

Article

Challenges of Disclosing Environmental Accounting Performance and Its Impact on Quality Supply Chains to Promote Sustainable Development in Companies—Experiences of Some Companies in the GCC—2024

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Abstract: In response to the growing environmental concerns and sustainability imperatives in the GCC and the world in general, companies are increasingly being urged to integrate environmental accountability into their core strategies and operations by accounting for environmental performance in their financial statements and the impact on supply chains and sustainable development. The problem of the study is to identify the impact of environmental accounting disclosure challenges on supply chains and sustainable development in companies. By taking the experiments of 20 companies and representatives of the study community interested in the topic and using the heuristic study approach through the questionnaire tool and a set of key variables, including the adoption of disclosure on environmental accounting performance (DEAP), supply chain sustainability performance (SCP), Sustainable Development Index (SD), and the (PLS) program, through statistical analysis, the study reached the most important results. The study revealed a positive relationship between the disclosure of environmental accounting performance, improved supply chains, and sustainable development in the companies represented by the study sample in the GCC, where both financial performance and environmental performance contribute to achieving the Sustainable Development Goals and supply chains. Accordingly, the study recommends many recommendations, the most important of which are: the need for companies to be encouraged to disclose the performance of environmental accounting as a strategic necessity, promote more sustainable supply chain management, improve financial performance, and effectively contribute to achieving the Sustainable Development Goals, thereby enhancing sustainability within companies and across supply chains. The study also recommends the need to continue studies in this aspect, especially in the GCC and East Asian countries, to urge companies to disclose the performance of environmental accounting in their financial statements.

Keywords: challenges of disclosing; environmental accounting; environmental performance; financial performance; supply chains; sustainable development; GCC countries



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1. Introduction

Environmental accounting can be traced back to the late 20th century, when environmental issues gained prominence on the global agenda [1]. It is essentially an extension of traditional financial accounting, focusing on the measurement, quantification, and reporting of environmental impacts associated with a company's activities [2]. Environmental accounting allows for a structured assessment of the environmental costs and benefits of

various operations, products, and processes. This integration of environmental considerations into financial and managerial decision-making processes is pivotal in enabling companies to make informed choices that align with sustainability objectives. Environmental accounting is a cornerstone of the Supply Chain and sustainability journey, as it provides a structured framework for assessing and managing the environmental aspects of business operations [3]. This approach extends beyond merely quantifying environmental costs and benefits; it informs companies on how to minimize negative environmental impacts and optimize positive ones [4].

Environmental accounting also plays a pivotal role in influencing supply chains, as the supply chain concept is becoming more complex than ever in the struggle to meet the globalization of the supply base and the diversification of products to keep up with the change in customer needs and expectations [5]. The supply chain is currently a competitive arena for businesses both domestically and internationally, which has forced businesses to rely on supply strategies as the cornerstone of strategic supply management [6]. Companies face challenges when trying to implement supply chain management. These challenges stem from the complexity of the supply chain, the unpredictability of the corporate product market, the absence of coordination and cooperation between various stakeholders to ensure effective communication, risk management in connection with price hikes and policy changes, and the lack of human resource capabilities that companies have in terms of technological competence [7]. The claim is that enterprises face uncertainty in the production process because market demand undergoes sudden changes and the demand for products depends on certain events [8].

In this world of rapid development and many environmental concerns, companies face an urgent need to integrate sustainability into their core process and strategic plans [9]. This imperative arises from the recognition that the traditional approach to business, which often prioritized short-term economic gains without accounting for the long-term environmental consequences, is no longer tenable. Climate change, resource scarcity, and other ecological challenges demand that companies adopt a more responsible and sustainable approach to their activities [10]. The companies have predominantly focused on economic growth and profit maximization as primary objectives, often overlooking or underestimating the long-term environmental costs associated with their operations. However, the last few decades have witnessed a significant shift in this paradigm. Sustainability has emerged as a critical consideration for businesses across sectors, and environmental responsibility has become a defining feature of corporate behavior [11].

Several key factors have driven this transformation in the business–sustainability landscape. **Regulatory Pressure:** Governments and international bodies have recognized the urgency of environmental issues and have introduced a slew of regulations to curb emissions, manage waste, and encourage responsible environmental practices [12]. **Non-compliance** with these regulations can lead to legal and financial consequences for companies. **Consumer Awareness and Expectations:** Today's consumers are more informed and environmentally conscious [13]. They increasingly expect the brands and products they engage with to be environmentally responsible. Companies that fail to meet these expectations may face reputational damage and loss of market share [14]. **Investor and Shareholder Influence:** Institutional investors and shareholders are also playing a pivotal role in driving sustainability initiatives within companies [15]. Sustainable practices that reduce resource consumption are seen as a way to mitigate these risks. **Climate Change Concerns:** The increasing urgency of climate change, manifested through more frequent and severe weather events, has underlined the significance of greenhouse gas emissions [16]. Businesses are facing mounting pressure to reduce their carbon footprint.

In response to these converging forces, companies are embracing sustainability as a strategic imperative, seeking to harmonize economic growth with environmental and social well-being [17]. This approach extends beyond merely quantifying environmental costs and benefits; it informs companies on how to minimize negative environmental impacts and optimize positive ones [4].

Environmental accounting informs product design and material selection by highlighting the environmental impacts of different choices [18]. It encourages companies to develop eco-friendly products and choose materials with lower environmental footprints, contributing to the reduction in overall environmental impact.

Through accounting for environmental performance, companies can identify areas where waste can be minimized, resource consumption reduced, and processes made more efficient [19]. Cost reduction and improved efficiency often go hand-in-hand with sustainability efforts.

