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RESEARCH ARTICLE

Effect of Environmental Accounting on Financial Performance and Firm Value of Listed Mining and Oil Companies in the Philippines

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Abstract: Environmental accounting is an emerging topic of research around the globe, but little is known of its practice and importance in the Philippines. This paper aims to determine the effect of environmental accounting on firm profitability and firm value of 24 publicly-listed mining and oil companies in the Philippines from 2012-2016. Panel regression was utilized with cross-sectional and time-series data. Environmental accounting was measured as environmental accounting disclosures and environmental costs reporting. Profitability was measured as net profit margin and return on equity, whereas firm value was measured as Tobin's Q. Moderating variables used were auditor-firm type, firm size, board size, number of years listed Philippine Stock Exchange (PSE), and location. The major business implication concluded was that environmental accounting disclosure has no significant effect on either profitability or firm value, but when moderated by location, it has a significant effect on return on equity. Environmental costs reporting, on the other hand, has a significant effect on return on equity, but when moderated by firm size, board size, number of years listed in the PSE, and location has a significant effect net profit margin, return on equity, and Tobin's Q.

Keywords: environmental accounting, mining and oil companies

Environmental accounting is an emerging field of study that links traditional accounting with environmental preservation and protection. Running the business has a direct or indirect impact on the environment that should be accounted for. Economic and business activities have roles in the depletion of natural resources, and business organizations have come under increased pressure to address these. Through environmental accounting, firms are encouraged to have better management by keeping

in mind the interests of all stakeholders, particularly focusing on the effects management decisions will have on the environment.

Entities, therefore, have the control to and is influenced by reporting for environmental accounting. According to Enahoro (2009), corporate negligence and avoidance of environmental costing leave gaps in financial information reporting; hence, there is no completeness and correctness of fair view to users of financial information, such as shareholders

and potential financial investors. Simply viewing profitability in terms of accounting standards is not enough. As interest in environmental accounting and reporting has rapidly grown, especially in the field of mining and oil extraction, its connection with a company's profitability is inevitably being deliberated. Stakeholders within and outside the company have different views and concerns in this subject. This also puts into question the management's response to environmental accounting.

In light of this, the study wants to find out, "What is the effect of environmental accounting on the financial performance and firm value of listed mining and oil companies in the Philippines?" Specifically, we investigated environmental costs reporting and disclosures' effects on profitability and firm value.

Framework of the Study

According to Suchman (1995), legitimacy is a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions. This theory explains the organization's behavior in disclosing social and environmental information to fulfill society's expectations. The theory focuses on the assumption that an organization must retain its social role by responding to society's needs and giving society what it wants (Suchman, 1995; Deegan, Rankin, & Tobin, 2002).

Legitimacy theory suggests that businesses are bound to societal contracts in which they are expected to implement activities and form the organization within the outlook of the social order to guarantee continued existence. It highlights reported disclosures to be appreciated by the community and to avoid being penalized. This reflects the firm's objective of being supported by the public when environmental accountability is being factored to increase growth, profitability, and value, most especially for firms that are more prone to environmental hazards.

On the other hand, Scott (2005) asserted that institutions are social structures that have attained a high degree of resilience. They are composed of cultural-cognitive, normative, and regulative elements that, together with associated activities and resources, provide stability and meaning to social life. Institutional theory attends to established social

behavior where rules, norms, and routines become established guidelines for social behavior. Though there are many interpretations of this theory, it is generalized as the perceived appropriateness of behavior. It explains the reasons why individuals or organizations act the way they do.

In light of this, there is a theoretical pressure by established social norms in a given location, especially considering the industry of the entity that they are expected to adhere to. It assumes that an organization's formal structure and operations are affected by the need to observe these norms, more greatly than the market demands. This includes environmental accountability that is being given greater attention over the years, and entities are confronted to address the issue. This theory then supports the emerging environmental implication of the organization's operations and behavior.

