Undertaking of environmental accounting responsibility to achieve sustainable development: evidence from Jordanian chemical and mining companies

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Abstract: This study is aimed to discuss and review the concept of environmental accounting and its contribution to sustainable development. The community started to place more pressure on government and companies to sustain their national resources and their environment. Therefore, almost all Companies started to work alongside with governments to solve the side effects of environmental problems through adopting the necessary accounting standard and necessary legislations that guide company actions to meet its social requirements. This study used a sample of Jordanian chemical and mining companies the most dominant type to investigate the study issue. A structured questionnaire distributed to the staff of these companies to examine their opinions about the availability of environmental accounting in companies systems. The general findings of the study revealed that Jordanian companies committed to environment accounting concept and methods in addition to their commitment for social responsibility as a part of sustainable development.

Keywords: environmental accounting; social responsibility; sustainable development; Jordan; industrial companies.


Biographical notes: Mohammad Aladwan is an Assistant Professor in the Department of Accounting at the University of Jordan. Taught accounting in four Jordanian universities. He Participated in many international economic conferences and published many research papers in the field of accounting. His main research interests are accounting theory, accounting standards and managerial accounting.

1 Introduction

Countries economic development and welfare of society can only be achieved by balancing between environment protection and maximisation of wealth. This equation has increased the awareness of both government and public whom started to practice
more pressure on companies to align its goals with environment sustaining requirements. Therefore, companies became more obligated to optimise of resources usage and controlling its activities to avoid environment damage. Social responsibility for community enforces companies to adopt methods and actions for their accounting processes that take into consideration the environment dimension. Hence, economic development and sustaining of environment requires a successful methodology and adoption of accounting approaches that integrate between social, economic, ecological and cultural elements (Deaconu and Nistor, 2016).

The increase in numbers of companies’ and the expansion of their activities led for more absorption of natural resources and hence increasing the number of environmental problems to serious levels of danger that threatens the nature and humans around the world. Consequently, countries started to put into action a set of preventative solutions for such problems. Recently government agencies and the public became familiar and more aware and familiar with environment harmful activities resulted from companies’ processes, therefore, many interested parties demanded by establishing and implementing strategies against harmful activities for the environment; these strategies will help to achieve sustainable development concept with time. This increase of awareness by government, community, unions, and companies about the environment problems has motivated scientist and scholars to develop the environmental accounting approach that serves the purpose of development. The Securities Exchange Commissions of many countries also placed punitive measures or disciplinary actions against companies in order to revise their financial statements to include more of their operational costs effects (Hossain and Nurunnabi, 2011). On the other hand, companies also became more aware of environmental and social problems that it causes due to the potential legal and social obligations that may arise on these companies to compensate for their operations side effect.

The growing attention for the concept of social responsibility and the role of accounting in deferent society important issues attracted and motivated researchers to investigate the degree of companies commitment to these concepts from deferent aspects such as legislation and environment accounting applications (Tregidga and Milne, 2006; Ghanbari et al., 2013). Despite insufficiency of international and local mandatory environmental accounting reporting, many industrial companies started to disclose voluntary reports to show their commitment to the environment and social responsibility although such reporting is still not clear (Ehsan and Kaleem, 2012). Many companies started to use an integration of financial and non-financial indicators to measure their effect on surrounding environment and stakeholders (Joshi et al., 2011). Moreover, companies also started to implement some strategies for managing their day-to-day negative impacts on the environment due to the direct and indirect pressure from stakeholders. The impact of these strategies can be recorded in financial and non-financial terms, both being necessary for measuring overall business performance (Nikolaou and Evangelinos, 2012). Researcher argued that motives for such reporting might include: legitimising company operations to meet social expectations; meeting borrowing conditions or industrial requirements; response to critics from media reports; attracting funds and investments; overcome the poor rating that results from environmental issues (Deegan, 2002; Patten, 2002). Another important motive also is related to economic rationality; that is, companies try to appear that it’s doing the right thing for the sake of community (Friedman, 1962; Rossi et al., 2013).
The increased attention to environmental accounting issues and its role in sustainable development created the need to investigate whether companies are complying with general international and local strategies of environmental protection or not and whether it is committed to deferent legislations concerning the environment. Therefore the originality of this study is expected to address the importance of environmental accounting concept and its role in increasing the efficiency and effectiveness of companies to achieve sustainable development in addition to investigating whether Jordanian industrial companies’ are committed to the application and procedures of environmental accounting.