1.1. Study Gap and Study Objectives

This study aims to bridge the study gap by studying the challenges of disclosing the performance of environmental accounting and its impact on supply chains and sustainable development in companies. This is achieved by addressing the experiences of some companies in the GCC, where the region has a unique economic, regulatory, and corporate governance environment. By referring to previous studies, which we will address in the theoretical literature, we find that this topic has not found sufficient enrichment and there is no study covering these variables. The GCC is characterized by rapid economic development and well-developed financial systems. This study aims to delve deeper into the impact of environmental accounting on supply chains and sustainable development in companies in the GCC countries. The Literature Review section will offer an in-depth examination of the existing body of knowledge on environmental accounting, its methodologies, and its influence on supply chains and sustainable development. The Data and Method section will elucidate the study methods employed to investigate the impact of environmental accounting [20]. It will describe the data sources, study approach, and methodologies used in the study process. The Results and Discussion section will present the study's findings, showcasing how environmental accounting influences supply chains and contributes to sustainable development. It will explore real-world examples and case studies to illustrate the practical applications of ecological accounting [15]. The Conclusion will synthesize the key findings and their implications for businesses and sustainability practitioners. It will underscore the significance of environmental accounting as a tool for promoting sustainability within companies and across supply chains [21].

1.2. Importance and Contribution of the Study

The importance of this study lies in its ability to contribute to the understanding of environmental performance accounting disclosure and its impact on supply chains and sustainable development, with a special focus on the experiences of companies in the GCC region. By exploring the unique challenges and dynamics of the GCC markets, this study provides insight into how environmental performance accounting, financial, and environmental aspects are disclosed through supply chains to achieve the Sustainable Development Goals for companies in the region. This is especially important in the GCC context, where timely disclosure of environmental accounting performance in financial statements is critical to maintaining investor confidence and ensuring market stability [22]. The results of this study are expected to have practical implications for companies operating in the region, especially since the GCC region is growing and developing very rapidly in the field of industries, real estate, and tourism, and this requires the emergence of many companies operating in an environment that must be maintained in order to achieve the goal of sustainability.

The problem of this study was to identify the challenges of disclosing environmental performance accounting and its impact on supply chains and sustainable development in companies in the GCC through the following questions of the study:

1. Does financial performance disclosure affect supply chains in companies?
2. Does environmental performance disclosure affect supply chains in companies?
3. Does the disclosure of environmental accounting performance have an impact on supply chains and promote sustainable development in companies?

2. Background on the Ranking of Environmental Performance Indicators for the GCC Countries Globally

The Gulf Cooperation Council (GCC) comprises six nations: Kuwait, Qatar, the Sultanate of Oman, the United Arab Emirates, Bahrain, and the Kingdom of Saudi Arabia. Member states share common characteristics such as Arab ethnicity, Islam, monarchy, culture, and traditions [23]. GCC member countries have high GDPs per capita due to their abundant oil and gas deposits [24]. Assad and Alshurideh [25] and Callen et al. [26] report that the region's economy rapidly develops due to increased oil and natural gas income and a construction and investment boom. Regional oil and natural gas output and growing worldwide prices have led to significant public and private investment over the last two decades [27]. Global events, including the Dubai World Expo 2020 in the UAE and the FIFA World Cup 2022 in Qatar, have led to significant expenditures. Saudi Arabia's Vision 2030 highlights the significant investments made by the GCC economies. Over the past two decades, oil-rich nations' financial markets have rapidly expanded, attracting domestic, regional, and foreign direct investments [28]. This study explained the challenges related to the disclosure of industrial companies in the GCC on the accounting of environmental performance and its impact on supply chains and the sustainable development of companies [29].

Ranking of the GCC Environmental Performance Index at the Global Level, in 2024

The 2024 Environmental Performance Index issued by Yale University provides a data-driven summary of sustainability worldwide. Using 58 performance indicators covering 11 sub-axes, the index ranks the EPI, which includes 180 countries, among the three policy objectives: climate change performance, Environmental Health, and ecosystem vitality. Table 1 shows this ranking [30].

Table 1. Ranking of the GCC Environmental Performance Index 2024.

(GCC) Countries	Ranking at the Level of Countries of the World
United Arab Emirates	53
Oman	54
Qatar	79
Kuwait	92
Saudi Arabia	106
Bahrain	151

Source: preparation of authors based on the reference: [30].

The authors believe that Table 1 and Figure 1 show us the ranking of the Environmental Performance Index at the level of the GCC countries and the world level. The UAE appears in first place among the GCC countries and is ranked 53 globally, and Oman ranks second on the level of the GCC countries and 54th globally, Qatar ranks third on the GCC countries and 79th globally; Kuwait ranks fourth on the GCC countries and 92nd globally; Saudi Arabia ranks fifth on the GCC countries and 106th globally; and finally, Bahrain ranks sixth at the level of the GCC countries and 151st globally.

Despite these indicators, the environment in the Gulf countries suffers from multiple problems, such as the scarcity of freshwater resources, the degradation of marine habitats and coastal areas, increased air pollution, and waste of all kinds. The GCC countries are getting closer to the rest of the world in their impact on global problems, such as global warming, climate change and ozone layer erosion [31]. Since the launch of the Earth Summit for Environment and Development (Rio de Janeiro 1992), the Gulf countries have participated in global environmental gatherings and interacted with global trends in addressing and cooperating on environmental issues. The Gulf countries supported and signed the global trend in many agreements and agenda items of the conference, and

one of the last conferences focused on the environmental performance of companies and organizations was COP28 in the UAE in 2023.

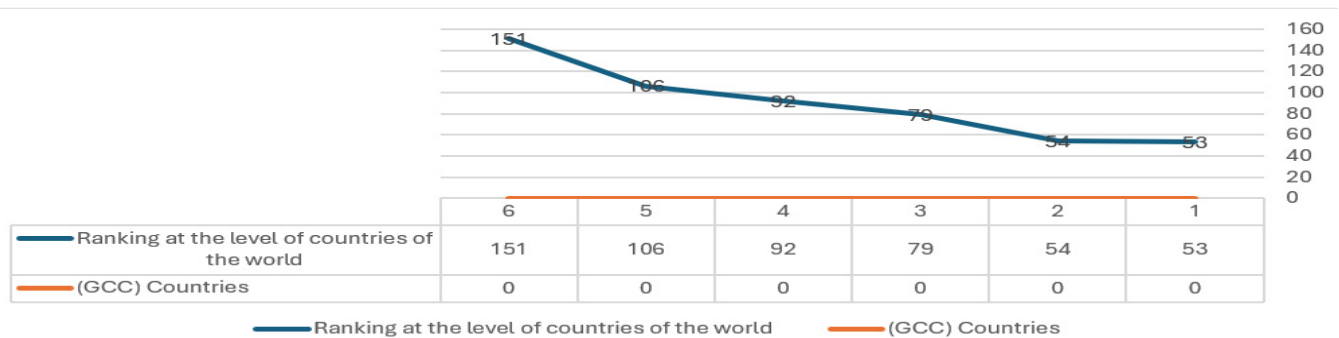


Figure 1. Chart ranking of the GCC Environmental Performance Index 2024. **Source:** preparation of authors based on the reference: [30].

