support for sustainable development, as well as the green transition. Theoretically, accounting aims to reflect the economic reality and then be in line with the preferences and practices in society according to professional standards (Ibrahim & Reddy, 2019), it is based on the conceptual framework of social accounting, which leads to the study of the role of accounting as well as its formation in social processes, and thus it is an integral part of the social accounting system, as this idea comes through a broad context that links accounting with issues related to the environment and social (Al-Madhoun, 2019; Amo & Ganu, 2020) stated that carbon emissions accounting represents a specialized tool that enables companies to follow as well as calculate and manage greenhouse gas emissions, as it aims to prepare environmental statements and help in achieving sustainability goals and compliance with emissions regulations. Ambarwatiet et al., (2020) defined it as the commitment of economic units to accurately identify and measure carbon emissions, while working to record and display them as well as disclosing them transparently.

1.1.2. Justifications and Motivations for Accounting for Carbon Emissions

These justifications and motives stand out in the quest of many studies to understand the reasons that led to carbon disclosure through theories that explain environmental and social disclosure as mentioned (Naoum, 2026).

which are as follows: Stakeholder Theory focuses mainly on a specific group of stakeholders rather than focusing on society as a whole, and this theory does not view the company as an independent entity, but rather as part of an interconnected network that includes stakeholders whose interests must be realized through operations, where the company tends to prioritize stakeholders with greater influence and power in order to enhance its competitiveness and continuity in the market. In addition, Theory of Legitimacy aims to shed light on the relationship between companies and society in a broader way, and here society as a whole is considered to be the main stakeholder. This theory is based on the concept of legitimacy, which represents the extent to which the company's operational activities are compatible with the expectations, standards, and values of society, in the sense that the company must benefit from the available

resources to implement its activities as well as ensure its continuity without being contrary to what society expects from it, as there is something known as the social contract between the company and the community, which the company seeks in order to obtain social acceptance of its work (Al-Durayi, 2020). Furthermore, Corporate Theory represents one of the main motives that motivates the company to voluntarily disclose information, and companies, in addition to their quest to achieve profit, seek to achieve and meet the requirements of society, as well as adapt to the standards and expectations of the organization; thus, the company works to modify its behavior and adapt its practices in order to be similar to the competition in form and performance (Abu Stala, 2022). Likewise, Agency Theory views the company as the result of voluntary contracts that bind specific parties and work to reduce the tendencies resulting from management prioritizing its personal interests instead of the interests of other parties. This theory was established during the 1970s with economic thought and is based on the legal framework that regulates agency relations between the manager, the agent, and the principal (Truong & Friday, 2022). Finally, Economic Theory is based on a concept called signal theory, where a company's carbon emissions are a potential source of unequal information due to external stakeholders who often have difficulty accessing accurate and appropriate data.

1.1.3. Challenges and Barriers in the Application of Carbon Accounting

When applied in practice, carbon accounting faces many major challenges, as most companies, unlike financial accounting, lack advanced and robust information systems in order to track emissions, as this lack leads to a lack and poor quality of data, and this makes them prone to errors and manipulation, in addition to this, many find it difficult to interpret the information related to carbon emissions and understand its details, which is a challenge that hinders the efficiency of carbon accounting (Al-Soufani, 2023) and constitutes the last challenges that carbon accounting faces related to carbon balance and trading Unlike traditional commodities, where carbon credits are not considered tangible physical products, but are described as a vague legal concept for many, which makes them more susceptible to fraud as well as illegal activities, as these obstacles highlight the importance of developing complete and appropriate frameworks in order to regulate carbon accounting, work to improve transparency, and then work to reduce the risks associated with it (Al-Mallah, 2018).