Lastly, the stakeholder theory may be the most used theory in business researches, especially in dealing with profitability. Contrary to the shareholder theory, which emphasizes the management's obligation for the shareholders' benefit, this theory explains that it is also the management's responsibility to act for the interests of all its stakeholders and not just its shareholders. A stakeholder is defined as "any individual or group who can affect or is affected by the actions, decisions, policies, practices, or goals of the organization" (Gatewood & Carrol, 1991, p. 673). As such, it is the management's duty to report costs and disclose information relevant and significant to the customers, society, government, the general public, and others who are directly or indirectly affected by the firm.

Environmental accounting costs and disclosures, which are voluntarily reported by the firms, may have an impact on the company's profitability. This theory assumes that a company's decision to have an environmental audit is positively affected by the firm's performance. As Jaggi & Freedman (1992) had emphasized in their prior study supporting a traditional economic thought, economic effectiveness has a tradeoff with environmental accountability. This may then negatively affect the income distribution to the shareholders and even the value of their interests. However, in support of the stakeholder theory, though this may be the case, the management's responsibility is not only to increase the wealth of its shareholders but also to provide information that can affect other stakeholders' decision-making.

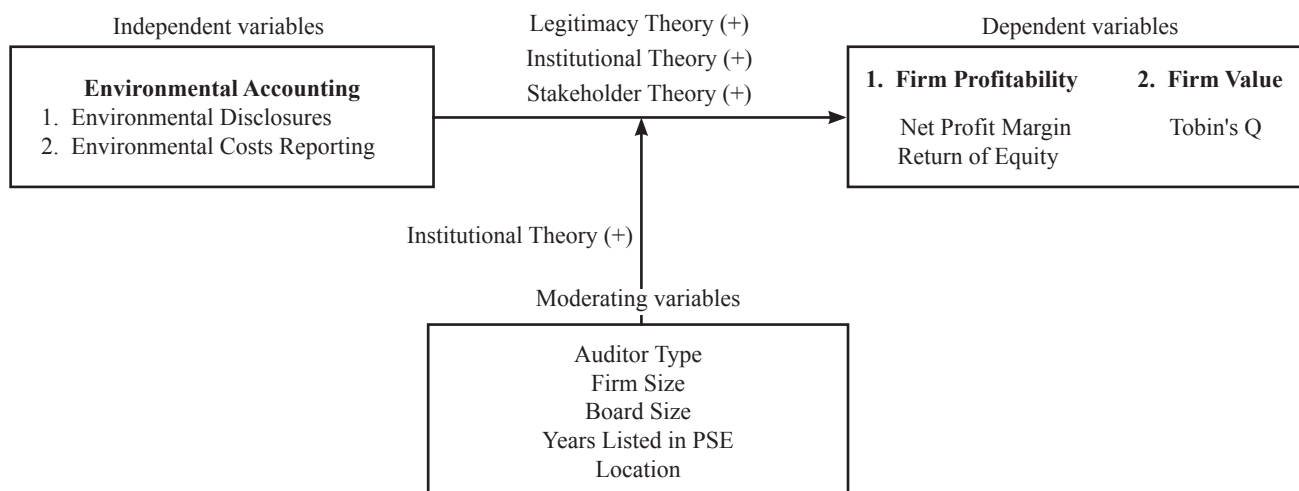


Figure 1. Diagram of the Operational Framework with environmental accounting in terms of environmental disclosures and environmental costs reporting as the independent variable and firm profitability in terms of net profit margin and return on equity and firm value measured as Tobin's Q as the dependent variables, the association of which is moderated by auditor type, firm size, board size, number of years listed in the Philippine Stock Exchange (PSE) and location of operations

Research Hypotheses

These research hypotheses were formulated to answer the objectives of the study in assessing the effect of environmental accounting, costs reporting, and disclosures on firm profitability and value.

The hypotheses relating to the effect of environmental accounting, in terms of disclosures and costs reporting, on net profit margin are:

H_{o1} : Environmental accounting disclosure moderated by auditor type, firm size, board size, number of years listed, and location has no significant effect on net profit margin.

H_{a1} : Environmental accounting disclosure moderated by auditor type, firm size, board size, number of years listed, and location has a significant effect on net profit margin.

H_{o2} : Environmental costs reporting, moderated by auditor type, firm size, board size, number of years listed, and location has no significant effect on net profit margin.

H_{a2} : Environmental costs reporting moderated by auditor type, firm size, board size, number of years listed, and location has a significant effect on net profit margin.