3. Letter Review Theoretical

Many studies in the GCC countries have not touched on the disclosure of environmental accounting performance and its impact on supply chains in order to achieve sustainable development, and this is what makes the study gap widen in this particular region, so the authors present a number of previous studies as follows:

The researchers Ortas, E., M. Moneva believe that this study contributes to the discussions of supply chain management, environmental practices, and drivers of the environmental and financial success of companies, as their study aimed to investigate the relationship between sustainable supply chain and the financial performance of companies [32]. Jui-Che Tu and Hsieh-Shan Huang also saw in their study that the European countries, the U.S., Japan, the UN, and Taiwan have successively promoted environmental accounting guidelines and required enterprises to disclose environmental improvement information to improve the environment through production that will unavoidably impact product manufacturing [33]. As a study by Suaad Jassem, Anna Azmi, and Zarina Zakaria indicated, the process of making an investment decision based on aspects of sustainability is gaining importance among organizations around the world. In this context, there is a need to make good investment decisions, which require sufficient knowledge among managers of organizations about sustainability management information to achieve environmental goals that meet the expectations of stakeholders [34]. In the study of Thi Tam Lo, Thi Mai Anh Nguyen, and Thi Thu Hin van, they referenced construction materials manufacturing enterprises in Vietnam at medium and large scales. This is considered one of the industries that cause significant negative impacts on the environment, and therefore, environmental efficiency can positively affect financial efficiency so that innovative solutions to reduce environmental pollution can enhance the profitability of enterprises [35]. The study of Panagiotis travels, Georgios malindritos, and Panagiotis rekletis aimed to explore the relationship between green supply chain management practices and three different performance aspects, namely supply chain, green (environmental) and business performance, and environmental dynamic control [36]. In a study conducted by Mohammed Shoaib, Aamer Aslam, and Anam Aslam, they also highlighted that environmental accounting disclosure practices have a positive impact on the company's performance and that these disclosure practices are highly dependent on company characteristics such as company size, profitability, listing time, leverage, board size, and company size [37]. As the study by Nasser Asiri, Tehmina Khan, and Michael Kend indicated, the Middle East and North Africa region suffers from serious environmental problems, mainly due to industrial and non-financial commercial activities. Implementation of Environmental Management Accounting will help companies to better manage and improve environmental issues regarding how they treat the environment. The main motivation for conducting this study was that previous research has reported a poor level of environmental accounting practices by companies

in the MENA region. The study focused on the most prominent companies that are interested in this aspect in countries in the Middle East and North Africa. These countries are Saudi Arabia, the United Arab Emirates, Kuwait, Oman, Qatar, and Bahrain [38]. The study of Maoli Ji, Yuguang Ji, and Shulan Dong also explored factors that drive environmental accounting information disclosure (EAID) among corporations in China and provides important insights for Chinese regulators into effective ways of fostering disclosures of environmental accounting information and raising corporate awareness of CSR fulfilment to ensure sustainable development [39]. The study by Agus Joko Pramono, suarno, Firdaus amiar, and Rene Fresca also aimed to implement the Sustainable Development Goals in the manufacturing sector in Indonesia through the relationship between sustainability management accounting and environmental management systems to determine whether these two variables can improve organizational performance in the Indonesian manufacturing sector [40]. In a recent study, the study of both researchers also dealt with Suhaib, Seyyed Amir Babak Rasmi, and Metin Türkay. Sustainability analysis of cement supply chains considering economic, environmental, and social effects and focused on the effects integration of sustainability indicators in cement supply chains in the framework of triangular accounting, studying sustainability using multi-objective optimization [41]. The study of Jennifer Davies et al. explores and discusses how NFTs, analyzed through the lens of the Technology Organization Environment (TOE) framework, can drive supply chain sustainability and overcome the barriers to Blockchain Technology (BCT) adoption [42]. Finally, I clarified the study of both Hamza Bushra and Hassan Adam revealing the role of accounting measurement of environmental costs in promoting sustainable development by application to Sudanese sugar companies. The study followed the analytical descriptive approach, and a questionnaire of 20 phrases, distributed over two areas, was applied to an intentional sample of 190 individuals from the financial and accounting staff working in sugar companies. The company emphasized the need to develop a comprehensive environmental accounting system based on the latest technology to analyze environmental costs and provide periodic reports on environmental performance, as well as implement continuous training programs for financial and accounting personnel on the importance of accounting measurement of environmental costs and its tools, along with the formation of an internal environmental committee that includes experts in environmental accounting and development. Its task was to monitor and evaluate the company's environmental performance, develop plans for continuous improvement, and provide incentives to employees and projects that contribute to reducing environmental costs and improving environmental performance [43].

The authors believe that this study is looking towards covering the study gap in the GCC countries by identifying the challenges of disclosing environmental accounting performance and its impact on supply chains and sustainable development in companies.

4. Framework and Hypothesis Development

4.1. Theoretical Framework

Environmental accounting is not just a reporting tool; it is an essential aspect of responsible business practice that influences supply chain decisions and fosters sustainable development [44]. Its significance can be viewed through several lenses. Quantification of Environmental Costs and Benefits: At its core, environmental accounting enables the systematic measurement and quantification of the environmental impacts associated with business operations [45]. Environmental accounting provides insights into areas where businesses can reduce their environmental footprint. A traditional accounting system does not provide a specific view of environmental impacts and their related costs, but focuses instead on financial performance [35]. By examining the data generated through environmental accounting, companies can identify inefficiencies, areas for improvement, and resource optimization opportunities.