However, our study is constructed as follows: the literature review and hypotheses development (Section 2); methodology of the study (Section 3). In Section 4, the data and analysis of the results and finally the conclusion and recommendations of the study are addressed in Section 5.

2 Literature review and hypotheses development

United Nations has reported that sustainable development is a methodology that integrates and allies economic conditions with the environment; hence such method is expected to benefit current generation without compromising the rights of future generations (Brundtland Commission Report, 1987). Maintaining similar welfare level for both generations requires sustaining a part of these resources for future generation (Cetin, 2006). Therefore, the usage of national resources by companies is legitimised by affirmativeness of community for their operation.

Awareness about national resources deteriorating has shifted people for more attention to national environment stocks and how these resources are used or wasted for the benefit investors. This growing fear about consumption or damaging of national wealth has increased the demands for more information particularly on the relationship between economic development policies and environment use. Consequently, it is become necessary to obtain a clear picture about resources consumption and environment damaging costs; hence, more information is needed about environment problems and about the programs, policies and procedures for sustainable development” (Brundtland Commission Report, 1987).

2.1 Environmental accounting

The tremendous increase of attention for environmental problems that caused by economic, social and technological development raised the need for a new field of accounting that can measure the consequences of these problems. Environmental accounting concept is known as the accounting methodology that employs conventional accounting to recognise, measure and evaluate the effect of environment on both entities and society (Sefcik and Soderstrom, 1997). This meaning has distinguished between environmental accounting and the popular conventional accounting. According to this concept, companies should select variables, adopt standards and procedures to measure and disclose any environment problem in terms of money to all interested parties inside or outside the company (Shaheer, 1998). Therefore, this type of accounting should also include an environment categorisation of business operation when collecting, analysing and monitoring organisational operations with respect to the environment (Tüsiad, 2005).
The growing of public demands to maintain environment against company’s actions forced companies to respond for these demands. Therefore, many companies begin to report financial and nonfinancial information concerning its interaction with the environment; this information includes; costs of compliance with the environmental laws, expected financial obligations for health, costs of damaging lands, water, and air pollution. It had been argued that even though regulation is necessary for achieving accounting transparency, it is also a function of a corporate culture that is unlikely to change overnight. Unless there is increased pressure from the forces on the ground to give the required attention to transparency of financial reports (Nurunnabi et al., 2011). Response to disclose such information in regular financial statements or even in special reports or a note in annual reports has worked as a mechanism and generally increased the public confidence in companies’ actions (Schaltegger, 1997; Watson and Mackay, 2003; Rossi, 2014). Some scholars argued that environmental accounting is a broad concept it includes three levels; the corporate level, national and international level (Chauhan, 2005). Measurement of the consequences of environmental problems still ambiguous; some problems can be measured in monetary items such as the costs of minimising pollution to air and water using special purpose equipment and devices. On the other side, some of these problems costs are hardly to be measured reliably such as voice pollution, depletion of nonrenewable resources, deforestation and land uses.

The continued negative effect of companies’ operations on environment encouraged accountants to search for new methods to measure the direct and indirect costs and side effects of these operations. Hence, several classifications and terminologies were introduced for environmental accounting. The following are some of the terminologies and classifications that used to distinguish this field of accounting:

- **Green accounting**: Green accounting is referred to the accounting concept that incorporates environmental costs with other reported financial information. It has been argued that the gross domestic products ignore the environmental costs and therefore management is demanded to use a revised model that incorporates environmental costs with other accounting information. Some referred this term of green accounting to the use of natural resources and its environmental implications.

- **Environmental accounting for sustainable development**: This concept is referred to the accounting method that integrates the costs of the environment with economic development. The aim of this concept is to ensure the interdisciplinary collaboration, methodologies that consider environment activities; developing credible valuation procedures for the environment, and the inclusion of the various ethical positions advanced by various groups on the value of the environment (Gamini, 2005).

