



The Role of Environmental Accounting and Environmental Disclosure in Improving the Reliability and Quality of Accounting Information

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دور المحاسبة البيئية والإفصاح البيئي في تحسين موثوقية وجودة المعلومات المحاسبية

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Abstract:

The purpose of this study is to investigate the role of environmental accounting and environmental disclosure to improve the quality of the accounting information. The main assumption of this study is that there is a statistically significant correlation between environmental accounting and environmental disclosure and the improvement of the quality of accounting information. A questionnaire was used in collecting the data, the researchers distributed 55 copies of the questionnaires to a selected sample of Libyan oil companies, using random sampling technique. Forty-eight questionnaires were eventually collected. The conclusions in the findings of the research are that there is an important role that environmental accounting and disclosure can play in measuring and monitoring environmental costs and charges, increasing the transparency of the company reports, helping the company to establish a more credible position for its policies and statements, for both investors and the general public, and in finally providing good reliable data that can support management and top management to make the right decisions especially when it comes to projects with the potential of having a very high environmental impact. The results also showed that Libyan oil companies realize the importance of environmental accounting and environmental disclosure in enhancing and improving the quality of financial reports. As a result, the main hypothesis of the study can be accepted and it can be concluded that there is a statistically significant relationship between environmental disclosure, the implementation of environmental accounting on one hand and the quality of accounting information in oil companies on the other.

Keywords: Environmental Disclosure, Environmental Accounting, Libyan oil companies, accounting information.

الملخص:

هدف هذه الدراسة هو التحقيق من دور المحاسبة البيئية والإفصاح البيئي في تحسين جودة المعلومات المحاسبية. الفرضية الرئيسية هي وجود علاقة ذات دلالة إحصائية بين المحاسبة البيئية والإفصاح البيئي من جهة وبين تحسين جودة المعلومات المحاسبية من جهة أخرى تم جمع البيانات باستخدام استمارة الاستبيان وذلك لتأكيد قبول أو رفض الفرضية المطروحة. تم

تصميم الأسئلة/العبارات من خلال مراجعة الدراسات السابقة، وقام الباحثون بتوزيع 55 نسخة استمارة على عينة مختارة من شركات النفط الليبية، باستخدام تقنية العينة العشوائية. تم جمع 48 استبياناً، وبعد مراجعتها للتأكد من اكتمالها وصلاحياتها، اعتُبرت صالحة للتحليل الإحصائي. تشير النتائج إلى أن للمحاسبة البيئية والإفصاح البيئي دوراً مهماً في قياس ومراقبة التكاليف والالتزامات البيئية، وزيادة شفافية تقارير المالية، ومساعدة الشركة على تعزيز مصداقية سياساتها وبياناتها أمام المستثمرين والجمهور العام، كما أن المحاسبة البيئية تساهم في توفير بيانات موثوقة تدعم الإدارة العليا لاتخاذ القرارات الصحيحة، خصوصاً عند التعامل مع المشاريع التي قد يكون لها تأثير بيئي كبير. وظهرت النتائج أيضاً أن شركات النفط الليبية تدرك أهمية المحاسبة البيئية والإفصاح البيئي في تعزيز وتحسين جودة التقارير المالية، بناءً على ذلك، يمكن قبول الافتراض الرئيسي للدراسة، بأن هناك علاقة ذات دلالة إحصائية بين الإفصاح البيئي، وتطبيق المحاسبة البيئية من جهة، وجودة المعلومات المحاسبية في شركات النفط الليبية من جهة أخرى.

الكلمات المفتاحية: الإفصاح البيئي، المحاسبة البيئية، شركات النفط الليبية، المعلومات المحاسبية.

1. Introduction

Companies are becoming increasingly concerned about environmental protection as an important strategic imperative to help achieve resource sustainability and reconcile economic development with environmental protection. Organizations have become more aware of their negative environmental impact and of the need for energy efficiency. The heightened environmental consciousness has generated a much-needed change in terms of company's management of environmental costs and liabilities. Environmental costs used to be seen as insignificant since there was not a lot of legislation in force and stakeholder pressure was at a low level (Gale, 2006; Scavone, 2006). However, according to the majority of studies, environmental costs have risen several fold as environmental consciousness is gaining traction worldwide, most significantly in developed countries and are expected to rise further due to pressure from stakeholders, more stringent environmental laws, new environmental taxes, compliance costs, and growing costs of waste management and treatment, such as pollution monitoring and so on (Martin & Selman, 1997; Bennett & James, 1998; Kokubu, 2002; Li, 2004; IFAC, 2005). However, for companies, it is difficult to measure and account for environmental costs as under the current accounting system, most environmental costs are included in overheads and therefore companies bear costs unfairly across their products with polluting products having lower environmental costs and more environmentally friendly products having higher environmental costs. Accounting for environmental costs unfairly distorts both the prices of products and companies' environmental performance. Environmental accounting thus becomes essential. Environmental accounting is a specialty of accounting which seeks to integrate accounting and environmental management in order to provide financial and non-financial information. This means that environmental accounting aims to provide information to ensure proper measurement of environmental costs, to support informed decision making and therefore to improve the performance of companies and their organizations (Wokeh, 2018; Mary et al., 2024). According to the U.S. Environmental Protection Agency (EPA), environmental accounting is "the process of identifying, measuring, analyzing, and disclosing environmental cost information E P A.E. To reach these goals, new standards are required for environmental costs measuring and reporting in order to better the quality and reliability of financial reporting (particularly in terms of environmental performance), and thus to support better decisions. Disclosing environmental information, whether within financial reporting or as separate environmental reporting, reinforces the qualitative characteristics of accounting information and helps companies maintain their sustainability pledges.