This study is a comprehensive exploration aimed to identify the impact of environmental accounting disclosure challenges on supply chains and promote sustainable

development in companies in the GCC countries. As the business world adapts to the imperatives of sustainability and the urgent need to address environmental challenges, environmental accounting stands as a cornerstone in this transformative journey [22]. By integrating environmental considerations into financial and managerial decision making, companies can make informed choices, reduce their environmental footprint, enhance their reputation, and contribute to global efforts to mitigate environmental challenges and promote sustainable development.

To determine the extent of the influence of the independent variable on the dependent variable, the theoretical framework of this study is developed in Figure 2, according to which:

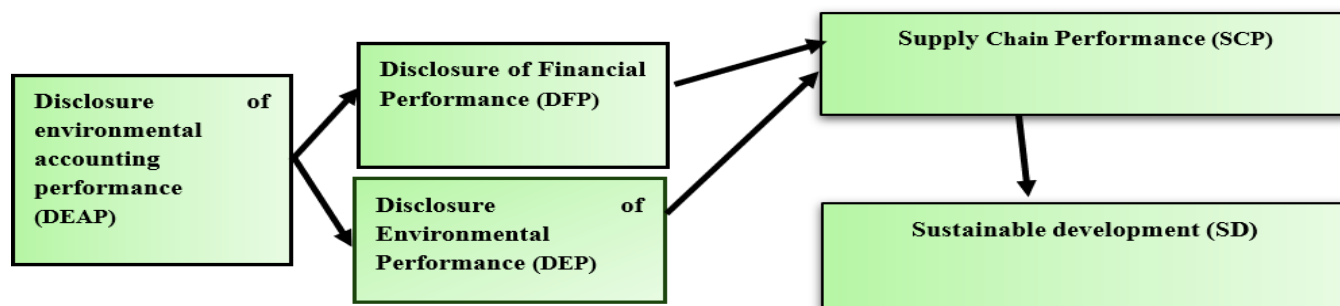


Figure 2. Study theoretical framework. **Source:** preparation of authors.

4.2. Development of Hypotheses

H1: *Disclosure of financial performance affects the supply chain performance in companies.*

4.2.1. Disclosure of Financial Performance (DFP)

Financial performance disclosure is a fundamental aspect of corporate governance, providing stakeholders with insights into a company's profitability, liquidity, solvency, and overall financial health [46]. By transparently reporting financial results, companies demonstrate their commitment to accountability and integrity, thereby building trust among stakeholders and fostering investor confidence [47]. Transparent disclosure of financial performance instills confidence in investors by providing them with accurate and reliable information to make informed investment decisions [48]. Disclosure of financial performance allows companies to maintain positive relations with creditors by demonstrating their ability to fulfill debt obligations and effectively manage financial risks [49]. Compliance with regulatory requirements for financial reporting ensures that companies comply with accounting standards and governance principles, enhance credibility, and avoid legal sanctions [50]. Finally, public disclosure of financial performance affects market perceptions of the company's value, growth potential, and competitiveness, which affect stock prices and market sentiment [51].

4.2.2. Challenges of Financial Performance Disclosure

The complexity of Financial Reporting Standards and systems can make it difficult for companies to ensure compliance and provide clear and concise disclosures [52]. Some financial metrics, such as fair value measurements and impairment assessments, include subjective judgments and estimates, which leads to possible discrepancies in reported results [53]. Companies are reluctant to disclose certain sensitive financial information, such as ownership statements or strategic plans, due to competitive concerns or speculative risks in the market. Ensuring the accuracy and reliability of financial statements requires strong internal controls, data validation, and independent audits, which can be resource-intensive and time-consuming [54].

4.2.3. Supply Chain Performance (SCP)

The concept of supply chain refers to the degree to which the supply chain meets or exceeds the expectations and requirements of customers and regulatory bodies. They include various aspects of the supply chain, including the quality of products or services, processes, relationships, and overall performance [55]. The concept of the supply chain also refers to a well-organized network of interconnected entities and processes that effectively cooperate to provide goods or services to customers while meeting or exceeding their expectations.

The quality of the products or services provided by the supply chain is also important. It involves meeting specifications, standards, and customer expectations regarding features, performance, durability, reliability, and safety [56]. Process quality also focuses on the effectiveness, efficiency, and consistency of processes and processes within the supply chain, as it includes the use of best practices, quality management techniques, and continuous improvement methodologies to improve processes, reduce waste, and enhance productivity [44]. Supplier quality refers to the quality of materials, components, and services provided by suppliers to the supply chain and includes the selection and management of suppliers based on their ability to meet quality standards, deliver on time, and maintain consistent performance. The quality of the relationship is about strength, trust, and cooperation between supply chain partners, including suppliers, manufacturers, distributors, and customers [57]. As for performance, it measures the overall performance of the supply chain in terms of key performance indicators such as delivery lead times, inventory turnover, order fulfillment rates, customer satisfaction, and financial performance. It involves monitoring, measuring, and optimizing performance to achieve the desired results and goals [45]. In the aspect of regulatory compliance and performance, the supply chain operates according to legal and regulatory requirements, industry standards, and ethical principles, including adherence to quality standards, safety regulations, environmental policies, and ethical guidelines to mitigate risks, protect stakeholders, and preserve the company's reputation [58]. The issue of continuous improvement is a key aspect of supply chain quality, including continuous efforts to identify, analyze, and address areas for improvement. It includes the implementation of corrective actions, preventive measures, and innovation initiatives to enhance quality, efficiency, and competitiveness [59]. The supply chain contributes to sustainable development by promoting economic growth, social equity, and environmental conservation [60]. Efficient supply chains minimize waste, reduce costs, and enhance product quality, leading to increased competitiveness and profitability for companies.