- **Environmental and economic accounting (SEEA)**: is referred to a framework that incorporates statistics about the environment to those of economics. This incorporation enables for a better understanding of environmental problems and their economic costs through a comparison between the two types of statistics. Further, this system is considered a way for integration between disclosures of environmental accounting and other related economic activities.

Some researchers categorised environmental accounting for two types’ micro level and macro level; these two categories are related to the national level (Micro) and international level (Macro). The national level compromise: environmental financial accounting (EFA); environmental cost accounting (ECA) and environmental management
accounting (EMA). The international level is known as environmental nation accounting. The EFA main interest is to collect and report environmental financial information into financial statements; EFA reported numbers include assets and liabilities numbers related to environmental costs that can be measured reliably (Gray et al., 1993). The ECA aimed to trace environmental costs that could be directly assigned to product or service; these costs might include pollution costs, environmental design and management costs (Yakhou and Dorweiler, 2004). According to this type of accounting; costs compromise both internal and external costs for the environmental harm or damage and those costs for environment protection. Protection costs include all types of costs for prevention, disposal, planning, control, and repairs. The last national type is EMA; this type is aimed to identify, collect and analyse financial and the non-financial related information for management decision making (United Nations Division for Sustainable Development, 2001). EMA also integrates corporate environmental information with business other information (Yakhou and Dorweiler, 2004). The second level, environmental national accounting (ENA) focuses on reporting accounting information concerning the use, damage and protection of national natural resources (Chauhan, 2005).

2.2 Benefits of applying the environmental accounting

According to legitimacy theory companies are operating for the sake of community and for this reason community approves their continuity and survival. In other words, if companies do not meet the expectation of its stakeholders in providing products or services and at the same time protecting their living environment this legitimacy will be drawn, and hence fail to survive (Deegan and Unerman, 2006). The new perceptions of society about their environment and how to maintain this environment from disposal or damage enforced companies to adapt their activities to fulfil society expectations and demands by protecting the environment from any harmful activities of operations, in addition, to allocate the necessary costs to cover any environmental damage if found. Therefore, companies are acting now based on the statement that, it’s not possible to succeed and compete in the market while destroying environment. Such consideration of environment in economic activities is aligning with environmental accounting concept.

According to the new society perception about the environment organisation performance can be only enhanced if environmental costs are considered and reported to public for improving the value of the company in public eyes as a way to achieve desired acceptance in the market (Russo, 1997; Toms, 2002). Consequently, increasing public satisfaction requires from companies to report reliable and objective information about environmental costs that company is accounted for (Alfsen, 1993).

Responding to public desires by companies will raise the need to produce a number of accounting reports that show consumption, balances and statistical data about all aspects of environment usage. These reports will be helpful for government, organisations, society and international environmental professional bodies to formulate certain programs and policies for conserving environment (Gray et al., 1993). The needed accounting reports about financial and non-financial information concerning issues related to environment encouraged accountants and financial staff to play a substantial role by utilising their skills, expertise to support businesses on how to deal with environmental issues. Therefore, accountants started to employ current and new accounting methods that control and reduce all business costs and that include environmental costs to increase companies’ returns while conserving the environment.
Hence, with respect to environment accountants are demanded to identify, collect, measure and report of environmental events that incur costs; monitor and control environmental costs; manage information systems so that the outputs are reflected accurately, provide relevant information concerning environment; formulating the necessary financial budgets taking in consideration environment and preparing special reports on environmental performance.

2.3 Environmental accounting in Jordan

Jordanian regulatory agencies similar to other countries started from the beginning of the millennium to consider environmental issues effect on sustainable development; so they directed economic sectors such as transportation, energy, mining, technology and chemical to establish policies and programs, adopting necessary legislation and accounting methods toward the standards of green economic. Furthermore, all parties that have a role in economic growth such as government institutions, private sector, international and regional environment professionals, educational institutions started to emphasise on establishing partnerships between them to achieve the desired economic Sustainable national plan. Many International development institutions such as UN pointed out that sustainable growth requires building capacity for both government institutions and local non-governmental organisations, thereby placing them to play a vital and more effective role in meeting their country sustainable development challenges, especially in light of the country present and future natural and fiscal limitations (United Nations, 2012).