2. Study Significance

The present study is of prime importance for a number of reasons, first and most significant among these reasons is, how environmental accounting has been supporting efficiency in resource management and enhancing transparency in environmental disclosure in the wider context of contemporary world's movement towards sustainable development. This will be achieved by testing the extent of the contribution of environmental accounting and environmental disclosure in improving the quality of accounting information in the context of enriching the knowledge-based modern literature of accounting, to enhance and support the efforts of the concerned institutions in developing their accounting system, and its information so as to be compliant with the current environmental evolution and needs of all the stakeholders, and finally, to conclude with a set of recommendations that would promote the environmental awareness in relation to the role of environmental accounting in improving the reliability and relevance of accounting information.

3. Study Objectives

This study focused on the role of environmental accounting and environmental disclosure in supporting improvement in the quality of accounting information, and their role in contributing to supporting sustainability practices among organizations. The specific objectives include:

- Determining the significance of environmental accounting on the accuracy and transparency of financial reporting
- Analysing the level of management awareness in oil companies about the importance of environmental accounting and environmental disclosure
- Conducting a field study to determine the extent to which environmental accounting and environmental disclosure are being practiced in oil company in Libya.
- Developing a set of recommendations that would enrich the supporting efforts in developing the accounting system with relation to the contemporary environmental evolution.

4. Study problem

The matter of precise tracking and documentation of environmental costs and obligations is a challenge for a great number of firms, in particular those that belong to environmentally intensive industries like oil. Environmental expenses and obligations are usually accumulated in a number of environmental management systems or cost centers within traditional accounting systems. However, environmental costs have been listed in the line item “expenses” in the budget without detailed allocations. This practice creates distorted accounting data and makes it harder for decision makers to assess it. In addition, the implementation of environmental accounting can be constrained by a number of factors: the absence of a single and advanced system of environmental accounting, the environmental disclosure system is also not as highly developed as it could be, and this also hinders the ability of organizations to provide financial reports that fully correspond to environmental performance and its costs. Nowadays, this problem is particularly relevant because, on the one hand, there is an increasing amount of environmental taxes and regulations, and on the other hand, companies also receive more and more pressure from stakeholders. All these aspects increase the volume and complexity of environmental costs and obligations. Without an appropriate environmental accounting, decisions made by companies based on incomplete and/or imprecise information will have an adverse effect on the firm’s financial performance, economic, and environmental sustainability. In particular, oil companies experience the restrictions due to a number of reasons: environmental damage caused by oil spillages, environmental taxes, high costs of compliance with environmental regulations, and the need for a highly transparent reporting, which can ensure the trust of both investors and society. Therefore, on the basis of the above, it is considered that it is necessary to highlight the importance of environmental accounting and its primary role in the improvement of the quality of the accounting information and to apply it in oil companies. It is so because this group of companies is one of the most environmentally-intensive, and there is a need to establish environmental management systems. Based on the above, the general research problem of the study can be formulated as: What is the current situation in terms of environmental accounting practices in oil companies, and how important are they for improving the quality of the accounting information?

5. Study Hypotheses

To meet the objectives of the study and to try to solve the research problem, the following main hypothesis has been proposed. There is a statistically significant relationship between the practice of (environmental accounting and environmental disclosure) and the quality improvement of accounting information in oil companies. This hypothesis will be tested and either confirmed or rejected by a set of sub-hypotheses that will be examined through the field study as one of the vital components of this study. The sub-hypotheses have been formulated as follows:

- There is a practice of environmental accounting rules, and procedures in Libyan oil companies.
- 2. Environmental accounting contributes to enhancing the transparency of financial reports and increasing the confidence of stakeholders and society as a whole
- Environmental accounting is used to track and measure environmental costs, which in turn increases the benefits obtained by the company.
- Environmental disclosure helps the company obtain various financial and non-financial benefits
- There is an awareness among Libyan oil companies of the importance of environmental accounting and environmental disclosure.

6. Literature Review

The growing environmental concern in recent decades, both locally and globally, can be attributed to the increasing impact of issues such as pollution, climate change, and natural resource depletion. The environmental concern has not spared other areas such as the accounting profession. This, therefore, brings to the fore the dire need to develop an accounting system that will embrace the environmental component. Traditional accounting methods have not offered and provided credible information about environmental costs and other economic activities’ impacts on the environment, thus raising environmental accounting as a modern trend within the accounting profession (Gale 2006, Jasch 2006, Birkin 1996, Ferreira et al. 2010). Accordingly, the existing literature on environmental accounting has been addressed by numerous researchers from different perspectives. Some studies have been on its effectiveness in increasing environmental disclosure and transparency level. Others