1.1.4. Carbon Emission Accounting Standards

In light of the challenges and obstacles of accounting for carbon emissions, there are many efforts made by the Standards Board and the National Supervisory Authority to develop accounting standards, the most prominent of which are the Greenhouse Gas Protocol. This protocol is a partnership between companies, non-profit organizations, governments, and academia, as it aims to develop accounting standards and financial reporting related to carbon emissions, which helps in unifying accounting practices globally and providing the greatest amount of transparency. It includes the Reporting Accounting Standard, which contains mandatory information such as a description of the company as well as the determination and evaluation of emission limits, in addition to optional information related to the performance and procedure of reducing carbon emissions. It also includes the Greenhouse Gas Accounting Project, which focuses on concepts and principles related to the measurement and determination of mitigation efforts and methods of disposal. In addition, the Global Reporting Initiative Standard provides detailed guidance on the disclosure of carbon emissions that are within the scopes and includes guidance on data collection and the definition of the three operational limits (Scope 1, 2 and 3), as well as reporting details, which helps in standardizing disclosure practices related to carbon emissions. Furthermore, in 2017, the Working Group on Climate Financial Disclosure presented a set of recommendations aimed at encouraging the company to disclose climate-related risks and opportunities, as these recommendations provide a framework to enable the company to prepare reports related to carbon emissions change and climate (Nathalia & Setiawan, 2022).

Moreover, the International Sustainability Standard represents another important effort in this field. In 2023, the International Sustainability Standards Board (ISB) launched mandatory disclosure standards (Kinsly, 2022; ISSB, 2023), including IFRS S1, which relates to general disclosures related to sustainability, and IFRS S2, which leads to the coverage of climate-related disclosures with a focus on risks as well as opportunities resulting from climate changes, including

disclosures related to carbon emissions, and focuses mainly on four axes: strategy, governance, metrics and objectives, and risk management. These standards significantly help to enhance transparency related to carbon emissions and climate risks on a global basis, thereby supporting sustainability and environmental responsibility efforts.

1.1.5. ESG Standard

With the increasing pressure on companies to provide accurate and correct information about the company's performance in the field of environment, society and governance, this ESG disclosure has become a basic criterion used to evaluate the extent to which the company has achieved sustainable development as part of its responsibility, which encouraged companies to measure their performance and report any information in order to enhance communication with various stakeholders and confirm the extent of their commitment to those responsibilities (Abul-Ela, 2025). The United Nations Principles for Responsible Investment (2006), which outlines how this concept can be leveraged in financial markets to paint a picture of corporate financial performance (Rahman, 2025). In practice, there are three main axes known as ESG : environmental, governance, and social.

1.1.6. ESG Themes and Categories

The following is a presentation of the most important indicators that are disclosed in the three main axes as mentioned by (Al-Saadi, 2021). Which are the Environmental Axis, the Social Axis, and the Governance Axis. The Environmental Axis includes resources such as energy and water, in addition to environmental wastes, working on compliance with environmental laws, as well as environmental assessment of suppliers. The Social Axis covers various topics such as employment, relations between employees and management, training, education, health, safety and marketing procedures, labeling, customer privacy, and socio-economic compliance. Meanwhile, the Governance Axis focuses on the governance structure and authority in delegation, in addition to the formation of the Supreme Governance Committee in decision-making, as well as committees, evaluating the performance of the Governance Body, and working to identify and manage social, environmental, and economic impacts.

1.1.7. ESG Standards

The ESG standard consists of three criteria as mentioned (Shuwaikh, 2025). The Environmental Criterion is concerned with measuring the impact of companies on the environment, based on the hypothesis that financial and investment activities may cause environmental risks, including challenges related to water and air as a result of energy use, pollution, and, most importantly, the production of waste. The Social Criterion focuses on the ethical and social aspects of investment and commercial activity while analyzing the relationship between the company and individuals and between the community and customers, including the company's investments in community development, such as providing a safe and healthy work environment for employees and ensuring a fair wage system while interacting positively with the local community. Meanwhile, the Governance Standard evaluates the performance and governance mechanisms of companies through indicators that include compliance with the tax system, anti-corruption, and protection of shareholders' rights, and measures governance standards in public and private companies with the aim of promoting sustainable investment by relying on approved international standards, namely the International Environmental Standard 2015, which is used to evaluate the performance of the environmental management system; the International Social Standard for Corporations 2010, which is used to measure the performance of social responsibility; and the International Governance Standard 2021, which aims to measure the level of corporate governance related to corporate governance.