Overall, the concept of the supply chain emphasizes the importance of delivering high-quality products or services, optimizing processes, building strong relationships, achieving performance goals, ensuring compliance, and continuously improving performance to meet the evolving needs and expectations of customers [42].

H2: *Disclosure of environmental performance affects the supply chain performance in companies.*

4.2.4. Disclosure of Environmental Performance (DEP)

Environmental performance disclosure has gained prominence in response to growing concerns about climate change, resource depletion, and environmental degradation. This makes companies increasingly aware of the importance of transparency and accountability in managing their environment [61]. One of the benefits of disclosure is that transparent disclosure of environmental performance allows stakeholders to accurately assess the company's environmental impacts, risks, and mitigation efforts. Disclosure of environmental performance also promotes dialogue and cooperation with stakeholders, including investors, customers, employees, regulatory bodies, and communities, thereby enhancing trust and building positive relationships [62]. In addition, comprehensive reporting allows companies to proactively identify and address environmental risks and reduce potential liabilities, regulatory non-compliance, and damage to their reputation, and also benefits companies that demonstrate strong environmental performance and sustainability com-

mitments. These companies can gain a competitive advantage by attracting investors, customers, and environmentally conscious talents [20].

4.2.5. Challenges of Disclosure Environmental Performance

Perhaps the most prominent of these challenges is the collection of accurate and reliable environmental data, which may be difficult due to the complexity of environmental impacts, measurement methodologies, and data sources [10]. Compliance with various environmental reporting standards and frameworks, such as the Global Reporting Initiative, the Committee for Development Policy, and the Supreme Council for Standardization and Metrology, requires companies to navigate a complex landscape of reporting requirements and guidelines. The identification of physical and stakeholder-related environmental metrics indicators and business processes requires careful consideration and stakeholder participation [42].

H3: *Disclosure of the environmental accounting performance affects the supply chain performance and promotes sustainable development in companies.*

4.2.6. Sustainable Development (SD)

The term sustainable development is often referred to as the long-term preservation of prosperity for future generations, contingent upon the responsible utilization of natural resources [63]. Sustainable development embodies a business practice that embodies the concept of satisfying economic and environmental demands for the betterment of the broader community [64]. The term sustainable development is often referred to as the long-term preservation of prosperity for future generations, contingent upon the responsible utilization of natural resources [15]. It was defined by the World Commission for Sustainable Development in 1987 as: “meeting the needs of the present without destroying the ability of future generations to meet their own needs [60]”. The United Nations Conference on Environment and Development (Rio de Janeiro, 1992) defined it as: “managing economic resources in a way that preserves or improves resources and the environment to enable future generations to live a better, decent life [61]”. The concept of sustainable development has become a reference for scientific study on the environment and has been a paradigm for development since its appearance in the Brundtland Report in 1987. Since the Rio de Janeiro Earth Summit, the concept has become hegemonic and has been incorporated into international treaties and the national constitutions and laws of many countries around the world [65]. It has also been used in issues related to business, the agricultural production industry, and urban development and has become the conceptual foundation of theoretical approaches like the green [66] and circular economy. It has become a part of the common sense of a large proportion of the world’s population and environmental defense political slogans [64]. Moreover, sustainable supply chain practices, such as ethical sourcing, fair labor practices, and community engagement, contribute to social well-being and stakeholder trust. By integrating sustainability principles into supply chain management, companies can achieve long-term viability while minimizing their environmental footprint [56].

4.2.7. Disclosure of Environmental Accounting Performance (DEAP) and Supply Chain Performance (SCP)

Disclosure of Environmental Accounting Performance affects the supply chain by influencing sourcing decisions, production processes, and distribution channels. Companies with strong environmental performance standards are likelier to partner with suppliers and vendors who prioritize sustainability [67], leading to higher-quality and more resilient supply chains. Additionally, environmentally conscious practices such as resource efficiency, waste reduction, and product innovation can enhance supply chain operations’ overall efficiency and effectiveness [68].

4.2.8. Disclosure of Environmental Accounting Performance (DEAP) and Sustainable Development (SD)

Sustainability has been widely accepted since the olden days, especially in rural societies. The world's ancient cultures combine worship and religious convictions with environmental preservation, which calls on people to take care of the planet and keep it in good condition; this may be considered a demonstration of sustainability in the ancient ages [69]. Sustainability and its corollary policy, sustainable development, have inspired intense scholarly work [15]. The link between environmental accounting performance and sustainable development lies in the pursuit of environmental conservation and resource stewardship to support long-term prosperity and well-being. By improving environmental accounting performance, organizations contribute to the broader goal of sustainable development by minimizing negative environmental impacts, conserving natural resources, and promoting resilience to environmental changes [70].

Based on the above discussion on the disclosure of the performance of the accounting environment and its impact on supply chains to promote sustainable development in companies, and after a thorough review of the theoretical literature on the subject of the study, the authors consider a model that will illustrate independent variables and dependent variables. The mechanisms of correlation of these variables, relying on the theoretical literature and previous studies on the subject of research, are shown in the following Figure 3:

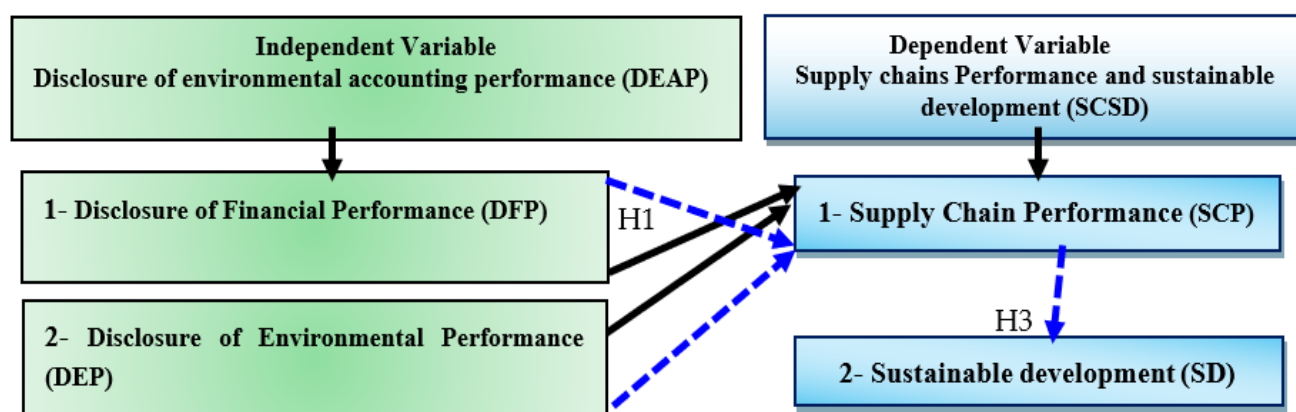


Figure 3. Study model. **Source:** preparation of authors.