The problem of limited resources in Jordan such as water, energy, agriculture land caused more pressure on the Jordanian government to increase the level of protection for these national sources while continuing the progress of economic development. Although Jordanian government try to adapt always to new environmental problems such as air, water, and land pollution; many of these problems still unsolved due to unavailability of expenditures. The Jordanian government budget is too small with a great deficit always; even though government is working hardily to seek support from neighbour, friendly countries, and international institutions to fund its programs for conserving environment; and despite of all these challenges it takes many steps toward environment protection by enacting several laws and regulation that protect environment, in addition, to allocate a part of its budget to support activities that contribute to conserving environment. With respect to the private sector, the government motivated this sector to play more role in supporting government and community in economic development.

According to the Ministry of Environment (MOE) (2016) report; Jordan still confronts several challenges concerning environment such as:

- neglecting the dimensions of the sustainable development in a comprehensive manner in regard to formulating environmental legislations
- violating the forestlands and the natural reserves
- increasing in the percentages of pollution due to the increasing growth in the sectors of chemicals and energy, in addition to an inadequacy regarding the abiding by the environmental regulations of the development facilities
- the lack of a comprehensive system for managing hazardous solid waste from industrial companies
• the concept of green economy is still under the implementation in the light of the spread of unsustainable patterns of production and consumption
• the lack of indicators regarding the environmental dimension of the sustainable development and their inaccuracy, in addition to the urgent need for developing and measuring it
• lack of coordination between authorities as for phrasing environmental legislation and policies leading to overlap and difficulty in the implementation of some of the existing legislations
• inadequacy in introducing environmental concepts and points of interest in other political fields
• weak participation from the private sector in developing sustainability in Jordan as in neighbouring countries
• failure of inspection, oversight and law enforcement
• general lack of environmental awareness and application of environmental concepts within different institutions and sectors.

The importance of environmental accounting and its association with sustainable development motivated the conduction for many research about this issue, therefore many worldwide studies have conducted to clarify environmental accounting concept in general and its role in sustainable development.

In a study that conducted by Robbins (1991) about the inclusion of environmental issues in strategies of European and United States companies. The results of the study pointed out that disclosures of the environmental information by these companies were more expanded due to expected claims for environmental financial damage, or from the expected environmental harmful activities that could negatively affect the public evaluation for company future financial position or business outcomes. The results of the study also concluded that the outside users of financial reports especially investors should be informed with environmental various problems that might affect companies obligations and assets valuations. Further, the study results also assured the need for full commitment of companies to laws and legislations that govern the resources usage and disposal of industrial waste because such violations could be used as a base for financial obligations against companies.

The commitment to environmental laws and regulations was also the focus of Roussey (1992) study. He analysed the degree of USA companies’ commitment to these laws and legislations, and exploring the amount of costs that incurred for cleaning disposal sites and industrial waste that harm the environment. The final results of the study assured that violation of environmental laws makes companies confronts environmental fines and legal obligations against these violations. The study also assured the importance of reviewing and preparing reports related to the possible obligations that may arise from violating environmental laws and legislations.

Veronica et al. (2010) investigated the effect of development level of environmental awareness on an accounting system for Portuguese companies. The results of the study found a positive relationship existed between the size of the organisation and the adoption of necessary new accounting methods such as environmental accounting. Despite this result; the findings of the study found also that compulsory environmental
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accounting standards is rarely applied in these companies. The consideration of the environment in companies’ activities was the aim of some other studies that undertaken to investigate this issue. Johnson (2009) investigated whether companies gave the necessary importance for green accounting concept that arises after 1980. The study results showed mixed results between companies in applying this method for achieving their organisational purposes, such as enhancing environmental performance, monitoring and controlling environmental costs, investing in clean technology, providing green products and services.

Investigating whether companies interact with its surrounding environment was the purpose of Bartolomeo (1997) study on Italian companies. The study explored the methods that applied by these companies to interact with its environment in terms of accounting. The study results generally found a clear weakness in implementing environmental accounting concept. Moreover, the results found little concern by these companies to the environment; and rarely disclosed accounting information about its environmental impact.