have focused on its influence on the decision-making process of organizations. Other studies have focused on the relationship between environmental accounting, market value, and stakeholders' reputation. In addition, other studies have been on the compliance with environmental disclosure by companies in the financial and non-financial reports, and other difficulties encountered in the implementation of environmental accounting systems. As a result, the differences in the results obtained by various studies are also different, given the economic and legal context in which they were conducted. Thus, it is necessary to review the existing literature on environmental accounting in order to build an integrated understanding of its theoretical and practical frameworks as well as to define the relevant research gap. In Patrick (2007), which was carried out in the context of a Sierra Leone company, the results demonstrate the increased level of awareness of the importance and effectiveness of environmental accounting and its practical application in the company being studied. The research also confirms that environmental accounting is a vital tool for decision-making that helps reduce costs and environmental burden. In addition, the study has also discovered that the ignorance of environmental accounting and the absence of the accounting of environmental costs resulting from pollution activities could lead to skewed performance measurement and inflated accounting outcomes. In a similar context, Qian et al., (2011) focused on the implementation of environmental management accounting in local governments in New South Wales, Australia. The purpose was to help improve waste management and recycling initiatives. This research was based on case studies of in-depth interviews with managers in 12 local councils. The results have shown that there has been an increasing use of environmental accounting information compared to the results of the previous studies. The study also discovered two prime movers of this development. The first one was extrinsic in the form of pressures from regulation, society, and the influence of other councils. The second one was an intrinsic influence on councils resulting from the complexity of waste operation, services' development, the continual changes in the waste management sector, and the council's positioning in the overall waste management strategy. In the same case, Al-Dosari (2011) aimed to research the role of environmental cost accounting in improving the quality of accounting information. The data were collected using 105 questionnaires submitted to employees in the accounting office of industrial companies listed on the Kuwait Stock Exchange. The results have shown that the majority of companies have complied with environmental standards to improve the quality of accounting information. Lee (2011) empirically tested research in environmental management accounting and environmental cost accounting. The research used survey methods to identify the variables that help Korean industrial organizations to use environmental cost accounting and studied the stimuli and barriers for using environmental cost accounting. The results showed an unavailability of structured methods for environmental cost accounting, problems with the available accounting, and information systems. The researcher suggested a need for additional studies of environmental accounting in other industries and other countries. On the other hand, Dissanayake et al. (2012) studied environmental accounting practices in Sri Lanka and observed the difference in the extent of its use in developing and developed countries, and the nature of these differences. The research was conducted through the content analysis of the annual reports of 20 companies for 2009–2010, ten companies listed in the London Stock Exchange and ten companies listed in the Colombo Stock Exchange, and through the distribution of a questionnaire for collecting information about the level of managerial awareness about the concepts of environmental accounting and corporate social responsibility in Sri Lankan companies. The results showed that both developing and developed countries do not transparently report the costs related to their social responsibilities; however, in developed countries, the disclosure level of these costs has a more formal nature and better quality than in developing countries. In a similar context, Peter and Krishna (2013) attempted to solve some issues of environmental accounting in the financial reporting in Malaysia, and to find the necessary environmental accounting procedures that need to be integrated into the corporate environmental management accounting system. The results of the research showed that environmental accounting in business organizations face many problems including a lack of informational support and lack of specialized expertise, although there are continuing efforts to improve environmental information systems and establish environmental management systems. In a related study, Chang (2013) attempted to analyze environmental cost management from an accounting perspective through the case study of three Taiwanese universities. Interviews were conducted and the account schedules were reviewed, annual reports, strategic plans, and sustainability reports. The results of the research showed the lack of environmental management accounting practices for environmental cost management, because of financial constraints, which results from the low level of importance that companies attribute to environmental costs, in addition to difficulties associated with the data collection and allocation. Al-Hussein (2014) researched to what extent environmental accounting is applied in the industrial establishments in Iraq and to what extent these establishments disclose environmental accounting information and what are the problems associated with its implementation. The study distributed 30 questionnaires to industrial companies in Najaf, and 25 of the questionnaires received were valid. The results showed that there is no actual application of environmental accounting in the industries of Najaf, and that some people are only partially aware of environmental accounting at a limited level. The study added that there are many barriers that prevent the application of environmental accounting in Iraq. Ibrahim (2015) studied the extent to which environmental management accounting techniques are applied in Syrian companies, the extent to which environmental costs are measured in these companies, and