5. Methods

The questionnaire was used to survey 20 companies and factories most interested in disclosing the performance of environmental accounting and its impact on supply chains and sustainable development in the GCC, which consists of 5 countries as a community for the study. An intentional probability sample was selected from the community for the companies and factories most interested in the topic (challenges of disclosing the performance of environmental accounting and its impact on supply chains to promote sustainable development) as follows: UAE with five companies, Saudi Arabia with five companies, Qatar with three companies, Oman with two companies, Kuwait with three companies, and Bahrain with two companies. These companies represent the study community realistically, and the number of usable questionnaires reached 200, which led to a response rate of 90% out of 220 questionnaires.

5.1. Analysis of Data

The data were analyzed using the partial least squares program (PLS) to find out the challenges of detecting the performance of environmental accounting and its impact on supply chains and the sustainable development of industrial companies in the GCC countries.

5.2. Study Tool Stability

To test the verification of the study instrument, the stability coefficient was calculated according to the Cronbach Alpha coefficient and the questionnaire questions were verified. This was in addition to determining the dimensions of the total variables for each study instrument, as shown in Table 2.

Table 2. Values of the stability coefficient of the study instrument by the alpha Cronbach coefficient.

Variables and Dimensions	Number of Statements	Alpha Cronbach Coefficient
Disclosure of Financial Performance (DFP)	4	0.910
Disclosure of Environmental Performance (DEP)	4	0.891
Supply Chain Performance (SCP)	4	0.901
Sustainable development (SD)	4	0.882
Total tool	16	0.931

It can be seen from Table 2 that the tool obtained a total stability coefficient (0.93) which reflects a high stability coefficient. This confirms that the tool has a high degree of stability, which can be relied on in the application of the study.

5.3. Demographic Information Analysis

Table 3 explains the analysis of the demographic information of the sample.

Table 3. Demographic information analysis.

Demographic	Elements	Frequency	%
Qualification	Doctorate	25	12.5%
	Master's	50	25%
	Bachelor's degree	125	62.5%
	Total	200	100%
Specialization	Management	80	40%
	Accounting	22	11%
	Economic	42	21%
	Other	56	28%
	Total	200	100%
Experience	Less than 5 years	30	15%
	From 5 and less than 10 years	60	30%
	From 10 and less than 15 years	49	24.5%
	From 15 years and less than 20 years	31	15.5%
	From 20 years and over	30	15%
	Total	200	100%
Position	Director	20	10%
	Managing director	60	30%
	Staff	120	60%
	Total	200	100%

5.4. The Outer Loading Test and Collinearity Statistics (VIF) of the Model

Table 4 shows the final path of loading the results of the proposed model of study variables (DFP, DEP, SCP, SD). In Table 4, the outer loadings represent the strength of the relationship between each indication (survey question), and the underlying outer loadings greater than 0.70 were considered adequately significant in the suggested model [71].

Table 4. The outer loading test and collinearity statistics (VIF) of the model.

Variables	Item	Outer Loading	Vif
Disclosure of Financial Performance (DFP).	DFP1	0.841	2.135
	DFP2	0.846	2.409
	DFP3	0.873	2.411
	DFP4	0.832	2.189
Disclosure of Environmental Performance (DEP).	DEP1	0.816	2.513
	DEP2	0.856	2.905
	DEP3	0.871	2.515
	DEP4	0.823	2.918
Supply Chain Performance (SCP)	SCP1	0.818	2.315
	SCP2	0.858	2.590
	SCP3	0.826	2.141
	SCP4	0.838	2.891
Sustainable development (SD)	SD1	0.817	2.290
	SD2	0.849	2.370
	SD3	0.837	2.287
	SD4	0.843	2.114

The VIF values for all variables in this dataset are significantly lower than the frequently accepted threshold of 5, suggesting that multicollinearity is not a significant issue.

The maximum observed VIF value is 2.918 for DEP4, which is far below the threshold, indicating that the indicators in the model exhibit a rather high level of independence. The measurement model demonstrates the absence of collinearity concerns, as seen by the lowest VIF score of 2.114 for (SD4).

5.5. The Reliability and Validity Test of the Model

Table 5 shows the reliability (Cronbach's alpha, composite reliability (ρ_a), and (ρ_c)) and validity average variance extracted (AVE), showing that construct reliability can be accepted if Cronbach's alpha value is greater than 0.70 [71]. Furthermore, convergent validity can be accepted if the composite reliability (ρ_a) and (ρ_c) is greater than 0.70 [71] and the AVE analyses are greater than 0.50. As a result, every item passes the reliability and validity tests.

Table 5. The reliability and validity test of the model.

Variables	Cronbach's Alpha	Composite Reliability (ρ_a)	Composite Reliability (ρ_c)	Average Variance Extracted (AVE)
Disclosure of Financial Performance (DFP)	0.885	0.877	0.913	0.785
Disclosure of Environmental Performance (DEP)	0.912	0.916	0.901	0.748
Supply Chain Performance (SCP)	0.881	0.879	0.910	0.790
Sustainable development (SD)	0.901	0.920	0.906	0.723

5.6. R-Squared Value

Table 6 shows the outcomes of the path quantity method for the proposed model using the R-squared value. The reliability of the R-squared assessment for the variable disclosure of environmental accounting performance on the effects of supply chain performance and sustainable development is 0.860, according to Table 4. As a result, if the R-squared value is greater than 0.25, the suggested model's predictive validity is based on the orientation [71].