1.1.8. Dimensions of ESG Standards

ESG standards are a complete three-dimensional framework that aims to assess sustainability and ethical implications in businesses and business activities (Fatih, 2023). In terms of the environmental aspect, this standard reflects the extent to which the business is committed to addressing issues related to the carbon footprint, the protection of natural resources and waste management, as well as the reduction of the effects of climate change, while factors such as energy consumption, environmental pollution, and the preservation of biodiversity are considered key elements. As for the social aspect, it is related to how companies interact with various parties such

as employees, customers, suppliers, and the local community, and this standard focuses on the rights of workers and ensuring work in a safe environment; companies that provide welfare to their employees and invest in improving community conditions are considered companies with good social performance. Meanwhile, the governance aspect refers to the internal procedures, policies, and organizational structure of the company, and this criterion includes executive compensation, the establishment of the board of directors, the organization of internal controls, shareholders' rights, and trust in business operations.

1.1.9. The Role of Carbon Accounting and ESG in Cost Management

In recent years, there has been a great interest in carbon emissions accounting and ESG standards, as they have played an important role in the development of cost management within companies. The reason for this is due to global trends toward adopting sustainability practices, as well as the extent of compliance with environmental and regulatory requirements. Moreover, the interest of cost management is no longer limited to reducing expenses only, but has expanded to include reducing environmental and social costs and improving the use of resources in a way that supports the company's continuity while enhancing its competitive position (Nertinger, 2015). Carbon emissions accounting and related data contribute to detecting sources of energy and material waste, which leads to a reduction in operational costs as well as an increase in production efficiency (Aziz & Abed, 2022). In addition, carbon accounting contributes to reducing the payment of fines and taxes resulting from environmental pollution, especially in light of the diversity and increase of international laws related to carbon emissions.

Furthermore, ESG standards provide information that helps investors and management evaluate sustainable projects, which are characterized by lower risks, greater effectiveness, and long-term benefits, and this is positively reflected in cost management (Lauria et al., 2022). Likewise, ESG standards adopted by companies are more capable of attracting customers and investors, leading to increased revenue and reduced costs (Fischbach et al., 2022). In addition, carbon emission accounting reports contribute to the integration of environmental costs into new cost structures, thereby providing more comprehensive and accurate information for planning and monitoring purposes for management. Consequently, the combined application of carbon emissions accounting and ESG standards supports more effective cost management while strengthening sustainability and long-term organizational performance.

2. Method

This research is an analytical deductive study that aims to examine carbon emissions accounting under ESG standards and its impact on cost management in companies. It includes an analysis of indicators and their effect on the company's cost structure by statistically proving hypotheses to measure the extent of the impact of carbon emissions accounting on company costs.

ESG standards will be applied to Degla Company, which is a company specialized in fish and poultry farming, and measure the ability to account for carbon emissions in light of these standards and indicators on cost management in the company, and the focus will be on the environmental and social axes for the year 2024-2025.

This study adopted a quantitative research approach to examine the relationship between carbon emissions accounting under ESG standards and its reflection on cost management in economic units. Data were collected through a structured questionnaire developed based on the dimensions of carbon emissions accounting, ESG standards, and cost management. The questionnaire was distributed to 50 respondents representing managers, accountants, auditors, and other professionals involved in financial and sustainability reporting within economic units. Responses were measured using a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The collected data were coded and analyzed using Statistical Package for Social Sciences (SPSS) Version 26 to ensure systematic and reliable statistical processing.