the problems that face their application. The research distributed 23 questionnaires to a sample of 100 companies in the coastal region of Syria. The results showed that most companies use management accounting techniques and measure waste treatment costs and costs related to radiation for internal purposes, and that they face many problems, including difficulty in measuring environmental costs, the lack of a unified framework to measure these costs, and lack of knowledge about environmental accounting concepts. In Libya, Al-Busaifi and Al-Lafi (2017) aimed to assess the degree of knowledge and understanding of the Libyan oil companies about the importance of environmental accounting information in the financial statements, the barriers to its application and the role of environmental accounting information in the process of decision-making. The study applied a questionnaire distributed on 50 copies to managers and staff of the National Oil Corporation and its subsidiary companies. The processing of the obtained information and their analysis through the Statistical Package for the Social Sciences and the T-Tests revealed a satisfactory level of knowledge and understanding of the importance of environmental accounting and identifying the barriers facing it. The most important barriers in this context are the absence of legally binding legislation, the low level of environmental information, the low level of the information system and the lack of appropriate systems for calculating environmental costs. Najib (2018) determined the effect of environmental cost accounting on the extent of environmental sustainability and competitive advantage in the Libyan manufacturing sector. The research design in this study is descriptive-analytical and applied, and based on studying the relationship between the variables (environmental cost accounting, environmental sustainability, environmental policies, and competitive advantage). The researcher distributed 139 questionnaires and obtained 87 valid questionnaires. The results of the study showed that there is a statistically significant positive relationship between environmental cost accounting and environmental sustainability. Also, a significant relationship exists between environmental policies and competitive advantage as well. The research findings, however, pointed to the failure of Libyan industrial organizations in the field of environmental accounting to apply the environmental accounting system in a perfect way, whether from the environmental awareness side or from the side of laws and legislation by the absence of the laws and legislation and in the field of environmental violations by continuing some forms of violation due to failure to adhere to environmental legislations and policies." Walid (2020) aimed to study the role of environmental cost accounting to enhance the quality of financial statements. The researchers applied the survey study was conducted by collecting data from the staff working in different institutions. The list of institutions was selected including (Al-Omouri Brothers Import and Export Company for Construction Materials, The Central Pharmacy for Hospitals, and The Textile and Manufacturing Company). For this research 50 copies of questionnaires were distributed and 36 copies were valid and suitable for analysis and studies. Results show that environmental accounting has strong relationship with the quality of financial statements. This result means that environmental accounting will improve the quality of financial statements, as environmental accounting enhances the reliability of the financial statements and their influence on users. Yusoh and Mat (2020) The study sought to determine the extent to which hotel companies in Malaysia adopted environmental accounting and the factors affecting the inclusion of environmental accounting in their accounting systems. The researchers distributed 212 valid questionnaires to hotels in the states of Selangor and Kuala Lumpur in Malaysia. The results showed that environmental accounting had not been widely implemented, while financial, information and institutional barriers played a crucial role in their implementation. The study by Walid and Houaria (2021) Also, it aimed to determine the extent of the use of environmental accounting by industrial organizations in Algeria. This study was based on a case study of one of the Algerian companies, called the 'Naftal' company, in Tiaret. The main tool for data collection in this study is the questionnaire, which was designed and distributed to a sample of employees specialized in the accounting and financial sections in this company. The processing and analysis of the information obtained revealed several outcomes. The first outcome was related to the implementation of environmental accounting in this organization as an actual reality. The second outcome concerned the awareness of the sample of the importance of environmental accounting. The study also included an inventory of obstacles and challenges facing the implementation of environmental accounting. The most important of these factors was the lack of sufficient and complete knowledge of the management of the organization of the environmental accounting procedures. Also, the absence of laws and legislation that oblige industrial organizations to apply these procedures, and the absence of the necessary detailed information were the challenges in front of the implementation of environmental accounting. Abuhajar and Dihum (2021) this research aims to study environmental accounting disclosure in Misurata City's business environment and to research the impact of both the environmental awareness of managers and the cost systems used for environmental accounting measurements in industrial companies on the quality of accounting information. The purposive sampling technique was used to collect data from employees of the cost and accounting departments and auditors. A total of 80 valid questionnaires were distributed and analyzed statistically using SPSS and Smart PLS 3 software to draw conclusions about the research hypotheses. The results of this study reveal that managers have awareness level of the significance of environmental accounting measurement which has a positive impact on the quality of accounting information, and the study also reveals that the cost systems are not fully covering environmental activity cost measurement. Haleem et al. (2021) analyzed environmental accounting through systematic literature review which was obtained from academic and professional literature from Emerald, Taylor & Francis, Oxford,

which is very clear environmental accounting is a control device and a good monitoring mechanism for the performance of companies operating in environmentally sensitive industries and activities, but disclosure of environmental costs was still limited. The study recommended the creation of more structured environmental accounting systems to better develop internal and external auditing systems, leading to an increase in firms' environmental performance. Halimi and Bahloul (2021) tried to explore the degree to which the environmental accounting system was able to support the implementation of corporate social responsibility at Naftal, Tebessa Unit. For the purpose of conducting the survey 50 questionnaires were distributed to a sample taken from the three departments: Finance and Accounting Department, the Technical Division and the Security, Safety, and Environment Department, the findings were of paramount importance; above all the results confirmed the existence of a statistically significant and positive relationship between environmental accounting and the different dimensions of social responsibility (environmental, economic, and social). The study of Eltaib (2021) focused on the effect of the environmental accounting system on following up environmental laws and regulations at the Libyan Iron and Steel Company. The data were collected using a questionnaire which was sent to a sample of 84 employees at the Libyan Iron and Steel Company. The main findings of the study were: firstly, environmental accounting has a significant effect on the follow-up of environmental laws and regulations at the Libyan Iron and Steel Company and, secondly, there is a positive and significant relationship between environmental accounting and the follow-up of environmental laws and regulations in the Libyan Iron and Steel Company. The purpose of the study of Aboustalah (2022) is to survey the availability of the prerequisites for implementing environmental accounting in Libyan cement companies. The study was conducted using a questionnaire as the data collection tool, which the number is 66 forms that have been completely filled, and they are sufficient for statistical tests. The study concludes that there is a high availability of the prerequisites for the implementation of environmental accounting in the Libyan cement company. The study of Altaraqi and Aldouri (2024) tried to survey the requirements of the implementation of environmental accounting in public service companies in Benghazi, Libya, a questionnaire was utilized as the main instrument for data collection. According to the most important of the findings, it can be noted that public service companies in Benghazi have the necessary requirements to implement environmental accounting. In fact, respondents are both aware of and appreciative of its importance and these companies are, relatively speaking, committed to its application. On the other hand, the findings of this study have also revealed that there is a scarcity of experts and specialists to direct them in the right way of practicing environmental accounting. The findings exhibited also the existence of some problems facing the public service companies in implementing environmental accounting. One of the most important problems is the absence of a team of experts and specialists to support the practical application of environmental accounting. Ambaraka (2024) tried to explore the reality of environmental accounting in the Sirte Electricity Company as for its requirements and obstacles to its adoption. Questionnaire was used as a tool to collect the data needed for this study; the researcher sent 50 forms to a simple random sample of 50 employees in the studied company, and 48 copies were returned filled. The research used the descriptive – analytical approach to deal with the information. The following can be mentioned as the most important of the results and findings of this study: the level of awareness of the company's staff about the importance of environmental accounting in the Sirte Electricity Company is low and the availability of its technical and human requirements is low. Also, the study detected organizational and administrative barriers to adopting environmental accounting in the studied company and it is necessary to strengthen efforts to establish a good and stimulating institutional environment and improve the availability of infrastructure and human requirements to help the best implementation of environmental accounting in the Libyan service sector. Meanwhile Iman and Fadwa (2024) tried to point out the requirements for the implementation of environmental accounting in the Libyan reality by taking as a case the public service companies in Benghazi. The research adopted a descriptive – analytical approach, which is well adapted to the nature of the study subject and its theoretical and practical aspects, and the questionnaire was the main tool used for collecting data from the members of the study population, and all the members of the study population, who are the employees of the public service companies specialized in financial accounting in Benghazi, were sent a questionnaire that was completed and returned. According to the most important of the results and findings of this study, it can be noted that the requirements for the implementation of environmental accounting are present in public service companies in Benghazi, and the respondents have a good awareness and understanding of environmental accounting and its importance, and these companies show a relative commitment to the implementation of its principles. On the other hand, the study also found some barriers against implementation including lack of specialized personnel and lack of experts to lead the application in a scientific and systematic way. In another study, Ali et al. (2024) conducted a study to investigate the factors affecting the implementation of environmental management accounting and the association between environmental accounting practices and financial and environmental performance during 2018 and 2019. The questionnaire was distributed to senior management accountants in a sample of 600 Vietnamese companies operating in the field of building materials to collect data, and 418 valid responses were used in the study which used SPSS to analyze the data. The study found six factors positively affecting the implementation of environmental management accounting; they are enforcement of government regulations, stakeholder interest, proactive environmental strategies, societal