With respect to the role of accounting in sustainable development, a regional study in turkey was conducted by Senol and Ozcelik (2012) about the effect of environmental accounting on sustainable development. The study stressed the importance of environmental accounting use for achieving desired performance. The study provided several recommendations concerning environment; such as the necessity for companies to remove its bad impacts on the environment like pollution; adopting laws and standards that guide companies’ actions in dealing with environment and finally establishing a healthy climate to operate by more focus on the environment accounting. A similar study of Sakmat et al. (2011) about the role of environmental accounting in sustainable development was undertaken to investigate the challenges of environmental issues in the 21 century for the Middle East and North Africa region (MENA). The paper addressed the major gaps in knowledge about economic and environment in MENA Region. The final results of the paper proposed a framework for the discussion of the economic ramification of various environmental issues facing the MENA Region. It also recommended for the use of environmental accounting systems and indicators which are considered useful for MENA region to manage environmental problems more effectively. The study also motivated the establishment of environmental accounts such as the System of Environmental Economic Accounting (SEEA), which is expected to become an international statistical standard for integration between economic development and environment.

From previously discussed literature and deferent research findings we can formulate our first hypothesis as follows:

\[ H1: \text{There is a commitment from Jordanian companies to environmental accounting concept and methods.} \]

The concept of green accounting was witnessed more attention by many researchers. In a study of Jahamani (2003) about green accounting concept and its aspects such as awareness, involvement, and reporting; the study revealed that developing countries have achieved a great progress in green accounting mentioned fields. The results also showed that countries such as Jordan and UAE are still in their early progress stages for green accounting. The study results for the two samples of decision makers sample addressed in these two countries revealed that; decision makers are highly aware of the environment protection issues, but their commitment to the environment protection is still low. In
Jordan also Rahahleh (2011) conducted a study that aimed to explore the most important available requirements that could be used to achieve environment accounting approach. Through the study, he investigated factors effect environmental accounting such as legislation, incentives and accounting staff as well as knowledge in the concepts and methods of environmental accounting. The results of the study found that the availability of these elements will contribute more to the commitment of environmental accounting. The general recommendation of the study included; increasing the education of environmental accounting concept for accountants, financial managers and corporate departments. Moreover, the study also recommended enacting the necessary legislation and adopting accounting standards that govern this application. And finally, the study recommended for the establishment for an effective system for incentives that include tax exemptions to encourage companies to adopt environmental accounting concepts.

Another study conducted by Saymeh and Al Shoubaki (2013) investigated the commitment of industrial companies for applying environmental accounting. The study diagnoses the importance of environmental accounting principles for all industrial companies. The researchers argued that environmental commitment requires evaluation for any project in terms of its contribution to companies’ environmental responsibilities. The study also investigated how the environmental responsibility is applied by industrial companies and how the financial department in each company complies with the environment requirements for more contribution in social responsibility and consequently in sustainable development. The study results found that all industrial companies are in general committed towards environmental accounting concept and they keep pace with the developments in this field. The results also showed that environmental accounting function in the industrial sector keeps pace with the new developments of environmental accounting that fulfil the social responsibility concept.

In a recent study conducted by Jebril (2016) on how government budget could be used as a tool to assist sustainable development. The study was constructed to assure the importance of solving environmental problems toward sustainable economic development. The content of the study proposed a conceptual framework that investigates factors that influence the success of sustainability recovery in Jordanian government. The results of the study found that the environmental degradation can be successfully reduced by environmental protection plan using financial procedures such as government expenditure or by non-financial procedures such as laws and regulations. The study also recommended for more government accounting disclosures used as a mean for communication between the government and stakeholders.

The quality of the type of environmental information that disclosed by companies was the purpose Mazahrirh et al. (2016) study on Jordanian chemical companies. The study is aimed to prescribe accounting principles and reporting practices that applied to these companies. A content analysis was utilised to examine and critique evidence through comparison between annual reports of local companies and international companies with respect to environmental reporting performance and international initiatives. The results of the study revealed differences between the two levels in quality of reporting and in the content of profile disclosure. This difference was justified by that; the main reason of such variation in reporting could be attributed to the voluntary not mandatory disclosures of local environmental reporting. The study finally revealed that the absence of proper legislation regarding environment issues will increase doubts about the likelihood for a better quality of environmental reporting.
Based on prior reviewed literature and researchers results the second hypothesis of the study is:

\[ H2: \text{There is a commitment from Jordanian companies to social responsibility and sustainable development concept.} \]

3 Methodology of the study

3.1 The study method

This study follows both descriptive and field research methodologies. The descriptive method review and discuss the different literature about environmental accounting with reference to journals, reports, textbooks, thesis and any related sources. On the other hand, the field investigation was based on a structured questionnaire prepared and distributed to a sample of Jordanian industrials companies’ staff to obtain the necessary information that serves the aim of the study.