The measurement of variables was based on ESG indicators, which include environmental, social, and governance dimensions. The environmental dimension focused on issues related to carbon emissions, resource consumption, environmental compliance, and waste management, while the social dimension assessed employee welfare, stakeholder relationships, and social

responsibility practices. The governance dimension evaluated organizational policies, transparency, accountability, and risk management mechanisms. To assess the reliability and validity of the research instrument, Cronbach's Alpha and Pearson Correlation tests were conducted. Furthermore, a linear regression model was employed to analyze the effect of carbon emissions accounting under ESG standards on cost management and to determine the strength and significance of the relationship between the study variables.

3. Results and Discussion

3.1. ESG Indicators

3.1.1. Indicators of the environmental dimension

Renewable Energy Ratio. This ratio is measured by the following equation (Renewable Energy Costs / Total Energy Costs Used)

(0 / 34512000) = 0%

The company does not use renewable energy from energy sources and relies on electrical energy from the company's government equipment and generators, the latter of which generates carbon emissions.

Emission reduction ratio. This ratio is measured by the following equation (previous year's emissions – current year's emissions) / previous year's emissions

There is no application of this 0% equation because the company does not measure the size of emissions.

Rationalization of water consumption. This percentage is calculated by the following equation:(Previous Year Consumption – Current Year's Consumption (/ Previous Year's Consumption in Cubic Meters

(125000 cubic meters – 100000)/125000 = 16%

The rationalization here came as a result of the water share granted by the state to the company due to the water scarcity in 2025 and did not appear in the company's records

Amount of water treated during the year. This percentage is calculated through the equation: (Amount of treated water/water used during the year)

0/ 100000= 0%

There is no water treatment in the company and there is no filter plant in the company

Percentage of fines. It is calculated through the following formula (Cost of fines / total costs of the company during the year)

The company's financial reports did not mention that the company pays fines, but there is an amount of 5,000,000 dinars that the company pays for waste disposal.

3.1.2. Socio-social indicators

The percentage of injuries is expressed as the percentage of injuries of employees and workers from pollution and is calculated according to the following equation:

(Number of Employees Injured / Total Number of Employees) 0/314 = 0%

The company has not recorded any cases of pollution or carbon emissions

Percentage of the number of trainee employees This percentage is expressed as the number of trainee employees relative to the total number of employees and is measured by the following equation:

(Number of trainee employees / total number of employees) 2/314 = 0.6%

Percentage of the number of female employees: This percentage expresses the number of female employees in the company compared to the total number of employees, and is measured by the following equation:

(number of female employees / total number of female employees) = 17% 54/314.

Percentage of new employees This percentage expresses the number of new employees in the company and is measured by the following equation:

(Number of New Employees/Total Number of Employees) 0/314 = 0%

because the company did not hire new staff during the year.

Through the above, the company has not paid attention to the environmental and social axis and there are no contributions in its records to the accounting of carbon emissions and ESG standards, therefore, the company is subject to fines if the requirements of meeting the responsibility towards the environment and society are applied to it, which will affect the cost structure in the future, and it may affect the volume of production or the decrease in market share, and this also affects the company's decisions in terms of investment, development and keeping pace with the requirements of the modern labor market.

3.2. Proof of research hypotheses

This axis includes the statistical aspect of examining the research tool and its testing of the data from the practical side for the purpose of presenting and interpreting the results of "Carbon Emission Accounting under ESG Standards and its Reflection on Cost Management", and then testing the impact hypotheses between the research variables. Accounting for carbon emissions under ESG standards is a way to know the extent of its impact on cost management, as a questionnaire form was developed to identify and measure this impact, and the five-point LeCarte scale was used through SPSS V.26 software to know and analyze the results, and the simple linear regression model was used to measure the impact.

3.2.1. Validity of internal consistency

The validity of the internal consistency of the questionnaire is determined by calculating the Pearson's correlation coefficient, the strength of the correlation of each statement of the questionnaire with the total score of the axis to which it belongs, and the following tables show the validity of the internal consistency of the study tool.