expectations, professional education network, and financial position, while enforcement of government regulations was found to be the most effective. The results also showed that implementation of environmental management accounting is significantly associated with improved financial efficiency as well as environmental efficiency. This supports the view that environmental efficiency supports financial success. In another study, Danqar and Ben Mabrouk (2025) conducted a study to examine the role of environmental accounting in improving the quality of accounting information. The study's main data collection tool was a questionnaire. The study found that the company's disclosure of environmental activities is a response to investors' needs for information to make investment decisions. The results also indicate that the reporting of environmental costs increases the efficiency and effectiveness of accounting information by using a minimum of resources to achieve environmental goals. On the other hand, the study shows that measurement and disclosure of environmental costs is an indicator of the fairness and credibility of financial reporting. In another study, Olivia and Sari (2025) examined the impact of environmental accounting on environmental cost efficiency and corporate profitability in the Indonesian context. The study's methodology was a systematic literature review (SLR). The data analyzed by the study were the content of 30 studies published in peer-reviewed journals. The results of the study showed that the adoption of environmental management accounting has a positive impact on environmental cost efficiency, as it helps to reduce waste, improve the use of energy, and optimize production processes to meet environmental standards, resulting in increased corporate environmental performance. In addition, systematic documentation of resource use and environmental impacts can help companies identify areas of waste and reduce the cost of environmental activities in production operations. In addition, the literature review indicates that companies that apply environmental accounting often achieve greater profitability compared to their peers. This is for a number of reasons, such as better resource management, reduced tax burden on pollution, and the ability of the company to create a positive corporate image among stakeholders. The previous studies provide the evidence of the high level of interest in environmental accounting, as this field of accounting has experienced substantial development over the last few decades, in tandem with the increasing awareness of environmental sustainability and the impact of economic activity on natural resources across the world. The most important reason for this development is the growing level of inability of the traditional systems of management accounting to provide accurate and decision-relevant environmental information, including environmental impacts and their associated costs (Gale, 2006; Jasch, 2006). For this reason, environmental accounting has been developed to respond to these shortcomings (Birkin, 1996; Ferreira et al., 2010). Most of the academic literature is designed to study the role of environmental accounting in improving accounting disclosure practices and the quality of accounting information to be provided to stakeholders such as investors, regulators, and civil society. Early studies, for example, have mostly focused on examining the factors and motivations behind companies' adoption of environmental disclosure and the role of institutional and regulatory pressures. The literature also focused on developed countries and this is related to the relatively high-level economic and regulatory environments, which is consistent with the new demands for corporate disclosure. On the other hand, recent studies began to shift their research to explore the relation between environmental disclosure and the quality of accounting information in terms of transparency, reliability, and comparability. These studies show that the integration of environmental information into the financial reports has a positive impact on the users' ability to make more informed and accurate economic decisions (Gray et al., 1995; Clarkson et al., 2011). However, most of the above-mentioned studies were conducted in the economic and regulatory environment of developed countries while similar studies in the developing countries are very few (Jamil et al., 2015). On the other hand, the existing literature suggests that environmental accounting practices in these countries are still characterized by their informality and non-institutionalization (Belal & Owen, 2007; Visser et al., 2007). This is mainly because several barriers still exist, such as weak legal and regulatory framework, low levels of professional competencies and skills, and the lack of incentives to encourage and support the adoption of these practices. (Amran & Haniffa, 2011). This situation affects the quality of the accounting information that companies in developing countries report negatively. This in turn would lead to less transparency and accountability and would limit the companies' capacity to meet their sustainability and environmental accountability objectives. From the above literature review, it is noticed that there is a gap in the study of the concrete impacts of environmental accounting implementation on the quality of accounting information in developing countries. For this reason, there is a need to conduct analytical and field studies to develop an environmental accounting model that is in line with the specific characteristics and economic and regulatory environment in these countries.