3.2 Data and sample characteristics

3.2.1 Data

The sample of the study consisted of 25 Jordanian industrial company (9 chemical companies and 16 mining company). The reason for such sample selection is that; these two types of companies are considered the most important type in activity, size and their effect on environment. A structured 150 questionnaires are distributed to staff in these companies; six questionnaires send for each company. 127 questionnaires were returned and 122 of them were valid for analysis purposes.

3.2.2 Sample characteristics

Table 1 shows the level of education for the sample. The results show that holders of bachelor’s degree are the highest with 38%; the diploma was in the second order by 23% while holders of master degree were 12%. Overviewing education results reveal that about 70% of the sample is well educated and have the knowledge to respond for the required information for the study.

<table>
<thead>
<tr>
<th>Qualification</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than diploma</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>Diploma</td>
<td>28</td>
<td>23</td>
</tr>
<tr>
<td>Bachelor</td>
<td>46</td>
<td>38</td>
</tr>
<tr>
<td>Master</td>
<td>14</td>
<td>12</td>
</tr>
<tr>
<td>PHD</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Others</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 2 results show the respondent’s age; the results show that 39% of respondent’s age was between 31–40 and 25% of respondent’s age was below 30 while 20% of the respondent’s age was between 41 and 50. These results indicate that majority of respondents are in the middle age (84%) and they cohabit the new concepts and knowledge about environment concerning issues.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 and below</td>
<td>31</td>
<td>25</td>
</tr>
<tr>
<td>31–40</td>
<td>47</td>
<td>39</td>
</tr>
<tr>
<td>41–50</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>51–60</td>
<td>16</td>
<td>13</td>
</tr>
<tr>
<td>More than 60</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3 shows the results of respondent’s specialisation field. The highest specialisation was for engineering with 34% then accounting or finance by 28%. Management and technicians percentages were too close 15% and 17%. It’s has been argued that the most familiar specialisations with the environment problems are those who directly deal with the environment such as engineers. Managers, accountants and engineers are considered the most related fields to the environment; their percentage together compromise 77% of the sample.

<table>
<thead>
<tr>
<th>Specialisation</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Finance or accounting</td>
<td>34</td>
<td>28</td>
</tr>
<tr>
<td>Engineering</td>
<td>42</td>
<td>34</td>
</tr>
<tr>
<td>Technician</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>Others</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4 shows the years of experience for respondents. The experience results showed that the majority of respondents have more than 6 years of experience; 74% of respondents have an experience between 6 and 15 years which is reasonable expertise about environment and its implications.

3.3 Validity and reliability of the study instrument

The internal consistency for the study investigating instrument (questionnaire) was tested using Cronbach’s Alpha test to examine the reliability of the measurement instrument according to the answers of respondents. Table 5 shows the results for this test; the value of Cronbach’s alpha value for all paragraphs was ($\alpha = 83.1$); this result is acceptable to analyse the collected data.
Table 4  The sample distribution for years of experience

<table>
<thead>
<tr>
<th>Years of experience</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–5</td>
<td>17</td>
<td>14</td>
</tr>
<tr>
<td>6–10</td>
<td>39</td>
<td>32</td>
</tr>
<tr>
<td>11–15</td>
<td>28</td>
<td>23</td>
</tr>
<tr>
<td>16–20</td>
<td>23</td>
<td>19</td>
</tr>
<tr>
<td>More than 20</td>
<td>15</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>122</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 5  Cronbach Alpha test

<table>
<thead>
<tr>
<th>Sample number</th>
<th>Cronbach’s Alpha (α)</th>
</tr>
</thead>
<tbody>
<tr>
<td>122</td>
<td>83.1%</td>
</tr>
</tbody>
</table>

4  Results of the study

The examination of the study hypotheses requires an initial examination of frequencies and standard deviation for each paragraph and then one sample t-test will be employed to test each hypothesis independently. The following is the results of frequencies and standard deviation for the two hypotheses paragraphs that were addressed by the questionnaire questions.