Table 1. the validity of the internal consistency of the statements of the first axis (Accounting for Carbon Emissions).

T	Paragraph	Correlation coefficient	Significance Level (SIG)
1	The company adopts a system to measure carbon emissions from its activities	.687**	.000
2	Emissions data are disclosed in the company's reports	.691**	.000
3	Carbon accounting has a role to play in improving sustainability information	669**.	.000
4	Management takes carbon accounting information into account when making its decisions	701**.	.000
5	Implementing carbon accounting leads to enhanced resource use efficiency	725**.	.000

**** Its function is at the significance level of 0.01 or less**

The table shows that the values of the correlation coefficient for each of the paragraphs of the first axis with the total score of the axis are positive and statistically significant at the level of significance of 0.01 or less, as the values of the correlation coefficient range from (0.669) at the minimum to (0.725) as the maximum, and this indicates the existence of internal consistency truthfulness.

Table 2. The validity of the internal consistency of the statements of the dimensions of the second axis (ESG standards).

T	Paragraph	Correlation coefficient	Significance Level (SIG)
First	Environmental Dimension		
1	The company is committed to reducing the environmental impact of its production operations	.732**	.000
2	The company adopts initiatives to reduce energy consumption and natural resources	715**.	.000
3	The company uses environmental performance measurement standards	722**.	.000
Second	Social Dimension		
1	Obliging the company to provide a safe work environment for employees	761**.	.000
2	The company supports social contributions and its responsibility towards the community	687**.	.000
3	The rights of the company's employees shall be reserved for making administrative decisions.	771**.	.000
Thirdly	Post-Governance		
1	The company has clear procedures for transparency and disclosure	782**.	.000
2	The company adheres to the principles of integrity in business administration	773**.	.000
3	The company has sustainability committees	717**.	.000

**** Its function is at the significance level of 0.01 or less**

The table shows that the values of the correlation coefficient for each of the paragraphs of the dimensions of the second axis with the total score of the axis are positive and statistically significant at the level of significance of 0.01 or less, as the values of the correlation coefficient range from (0.687) at the minimum to (0.782) as the maximum, and this indicates the existence of internal consistency truthfulness.

Table 3. The sincerity of the internal consistency of the statements of the third axis.

t	Paragraph	Correlation coefficient	Significance Level (SIG)
1	Reports with carbon emissions information help determine environmental costs	.741**	.001
2	Sustainability practices reduce long-term operational costs	720**.	.000
3	The company relies on the results of ESG indicators when analyzing costs	761**.	.000
4	Measuring carbon emissions helps improve resource efficiency and reduce costs	841**.	.003
5	Integrating ESG indicators with the company's accounting system leads to enhanced cost management effectiveness	812**.	.000

**** Its function is at the significance level of 0.01 or less**

The table shows that the values of the correlation coefficient for each of the paragraphs of the third axis with the total score of the axis are positive and statistically significant at the level of significance of 0.01 or less, as the values of the correlation coefficient range from (0.720) as a minimum to (0.841) as a maximum, and this indicates the existence of an internal consistency truthfulness.

3.2.2. Constructive Honesty

Constructive honesty is one of the measures of the validity of the tool, which measures the extent to which the objectives are achieved and shows the extent of the correlation of each axis of the study with the total score of the questionnaire, as shown in Table 4, which shows the correlation coefficients of each axis of the study tool with the total score of the resolution.

Table 4. The coefficients of Pearson correlated for each of the study axes with the total score of the questionnaire.