Table 6. R-squared value.

Factor	R-Square
Challenges of disclosing environmental accounting performance and its impact on Quality supply chains to promote sustainable corporate development—experiences of some companies in the GCC—2024	0.860

5.7. Hypotheses Testing

The results obtained from the PLS-SEM analysis of the data in Table 7 indicate a positive relationship between the disclosure of environmental accounting performance and supply chains and the sustainable development in companies. This is as follows:

Table 7. Testing of hypotheses.

Variables	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	p Values
Disclosure of financial performance (DFP) -> Supply Chain Performance (SCP).	0.195	0.197	0.050	3.770	0.000
Disclosure of environmental performance (DEP) -> Supply Chain Performance (SCP).	0.197	0.198	0.051	3.819	0.000
Disclosure of environmental accounting performance (DEAP) -> supply chain performance (SCP), Sustainable development (SD).	0.196	0.195	0.051	3.799	0.000

H1: Disclosure of financial performance (DFP)-> Supply Chain Performance (SCP), Original sample (O) = 0.195, Sample mean (M) = 0.197, Standard deviation (STDEV) = 0.050, T statistics (O/STDEV) = 3.770, p values = 0.000.

H2: Disclosure of environmental performance (DEP)-> Supply Chain Performance (SCP), Original sample (O) = 0.197, Sample mean (M) = 0.198, Standard deviation (STDEV) = 0.051, T statistics (O/STDEV) = 3.819, p values = 0.000.

H3: Disclosure of environmental accounting performance (DEAP)-> supply chain performance (SCP), sustainable development (SD), Original sample (O) = 0.196, Sample mean (M) = 0.195, Standard deviation (STDEV) = 0.051, T statistics (O/STDEV) = 3.799, p values = 0.000.

5.8. Bootstrapping Analysis

Figure 4 shows the T-value of the proposed model of the bootstrap program with partial least squares 3.3.3 (pls 3.3.3), which was used to evaluate the (H1) of the study. The results of the T-value test of the ethical values of disclosure of financial performance (DFP) variable in supply chain performance (SCP) are also shown.

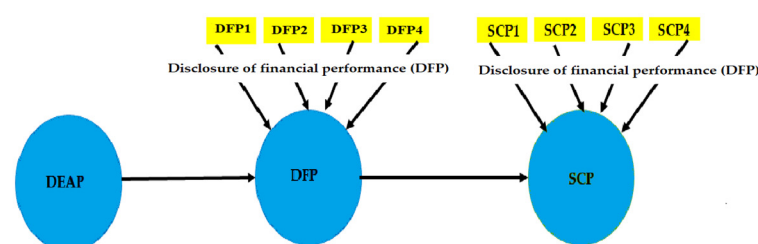
**Figure 4.** Bootstrapping analysis—H1.

Figure 5 shows the T-value of the proposed model of the bootstrap program with partial least squares 3.3.3 (pls 3.3.3), which was used to evaluate the (H2) of the study. The results of the T-value test on the ethical values of disclosure of environmental performance (DEP) variable in supply chain performance (SCP) are also shown.

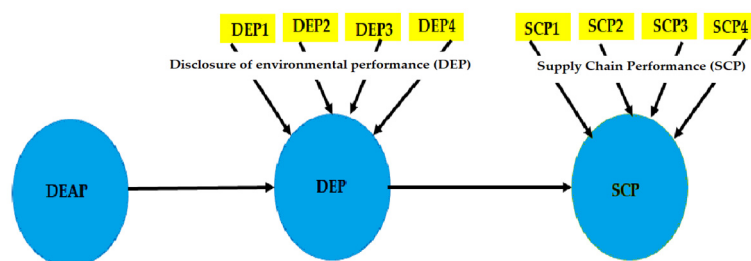


Figure 5. Bootstrapping analysis—H2.

Figure 6 shows the T-value of the proposed model of the bootstrap program with partial least squares 3.3.3 (pls 3.3.3), which was used to evaluate the (H3) of the study. The results of the T-value test of the ethical values of disclosure of environmental accounting performance (DEAP) variable in supply chain performance (SCP) and sustainable development (SD) are also shown.

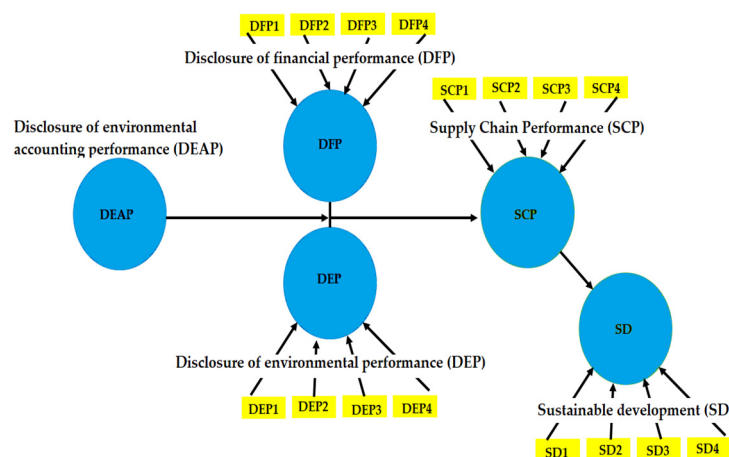


Figure 6. Bootstrapping analysis—H3.

6. Discussions and Results

The main objective of the study is to study the challenges related to accounting disclosure of environmental performance and its impact on the performance of Adid Quality supply chains to promote the sustainable development of companies in the GCC countries. By addressing the intake of the companies and factories of most interest, the study reached the following results:

The study model of PLs analysis with all dependent variables (DEAP) and independent variables (SCP, SD) showed the values of the outer loading test and the statistics of the nested linear relationship to be above 0.70, as shown by Table 3.