4.1  Hypothesis testing

4.1.1  Hypothesis 1: undertaking environmental accounting concept and methods

Table 6 shows the mean and the standard deviations for the first hypothesis paragraphs that related to the commitment of companies for environmental accounting concept. As appears from the results in paragraphs (1, 3, 4, 6, and 7) arithmetic mean is higher than 3 while paragraphs 2 and 5 are less than 3. These results assure that most of environmental accounting concepts and methods are followed in the sampled companies; this conclusion is also evidenced through the arithmetic mean for all paragraphs of (3.410). Paragraphs with mean less than 3 can be explained by weakness in commitment to such activities. The results confirm most of the Jordanian literature results that these companies are generally committed to environmental accounting concepts and methods.

4.1.2  Hypothesis 2: commitment to social responsibility and sustainable development

Table 7 shows the mean and standard deviations of the second hypothesis paragraphs related to the commitment of companies for social responsibility and sustainable development. It is evidenced from all paragraphs results that the mean is above 3 except for paragraph 7 only the arithmetic mean was below than 3. Paragraph 7 results reveal weakness in the internal system of punishment and rewards concerning environment
contradicting activities. However, the hypothesis paragraph results, in general, indicates that companies’ management and staff are committed to social responsibility and consequently committed to sustainable development. The average mean for all paragraphs was above 3 (3.551); this result also confirms the previous hypothesis results.

Table 6  
Arithmetic mean and standard deviation for commitment to environmental accounting concept

<table>
<thead>
<tr>
<th>Nos.</th>
<th>Paragraph</th>
<th>Arithmetic mean</th>
<th>Std. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The company apply international accounting standard concerning environment</td>
<td>4.266</td>
<td>1.210</td>
</tr>
<tr>
<td>2</td>
<td>The company recognise, measure harmful environment activities</td>
<td>2.833</td>
<td>0.815</td>
</tr>
<tr>
<td>3</td>
<td>The company disclose special report about environment issues</td>
<td>3.497</td>
<td>1.267</td>
</tr>
<tr>
<td>4</td>
<td>The company report to government and public it activities concerning environment</td>
<td>3.366</td>
<td>1.070</td>
</tr>
<tr>
<td>5</td>
<td>The company allocate resources or reserves against harmful environmental processes side effects</td>
<td>2.950</td>
<td>0.916</td>
</tr>
<tr>
<td>6</td>
<td>The company have an environmental accounting system or subsystem</td>
<td>3.166</td>
<td>1.147</td>
</tr>
<tr>
<td>7</td>
<td>The company have specialised, experienced and trained accountants can account for environment</td>
<td>3.793</td>
<td>1.177</td>
</tr>
<tr>
<td></td>
<td>Average arithmetic mean for all paragraphs</td>
<td>3.410</td>
<td>–</td>
</tr>
</tbody>
</table>

Table 7  
Mean and standard deviation for commitment to Social responsibility and sustainable development

<table>
<thead>
<tr>
<th>Nos.</th>
<th>Paragraph</th>
<th>Arithmetic mean</th>
<th>St. deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Company and staff are aware of social responsibility concept and sustainable development</td>
<td>3.677</td>
<td>1.113</td>
</tr>
<tr>
<td>2</td>
<td>The company educate, train and encourage its staff about environment conservation</td>
<td>3.992</td>
<td>0.828</td>
</tr>
<tr>
<td>3</td>
<td>The company strategy avoid air, land, water, harm or pollution</td>
<td>3.153</td>
<td>0.803</td>
</tr>
<tr>
<td>4</td>
<td>The company have special department or unit or employees responsible for monitoring environment activities</td>
<td>3.359</td>
<td>0.755</td>
</tr>
<tr>
<td>5</td>
<td>Management and staff are aware of green accounting or green economy</td>
<td>4.388</td>
<td>1.341</td>
</tr>
<tr>
<td>6</td>
<td>The company install special equipment to prevent harmful effects of its operations</td>
<td>3.614</td>
<td>1.236</td>
</tr>
<tr>
<td>7</td>
<td>The company have code of ethics, instruction and reward system for activities concerning environment</td>
<td>2.736</td>
<td>0.567</td>
</tr>
<tr>
<td>8</td>
<td>The company adapt any new technologies as equipment’s, machines, raw materials that protect environment</td>
<td>3.494</td>
<td>0.785</td>
</tr>
<tr>
<td></td>
<td>Average arithmetic mean for all paragraphs</td>
<td>3.551</td>
<td>–</td>
</tr>
</tbody>
</table>
4.2 One sample t-test