Significance Level	Correlation coefficient	Themes
.000	.781**	**Emissions Accounting**
.001	.801**	**ESG Standards**
.000	.720**	**Cost Management**

**** Its function is at the significance level of 0.01 or less**

Stability of the study tool. The researcher verified the stability of the study tool through the use of Cronbach's alpha coefficient ( ).crobach^' sAlpha (α)

To find out the stability of the questionnaire among the researchers, the Cronbach's alpha coefficient test was performed, as Table (5) shows that the stability of the emissions accounting axis was 0.823. The axis of ESG criteria was (0.862), while the axis of cost management was (0.870). This indicates the stability of the questionnaire questions, and the alpha coefficient ranges from zero to the correct one. In the case of zero, it indicates that there is no stability, and in the case of (1), it indicates that there is stability, and this indicates that the questionnaire represents the studied phenomenon accurately.

Table 5. The stability coefficient (Cronbach's Alpha) for the themes of the questionnaire form.

Cronbach' s Alpha	Themes
0.823	**Emissions Accounting**
0.862	**ESG Standards**
0.870	**Cost Management**

From the above, it is concluded that the study tool has a high degree of stability and can be relied on in the field application of the study, and it is an important indicator that the phrases that make up the questionnaire give stable and stable results in the case of application to the sample members, and therefore there is reassurance about the analysis of the study data.

3.2.3. Hypothesis Testing:

Hypothesis 1: There is a statistically significant relationship between emissions accounting and the environmental dimension at the significance level (α=0.05).

Carbon emission accounting has an important role in light of the ESG standards of the environmental dimension, and they are two of the most important factors that affect a person in the performance of his work in general in all economic units, as the researcher applied a questionnaire to show "Accounting for Carbon Emissions under ESG Standards and its Reflection on Cost Management", which consists of (50) viewsThe Correlation Pearson coefficient has been calculated, to find out the type of relationship between carbon emission accounting and the environmental dimension , the number related to the correlation within the domain should be (+1 to -1), where (+1) indicates that the two variables are directly related to each other, while (-1) indicates that the two variables are inversely related to each other, and the value (0) indicates (0)) indicates that there is no correlation between the two variables to be measured, and Table (6) shows the correlation coefficients at the level of 5%.

Table 6. The correlation between carbon emission accounting and the environmental dimension.

Correlations			
		Carbon Accounting	Environmental Dimension
Carbon Accounting	Pearson Correlation	1	.889**
	Sig. (2-tailed)		.001
	N	50	50
Environmental Dimension	Pearson Correlation	.889**	1
	Sig. (2-tailed)	.001	
	N	50	50

****. Correlation is significant at the 0.01 level (2-tailed).**

There is a significant relationship between the accounting of carbon emissions and the environmental dimension, which reached (0.889) with a significant level of (0.001), which is less than (0.01), which indicates the acceptance of the hypothesis, and as Table (6) shows, the correlation coefficient (Pearson) has a strong direct relationship between the study variables.

Hypothesis 2: There is a statistically significant relationship between carbon emission accounting and the social dimension at the significance level (α=0.05).

As for knowing the relationship between the carbon emission accounting variable and the social dimension, it reached (0.857) with a significant level of (0.000), which is less than (0.01), which indicates the acceptance of the hypothesis, and as Table (7) shows, the correlation coefficient (Pearson) has a strong direct relationship between the study variables.

Table 7. The correlation between carbon emission accounting and the social dimension.

Correlations			
		Carbon Accounting	Social Dimension
Carbon Accounting	Pearson Correlation	1	.857**
	Sig. (2-tailed)		.000
	N	50	50
Social Dimension	Pearson Correlation	.857**	1
	Sig. (2-tailed)	.000	
	N	50	50

****. Correlation is significant at the 0.01 level (2-tailed).**

Hypothesis 3: There is a statistically significant relationship between carbon emissions accounting and the governance dimension at the significance level (α=0.05).

As for knowing the relationship between the carbon emission accounting variable and the governance dimension, it reached (0.866) with a significant level of (0.000), which is less than (0.01), which indicates the acceptance of the hypothesis, and as Table (8) shows, the correlation coefficient (Pearson) has a strong direct relationship between the study variables.