7. Results and discussion

As it was already mentioned in the Introduction, the first part of the study was essentially theoretical and it was dealing with the problem under investigation. More specifically, the first part aimed at presenting and analyze the previous studies related to the importance of environmental accounting and Its contribution to improving the quality of accounting information. The second part of the study was devoted to analyzing and presenting the empirical results, tries, on the one hand, to summarize and discuss the most important findings in the context of the aims and the questions of the research and, on the other hand, to draw the conclusions on the results. Also, it

has to be noted that the second part of the study provides guidelines and suggestions to those who have been interested in this field of studies. However, Weighted mean and relative weight in the present study were calculated on the basis of the data collected by using a five-point Likert scale that measured the extent of agreement of the sample population with the questionnaire items. The respondents' answers were then categorized into five groups according to Likert scale: Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree. The response weights given to each item in this case were the following (see the table below):

Table (1) shows the response weights on the basis of five-point Likert Scale for the ranks

Opinion	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
response	5	4	3	2	1

Table (1) shows the calculation of respondents' attitudes using a five-point Likert scale; The length of interval= $(4/5) \approx 0.80$ approximately. The length of the interval was obtained by assigning the five response weights (1–2–3–4–5) for positive questions and the opposite of these values for negative questions that make four ranges as follow:

Table (2) shows how the sample attitudes were determined by the five-point Likert scale with the use of the weighted mean.

Likert Scale Category	Weight Range	Interpretation
Strongly Disagree	From 1, to 1.8	Very Low
Disagree	From 1.81 to 2.60	Low
Neutral	From 2.61 to 3.4	Moderate
Agree	From 3.41 to 4.2	High
Strongly Agree	From 4.3 to 5	Very High

Table (2) indicates that the weighted mean for response option Strongly Disagree is between 1 to < 1.80, the weighted mean for Disagree is between 1.81 to < 2.60, for Neutral is 2.61 to < 3.40, for Agree is 3.41 to < 4.20 and for Strongly Agree is 4.21 to 5.

7.1 Data Discussion and Analysis

The questionnaires were distributed to the target sample, who returned them once completed. Their answers were coded and then computer entered. The responses were processed using statistical methods deemed appropriate to the subject and purpose of the study. This is done to achieve valid results and to either accept or reject the hypothesized relationship hence the rest of this paper will be devoted to the analysis and discussion of the data that were collected from the questionnaires.

7.2 Demographic Characteristics of the Respondents

This section presents information such as the type of educational qualification, current occupation and the duration of experience. The reason for including these questions is the belief that the background of the respondents is likely to influence the extent to which the information they provide can be relied upon. From Table (3) below, it is clear that the majority are Employees (45.83%), followed by those in the position of Head of Department (33.33%), with the fewest being Department Managers (20.83%). These results also indicate some variety of job positions thus providing some balance in the objectivity of the study in looking into the importance of environmental accounting and its contribution in improving the quality of accounting information.

Table (3) Present Occupations of Respondents

Job Position	Number of Respondents	%
Department Manager	10	%20.83
Head of Department	16	%33.33
Employee	22	%45.83
Total	48	%100

With regard to current Occupation of Respondents, slightly more than half (52.17%) of the study subjects held a postgraduate (Master's or PhD) degree, as Table (4) illustrates. The second highest percentage of respondents (43.75%) held a Bachelor's degree. Only a few participants (approximately 4%) had an Intermediate Diploma. From the above, it is evident that all the respondents of the research were highly educated. It should therefore be reassuring that the questionnaires were answered by such respondents.

Table (4) Academic Qualification of Respondents

Academic Qualification	Number of Respondents	%
phD	2	%4.17
Master	23	%47.92
Bachelor	21	%43.75
Intermediate Diploma	2	4.17
Total	48	%100

As to the level of education, the majority of respondents %52.08 had an accounting as table (5) shows, while the other group had non-accounting qualification (47.92%). It means that, in order to have the two sides view: the accounting specialists and the other specialists; in this research, the number of accounting specialists is slightly higher.

Table (5) Type of Educational Qualification

Type of Educational Qualification	Number of Respondents	%
Accounting qualification	25	%52.08
Non-accounting qualification	23	%47.92
Total	48	%100

In terms of years of experience, as can be seen in Table (6), a little less than two-thirds of the respondents (72.92%) had more than 10 years of experience. This is followed by the participants with 5 to less than 10 years of experience (20.83%). The smallest proportion of respondents includes those with less than 5 years of professional experience. This means that the sample has been collected with a majority of highly experienced respondents, which lends validity and credibility to their perspectives on the importance of environmental accounting in the overall quality of accounting information.

Table (6) Length of Experience in Present Occupation

Years of Experience	Number of Respondents	%
less than 5 years	3	%6.25
From 5 years to less than 10 years	10	%20.83
From 10 years to 15 years	11	%22.92
more than 15 years	24	%50
Total	48	%100

7.3 Testing research hypotheses

The current section aims to test the hypotheses of the study and verifying their accuracy. The data obtained in this study would be employed to measure the extent to which the collected data matches with the listed hypotheses using the designated statistical analysis tools. Therefore, each hypothesis would be either accepted or rejected accordingly.