As mentioned earlier the methodology includes conducting one sample t-test to examine the two hypotheses of the study which are:

\( H1: \) There is a commitment from companies to environmental accounting concept and methods.

\( H2: \) There is a commitment from companies to social responsibility and sustainable development concepts.

Table 8 shows the results of one sample t-test; the results show that the two hypotheses are significantly valid. As appears in the table all of the calculated-t results are higher than that of statistical-t at a degree of freedom of 121 with significance below 5%.

According to the rule of one sample t-test; if calculated-t is higher than statistical-t the null hypothesis is rejected. Therefore, and based on these results we accept the two hypotheses of the study; because all of the results previously discussed proved that Jordanian companies undertake environmental accounting to achieve sustainable development through their commitment to the proper methods and concepts concerned with environmental accounting; and also these companies are committed to its social responsibility through applying the necessary accounting concept and methods that serve the sustainable development process and moreover these companies fosters the necessary knowledge and awareness for its staff to both social responsibility and sustainable development concepts.

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>T-calculated</th>
<th>T-statistical</th>
<th>Sig</th>
<th>Df</th>
<th>Decision</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1</td>
<td>4.61</td>
<td>1.65</td>
<td>0.000</td>
<td>121</td>
<td>Accepted</td>
</tr>
<tr>
<td>H2</td>
<td>5.25</td>
<td>1.65</td>
<td>0.000</td>
<td>121</td>
<td>Accepted</td>
</tr>
</tbody>
</table>

Sig. \( \leq 0.05 \).

5 Conclusion and recommendations

5.1 Conclusion

In the last 20 years, the concept of sustainable development has a great importance in policy-making process and considered a major turning point for our societies. Although the complexity of this concept, it’s vital for both present and future generations; the importance of this concept raised the need for legislation and more accounting methods, tools and indicators to balance between sustainable development and environment.

This study was constructed to address the issue of environmental accounting and sustainable development to provide more insight into this issue. The study was aimed to investigate whether Jordanian mining and chemical companies undertake the concept of environmental accounting in economic sustainable development or not. Recently environmental accounting is considered a vital method that supports sustainable development. The methodology of the study followed two scientific methods to investigate this problem; both descriptive and field investigation was applied. The study reviewed the previous literature to address the importance of implementing environment
accounting concept, and a questionnaire was also used to examine and capture the companies’ commitment to environment accounting. The commitment was tested from two dimensions: commitment to environment accounting concepts and commitment to the concept of social responsibility and sustainable development. The results of the arithmetic mean for almost all of paragraphs concerning this commitment proved that Jordanian companies are committed to the environment accounting from the two examined dimensions. When testing the two predetermined hypotheses of the study using one sample t-test the results also confirmed this commitment. Consequently, the final conclusion of the study is consistent with many results of similar conclusions reached by local and international studies.

5.2 Recommendations of the study

- Providing more awareness for companies’ staff about the concept of environmental accounting and social responsibility and their general framework in order to achieve the desired benefits for economic sustainable development.
- Setting proper legislation and adopting the necessary accounting standards that guide companies’ activities concerning environmental issues.
- Obligating the accounting department to collect measure and disclose environmental information for interested parties.
- More education and training to enhance the qualification, skills and expertise of accountants, auditors, engineers, technicians, economists, and administrators to meet the requirement of economic sustainable development while conserving environment.

References


Undertaking of environmental accounting responsibility