Table 8. The correlation between carbon emission accounting and the governance dimension

Correlations			
		Carbon Accounting	Post-Governance
Carbon Accounting	Pearson Correlation	1	.866**
	Sig. (2-tailed)		.000
	N	50	50
Post-Governance	Pearson Correlation	.866**	1
	Sig. (2-tailed)	.000	
	N	50	50

****. Correlation is significant at the 0.01 level (2-tailed).**

Hypothesis 4: There is no statistically significant effect of carbon emission accounting under ESG criteria on cost management at a significant level of (0.05).

As for measuring the impact of carbon emissions accounting under ESG criteria on cost management and choosing the best data model, it was found that the value of (0.936R^2=), which means (the coefficient of determining the best model), i.e., the variable of accounting for carbon emissions under ESG criteria is explained (93%) affecting the dependent variable (cost management), i.e., the rest is considered random errors in the selection of the specific answer or attributed to unknown errors, as its value reached (7%), as for the strength of the relationship between the variables in the model, it was (0.967), as the value of the test (F=14.998) calculated which is at the level of significance of (0.000), which is less than (0.05), which indicates that there are no significant differences, and the model represents the studied phenomenon accurately valued, which indicates the rejection of the hypothesis that states that there is no statistically significant effect for the accounting of carbon emissions under ESG criteria. on cost management at a

significant level of (0.05)) in the sense of accepting the alternative hypothesis, i.e. there is an effect of carbon emissions accounting under ESG standards on cost management, as the amount of effect between the carbon emission accounting variable under ESG standards was 0.818) on cost management after passing the (t) test with a significant level of (0.000) less than (0.05), i.e., the effect is significant, as shown in Table 8.

Table 9. The indicators for determining the best model for accounting carbon emissions under ESG standards

Model Summary[c,d]

Model	R	R Square[b]	F	Sig.
1	.967a	.936	14.998	.000

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	Emissions Accounting	.818	.022	.967	38.013	.000

a. Dependent Variable: Cost Management
b. Linear Regression through the Origin

4. Conclusion

The use of carbon accounting helps in managing the costs of risk as well as enhancing and adding financial and economic value to other companies.Carbon accounting is the process of measuring the volume of carbon emitted over a specific period of time, as it is a key part of the way companies measure the amount of emissions they contribute and then disclose them in their business. ESG metrics use a company's impact beyond its financial performance rather than measuring profits with traditional financial analysis. The concept of adopting carbon accounting in ESG indicators is not limited to reputation only, but also includes risk management and long-term value. Carbon emissions accounting and proper action to reduce environmental pollution should be applied and disclosed in the company's financial reports. It is necessary to impose fees on pollution and then use these fees to solve the problems that result from environmental pollution on the one hand, and on the other hand, it is to encourage pollution reduction .Develop a comprehensive strategy to enhance the impact of ESG standards by attracting investment as well, with a focus on improving disclosure and transparency.Preparing action plans to promote innovation in the environment and develop environmentally friendly technology in all companies.

References

Abou Stala, A. A. M. (2022). Accounting roles and its impact on the quality of financial roles in Arab role production companies (Doctoral dissertation). Republic of Algeria.

Abul Alaa Mohamed, A. M. A. (2025). Analysis of the relationship between disinformation and order in benevolence in the field of systems, societies and ESG cultivation: The accuracy of verification of loads and regulations on wholesale prices: An applied study on companies listed on the Egyptian Stock Exchange. *Social Sciences, Agricultural and Commercial Sciences, Faculty of Commerce, Damietta University, 6*(2), 1295–1353.

Al-Durayee, A. A. A. R. (2023). The impact of the application of sustainability accounting standards in the accounting system and its reflection on the quality of health services (Master's thesis). University of Wasit, Faculty of Administration and Economics.

Al-Madhoun, I. R. (2023). Carbon accounting and climate change risks. *Journal of the Palestinian Accountant*, 44–48.