Table (7) Illustrates the weighted means, percentage weights and the direction of the responses of the items of the scale of the role of environmental accounting in enhancing the quality of accounting information

Contents		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Weighted Average	Percentage Weight	Response Direction
The company has an environmental accounting system for issuing reports related to environmental costs	N	0	6	14	25	3	3.52	70%	Agree
	%	0.00	12.5	29.1	52.08	6.25			
The company discloses the measures implemented to reduce the impacts of pollution and the extent of its compliance with environmental protection standards.	N	1	6	8	22	11	3.75	%75	Agree
	%	2.08	12.5	16.6	45.83	22.9			

Environmental disclosure helps to enhancing the predictive ability of future events for decision-makers.	N	0.0	0.0	9.0	26.0	13.0	4.1	82%	Agree
	%	0.0	0.0	18.8	54.2	27.1			
Environmental disclosure helps a company avoid litigation and reduces compensations and fines that may arise from non-compliance with environmental protection	N	0.0	0.0	6.0	25.0	17.0	4.2	85%	Agree
	%	0.0	0.0	12.5	52.1	35.4			
Environmental disclosure helps in obtaining financial incentives, such as loans with low costs and easy terms.	N	2.0	1.0	10.0	26.0	9.0	3.8	76%	Agree
	%	4.2	2.1	20.8	54.2	18.8			
Environmental disclosure helps companies obtain tax incentives provided by the government for those that disclose their environmental performance	N	2.0	3.0	15.0	18.0	10.0	3.6	73%	Agree
	%	4.2	6.3	31.3	37.5	20.8			
environmental disclosure affects the company's ability to enhance the marketing of its products.	N	1.0	8.0	13.0	18.0	8.0	3.5	70%	Agree
	%	2.1	16.7	27.1	37.5	16.7			
Environmental accounting helps improve product quality by tracking and measuring environmental costs	N	0.0	4.0	8.0	23.0	13.0	3.9	79%	Agree
	%	0.0	8.3	16.7	47.9	27.1			
Disclosure of environmental information affects a company's ability to compete with similar companies	N	0.0	4.0	12.0	20.0	12.0	3.8	77%	Agree
	%	0.0	8.3	25.0	41.7	25.0			
Environmental disclosure is considered one of the tools banks rely on to decide whether to grant credit	N	2.0	7.0	17.0	18.0	4.0	3.3	66%	Neutral
	%	4.2	14.6	35.4	37.5	8.3			
Disclosing environmental costs makes financial reports more credible and reliable	N	0.0	4.0	4.0	30.0	10.0	4.0	79%	Agree
	%	0.0	8.3	8.3	62.5	20.8			
The use of environmental accounting helps track and measure environmental costs	N	0.0	1.0	9.0	25.0	13.0	4.0	81%	Agree
	%	0.0	2.1	18.8	52.1	27.1			
The company discloses the policies it follows to manage environmental costs	N	0.0	11	6	20	11	3.65	73%	Agree
	%	0.00	22.9	12.5	41.67	22.9			
Environmental accounting disclosure contributes to determining the collateral requirements for granting credit	N	2.0	6.0	11.0	25.0	4.0	3.5	70%	Agree
	%	4.2	12.5	22.9	52.1	8.3			
Environmental disclosure helps a company improve its image and reputation in the eyes of the public	N	0.0	1.0	2.0	28.0	17.0	4.3	85%	Strongly Agree
	%	0.0	2.1	4.2	58.3	35.4			
Measuring and disclosing environmental costs serves as evidence of company's awareness and commitment to the importance of environmental issues.	N	0.0	0.0	7.0	24.0	17.0	4.2	84%	Agree
	%	0.0	0.0	14.6	50.0	35.4			

Environmental disclosure helps increase public trust in companies that fulfill their environmental responsibilities	N	0.0	1.0	5.0	28.0	14.0	4.1	83%	Agree
	%	0.0	2.1	10.4	58.3	29.2			
Environmental disclosure facilitates the comparison of current-year information with previous financial years or with similar companies.	N	0.0	0.0	6.0	26.0	16.0	4.2	84%	Agree
	%	0.0	0.0	12.5	54.2	33.3			
Environmental disclosure reflects the fairness and transparency of the information a company provides in its reports and financial statements	N	0.0	2.0	5.0	29.0	12.0	4.1	81%	Agree
	%	0.0	4.2	10.4	60.4	25.0			

First: Testing the following first sub-hypothesis:

There is a practice of environmental accounting rules, and procedures in Libyan oil companies. This sub-hypothesis is tested based on the responses to the following statements

- The company has an environmental accounting system for issuing reports related to environmental costs (weighted mean 3.52, percentage weight 70%)
- The company discloses the measures implemented to reduce the impacts of pollution and the extent of its compliance with environmental protection standards (weighted mean 3.75, percentage weight 75%)
- The company discloses the policies it follows to manage environmental costs (weighted mean 3.65, percentage weight %73 %)

The items of the previous statements related the application of environmental accounting recorded relatively high weighted averages, this indicates a general agreement trend, that means there is a level of application of environmental accounting within the organization, this in turn justifies supporting the mentioned hypothesis

Second: Testing the following second sub-hypothesis:

Environmental accounting contributes to enhancing the transparency of financial reports and increasing the confidence of stakeholders and society as a whole. The present sub-hypothesis is examined through an analysis of participants' responses to the following statements.

- Environmental disclosure helps to enhancing the predictive ability of future events for decision-makers (weighted mean 4.1, percentage weight 82%)
- Disclosing environmental costs makes financial reports more credible and reliable (weighted mean 4.0, percentage weight 79%)
- Environmental disclosure reflects the fairness and transparency of the information a company provides in its reports and financial statements (weighted mean 4.1, percentage weight 81%)
- Environmental disclosure helps increase public trust in companies that fulfill their environmental responsibilities weighted mean 4.1, percentage weight 83%)

The responses to the previous statements regarding the role of environmental accounting in improving the transparency of financial reporting and increasing the confidence of stakeholders and the community recorded relatively high weighted averages, indicating a general tendency toward agreement, thereby supporting the aforementioned hypothesis.