The study model achieved the following values on the reliability and validity test of all its variables (DFB, DEP, SCP, SD): Cronbach's Alpha with a value greater than 0.70, composite reliability ((rho_a) and (rho_c)) with values greater than 0.70, and the average variance in the extracted validity (AVE) with a value greater than 0.50, according to Table 4.

The results of the hypothesis study (H1) showed: Disclosure of financial performance affects the supply chain performance in companies through Variants Items (FEP, SCP) including:

The results of the study showed that financial performance disclosure is an important tool for making financial decisions to achieve good performance of the company's supply chains. The results also showed that identifying the strengths and weaknesses of financial performance leads to continuous improvement of the company's supply chain performance. The study results also confirmed that companies regularly assess financial performance to improve the performance of supply chains. The results also confirmed that the disclosure of financial performance by companies helps the functioning of supply chains. The authors believe that these results are largely consistent with what has been reported in the theoretical literature through previous studies [37,51,52,55,56].

The results of the study of hypothesis (H1) showed a correlation between the disclosure of financial performance (DFP) and the supply chain performance (SCP), according to the following values: original sample (O) = 0.195, sample mean (M) = 0.197, standard deviation (STDEV) = 0.050, T statistics (O/STDEV) = 3.770, and *p* values = 0.000. This is confirmed in Table 6.

The results of the hypothesis study (H2) showed that disclosure of environmental performance affects the supply chain performance in companies through variant items (DEP, SCP).

The results of the study confirmed that companies prefer to disclose environmental performance to increase the efficiency of supply chain management. The results also confirmed that the company is interested in educating those interested in environmental accounting to improve supply chain performance. Also, through the answers of the study sample, the results showed that the top management of companies encourages the development of green supply chain performance. The study's results also confirmed that the disclosure of environmental performance in companies helps to achieve better supply chain performance. Our study, in this aspect, is consistent with what is stated in the studies [10,20,44,58,61,62]. It also contrasts with studies [37,39,40].

The results of the study of hypothesis (H2) showed a correlation between the disclosure of environmental performance (DEP) and the supply chain performance (SCP), according to the following values: original sample (O) = 0.197, sample mean (M) = 0.198, standard deviation (STDEV) = 0.051, T statistics (O/STDEV) = 3.819, and *p* values = 0.000. This is confirmed in Table 6.

The results of the study of hypothesis (H3) showed a correlation between disclosure of environmental accounting performance (DEAP) and sustainable development (SD), according to the following values: original sample (O) = 0.195, sample mean (M) = 0.191, standard deviation (STDEV) = 0.050, T statistics (O/STDEV) = 3.822, and *p* values = 0.000.

The results of the hypothesis study (H3) showed that disclosure of the environmental accounting performance affects the supply chain performance and promotes sustainable development in companies through variants items (DEAB, SCP, SD).

The results of the study confirmed that companies disclose environmental performance practices in financial statements to achieve sustainable development. The results of the study also show that there is an impact of measuring the company's financial performance on achieving sustainable development. The results also showed that measuring environmental costs reduces damage to the environment and achieves sustainable development. The results of the study also confirmed that the disclosure of the company's financial performance is influenced by its practices towards sustainable development. This is indicated by some studies, such as [15,51,52,61,63,64]. The results of the study also showed that the company's environmental performance improves through attention to sustainable development. The results of the study also showed that the company suffers from a lack of concepts in the environmental dimension, which affects sustainable development. The results also confirmed that the company's environmental performance is monitored to achieve the Sustainable Development Goals. Finally, the results of the study showed that the accounting disclosure of environmental performance is a mechanism for judging the company's performance and achieving sustainable development. Our study, in this aspect, is consistent with the studies [10,20,61,62,69,70].

7. Recommendations

Based on the applied study procedures, the theoretical literature, and previous studies, the study makes the following recommendations.

Our study underscores the critical role of environmental accounting adoption in driving sustainable development and enhancing supply chain sustainability within companies. By examining a comprehensive set of variables, including disclosure of financial performance (DFP), disclosure of environmental performance (DEP), supply chain performance (SCP), and sustainable development (SD), we have contributed to a holistic understanding of sustainability in the business context of the GCC countries.

Our findings are consistent with previous studies with which we agree that environmental accounting practices provide a path to achieving environmental and financial goals. Such practices not only improve environmental performance, but also contribute to the development of sustainable supply chains. Moreover, our study highlights the competitive advantage of large companies in the GCC countries achieving supply chain sustainability, reflecting the importance of economies of scale. This is indicated by the studies [36,37,39–42].

As companies continue to face mounting pressure to address environmental and social responsibilities in the GCC countries, specifically Saudi Arabia, our study provides valuable insights. It underscores the business case for environmental accounting practices, showcasing how they can drive sustainable development and foster sustainable supply chains. This not only benefits the companies themselves by enhancing their financial and environmental performance, but also contributes to the broader societal goal of achieving sustainability, according to the studies [32–34,42].

Through the results shown, the authors emphasize the need for companies in the GCC region to pay attention to environmental accounting disclosure in the financial reports of all stakeholders. The authors also believe in the development of supply chains within companies to promote sustainable development in the GCC countries, as indicated by studies [37,39].

To remain competitive and fulfill their corporate social responsibility, companies must consider the adoption of environmental accounting practices as an integral component of their sustainability strategies. As the sustainability landscape evolves, embracing these practices will be crucial for companies seeking to navigate the complex terrain of environmental responsibility and economic viability.

Our study serves as a testament to the potential benefits of this approach, highlighting how it can catalyze sustainable development, the cultivation of sustainable supply chains, and, ultimately, a more sustainable future, not only in the GCC countries but also in all countries of the world.

Our study also recommends that future studies in this field cover the study gap. There should be studies that focus on identifying the challenges facing companies when disclosing financial and environmental performance and its impact on supply chains and sustainable development in companies operating in the entire GCC, North African countries, and companies operating in East Asia, where studies are still needed, as there are few of them.

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