Al-Saadi, A. S. M. (2021). Measuring the level of sustainable disclosure in light of integrated reporting to enhance company value: An applied study of a sample of banks listed on the Iraq Stock Exchange (Master's thesis).

Al-Shuwaikh, K. F. A. R. S. (2025). Sustainable financing governance for startups to develop creativity and innovation among youth. *Arab Journal of Literature and Humanities*. Arab Foundation for Education, Science and Literature.

Ambarwati, D., Hapsoro, D., & Wicaksono, C. A. (2020). Relationship analysis of eco-control, company age, company size, carbon emission disclosure, and economic consequences. *The Indonesian Journal of Accounting Research, 23*(2).

Anagnostopoulou, E. (2017). Relationship between climate change strategy, risk management, carbon accounting and corporate financial performance.

Aziz, K. A. I., & Abed, B. Y. (2022). Green production and sustainable cost management techniques: A theoretical study. *Al-Ghary Journal for Economic and Administrative Sciences, 18*(Special Issue).

Elmadhoun, I. R. I., & Reddy, G. N. (2019). The role of carbon accounting in managing climate change risks: Literature review. *International Journal of Science and Research (IJSR), 7*, 583.

El-Mallah, S. S. E. (2018). Analysis of the relationship between voluntary disclosure of greenhouse gas emissions and the financial performance of companies listed on the Egyptian Stock Exchange. *Accounting Thought, 22*(4), 1042–1098.

El-Sayed, B. F. M. (2025). The modified role of activating the risk management committee on the relationship between ownership structure patterns and the level of carbon emissions disclosure: Evidence from companies listed on the Egyptian Stock Exchange. *Journal of Accounting Research, 12*(4), 555–622.

Fateh, G. (2023). Evaluation of environmental, social and corporate governance (ESG) practices of LafargeHolcim. *Algerian Scientific Journal, 17*(1), 601–617.

Fischbach, J., Adam, M., Dzhagatspanyan, V., Mendez, D., Frattini, J., Kosenkov, O., & Elahidoost, P. (2022). Automatic ESG assessment of companies by mining and evaluating media coverage data: NLP approach and tool. https://doi.org/10.48550/arXiv.2212.06540

Ibrahim, M. A. A. R. (2026). Carbon accounting as a tool to support carbon pricing systems. *Journal of Financial and Business Research, 27*(2).

Kingsly, P. K. M. (2022). Deep dive into ISSB standards: IFRS S1 and IFRS S2.

Lauria, D., Lindquist, W. B., Mittnik, S., & Rachev, S. T. (2022). ESG-valued portfolio optimization and dynamic asset pricing. https://doi.org/10.48550/arXiv.2206.02854

Nathalia, C., & Setiawan, D. (2022). Does board capital improve climate change disclosures? *Cogent Business & Management, 9*(1).

Nertinger, S. (2015). *Carbon and material flow cost accounting: An integrated approach in the context of sustainable performance and business*. Springer Gabler Wiesbaden. https://doi.org/10.1007/978-3-658-08130-0

Rahman, M. A. N. (2025). Pengaruh pengungkapan ESG terhadap nilai perusahaan dengan pertumbuhan penjualan sebagai variabel moderasi sektor energy dan basic materials di negara ASEAN tahun 2021–2023 (Undergraduate thesis).

Tarkh, A. S., & Ibrahim, M. A. (2024). The role of government disclosure of carbon emissions in including environmental allocations in the federal budget. *Journal of Accounting and Financial Studies (JAFS), 19*(69).

Truong, X. L., Friday, L. D. T., & Swint, H. (2022). The influence of information transparency and disclosure on the value of listed companies: Evidence from Vietnam.

Zhi-hong, S., Yue, W., & Dong-mei, L. (2021). Carbon accounting information disclosure under the background of green development. *The International Journal of Business Management and Technology, 5*(3), 118–124.