Third: Testing the following third sub-hypothesis:

Environmental accounting is used to track and measure environmental costs, which in turn increases the benefits obtained by the company. The current sub-hypothesis is tested through participants' responses to the following statements.

- The use of environmental accounting helps track and measure environmental costs (weighted mean 4.0, percentage weight 81%)
- Environmental accounting helps improve product quality by tracking and measuring environmental costs (weighted mean 3.9, percentage weight 79%)
- Environmental disclosure facilitates the comparison of current-year information with previous financial years or with similar companies (weighted mean 4.2, percentage weight 84%)

- Measuring and disclosing of environmental information affects a company's ability to compete with similar companies (weighted mean 3.8, percentage weight 77%)

The responses to the previous statements about the use of environmental accounting to measure and monitor environmental costs- thus making an effective contribution to the increase of benefits achieved by the company- recorded relatively high weighted averages, indicating a general tendency toward agreement and thus supporting the aforementioned hypothesis.

Fourth: Testing the fourth sub-hypothesis

Environmental disclosure helps the company obtain various financial and non-financial benefits. To test this hypothesis, participants' opinions on the following statements were collected

- Environmental disclosure helps a company avoid litigation and reduces compensations and fines that may arise from non-compliance with environmental protection (weighted mean 4.2, percentage weight 85%)
- Environmental disclosure affects the company's ability to enhance the marketing of its products (weighted mean 3.5, percentage weight 70%)
- Environmental disclosure helps in obtaining financial incentives, such as loans with low costs and easy terms (weighted mean 3.8, percentage weight 76%)
- Environmental disclosure helps the company improve its image and reputation in the eyes of the public (weighted mean 4.3, percentage weight 85%)
- Environmental disclosure helps companies obtain tax incentives provided by the government for those that disclose their environmental performance (weighted mean 3.6, percentage weight 73%)

The previous statements carried out to test the fourth hypothesis- that environmental disclosure provides the company with many financial and non-financial benefits- recorded high weighted percentages and indicate a general agreement trend, thereby supporting the aforementioned hypothesis.

Fifth: Testing the fifth sub-hypothesis

There is an awareness among Libyan oil companies of the importance of environmental accounting and environmental disclosure. The current sub-hypothesis is tested based on participants' responses to the following statements

- Environmental disclosure is considered one of the tools banks rely on to decide whether to grant credit (weighted mean 3.3, percentage weight 66%)
- Environmental accounting disclosure contributes to determining the interest rates on loans (weighted mean 3.5, percentage weight 70%)
- Environmental accounting disclosure contributes to determining the collateral requirements for granting credit (weighted mean 3.5, percentage weight 70%)
- Measuring and disclosing environmental costs serves as evidence of company's awareness and commitment to the importance of environmental issues (weighted mean 4.2, percentage weight 84%)
- the company conducts training sessions and workshops for employees in the field of environmental disclosure and environmental accounting (weighted mean , percentage weight)

Despite the fact that some responses to previous questions about the awareness of Libyan oil companies of the importance of environmental accounting and environmental disclosure yielded relatively low weighted averages, the majority of the responses to those statements showed comparatively high weighted averages. This reflects a general tendency towards agreement, thereby lending support to the aforementioned hypothesis.

Conclusion

Oil companies are among the most influential entities in terms of both environmental and economic impact of environmental and economic consequences. Libya is increasingly experiencing difficulty in managing the by-products of extractive industries due to infrastructural inadequacy. Simultaneously, there is a growing demand on behalf of both investors and society as a whole for greater transparency as to how these companies measure up in terms of environmental performance. The present study was designed with a view to investigating the role that environmental accounting and environmental disclosure play in improving the quality of accounting information in Libyan oil companies. To that end, the primary hypothesis of the research was formed as the following: there is a statistically significant relationship between the implementation of environmental accounting and disclosure and the improvement of the quality of accounting information. In order to test the primary hypothesis, data were collected by using a questionnaire that was designed in the light of previous studies and that contains a number of statements that highlight the importance of the environmental accounting and disclosure in improving the quality of accounting information. Fifty-five questionnaires were distributed among a random sample of Libyan oil companies. Forty-eight questionnaires were returned and statistically analyzed, and all of them were considered

valid. The collected data were subjected to analysis using both a descriptive and a quantitative approach by the use of weighted means and weights percentages. The findings of the research indicated that environmental accounting and disclosure play a role in tracking and measuring environmental costs which leads to the greater transparency in financial reporting and to the improvement of the image of oil companies before investors and society as a whole. In addition, the availability of environmental information with the financial data allows both management and investors to make better decisions, particularly when it comes to investing in projects with a great environmental impact. The results of the research also indicated that the implementation of environmental accounting and disclosure improves the image of Libyan oil companies, highlights their social and environmental responsibilities, and increase the awareness of these companies with regard to the importance of this field. All the subsidiary hypotheses supported the main hypothesis since their weighted means are between 3.3 and 4.3 and the majority of them had the response of "Agree." Therefore, it can be stated that environmental disclosure improves predictive capacity, transparency, public trust, and the quality of financial reporting and environmental accounting improves measuring and tracking environmental costs and product quality. As a result, the main hypothesis of the study can be accepted, and it can be concluded that there is a statistically significant relationship between environmental disclosure, the implementation of environmental accounting, and the quality of accounting information in oil companies.

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Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

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