The hypotheses relating to the effect of environmental accounting, in terms of disclosures and costs reporting, on return on equity are:

H_{o3} : Environmental accounting disclosure moderated by auditor type, firm size, board size, number of years listed, and location has no significant effect on return on equity.

H_{a3} : Environmental accounting disclosure moderated by auditor type, firm size, board size, number of years listed, and location has a significant effect on return on equity.

H_{o4} : Environmental costs reporting moderated by auditor type, firm size, board size, number of years listed, and location has no significant effect on return on equity.

H_{a4} : Environmental costs reporting moderated by auditor type, firm size, board size number of years listed, and location has a significant effect on return on equity.

Research by Makori and Jagongo (2013) and Connelley and Limpaphayom (2004) showed no significant relationship between environmental costs

reporting and firm profitability. This is contrary, however, to the study of Bassey, Effiok, and Eton (2013), which concluded that environmental costs significantly influences a firm's profitability.

The hypotheses relating to the effect of environmental accounting, in terms of disclosures and costs reporting, on firm value measured using Tobin's Q are:

H_{o5}: Environmental accounting disclosure moderated by auditor type, firm size, board size, number of years listed, and location has no significant effect on firm value measured using Tobin's Q.

H_{a5}: Environmental accounting disclosure moderated by auditor type, firm size, board size, number of years listed, and location has a significant effect on firm value measured using Tobin's Q.

H_{o6}: Environmental costs reporting moderated by auditor type, firm size, board size, number of years listed, and location has no significant effect on firm value measured using Tobin's Q.

H_{a6}: Environmental costs reporting moderated by auditor type, firm size, board size, number of years listed, and location has a significant effect on firm value measured using Tobin's Q.

Connelly and Limpaphayom's (2004) research on environmental accounting and firm value suggested that there is a significant positive relationship between environmental reporting and a company's market valuation, which is indirect support to Porter's hypothesis. Based on the research of Che-Ahmad, Ozasuwa, and Mgbame (2015), which used auditor type, firm size, and industry type as moderating variables, only firm size exhibited a negative relationship, whereas auditor type and industry type showed a positive relationship, supporting the stakeholder-shareholder perspective. On the other hand, Ionel-Alin's (2012) study concluded that the number of board of directors affects the level of environmental accounting disclosures of a company. Lastly, there is a decreasing level of environmental disclosure as firms continue to operate (Omnamasivaya & Prasad, 2016b).

Review of Related Literature

Environmental Accounting Over Industries and Countries

Differences in a country's history, government structure, and industries also involved results in varying forms of environmental accounting. The study of Moid (2017) highlighted the difficulty of accountants in measuring and incorporating environmental accounting in the financial statements. Moid (2017) described environmental reporting as more descriptive, discretionary, and non-financial only in their efforts to disclose some information to the general public. In the research of Athma and Rajyalaxmi (2017), Marahatna companies divide environmental accounting into two approaches: a physical approach where environmental aspects are presented in physical terms, and monetary approach which is a result in the gap in reporting using the physical approach but not enough measurement for environmental accounting.

In China, firms are still viewed to resist adaptation of environmental accounting (Li, 2015). In American and European companies, on the other hand, firm size seems to dictate the company's decision for voluntary environmental disclosure (Meek, Roberts, & Gray, 1995). The study of the London Stock Exchange FTSE 100 companies has shown that the differences in the board composition can be a driver for differences in environmental accounting disclosures (Ionel-Alin, 2012); a larger number of board of directors results in more environmental disclosures. Furthermore, a greater level of disclosure occurs when there is an existing environmental committee on the board.

A study of Omnamasivaya and Prasad (2016b) suggested that the age of companies affects the level of environmental accounting disclosures they present. This paper revealed that the older the company gets, the lesser the environmental accounting disclosures they make; thus, a negative inverse relationship between environmental accounting disclosures and a firm's age.

Oil and gas manufacturing companies in Nigeria have varying patterns but still show minimal disclosure (Enahoro, 2009). Industrial and mineral companies in Jordan also have different environmental accounting disclosures among big companies and relatively rare on the rest because, like most of the other countries, they also have no specific standard for disclosing requirements (Altarawneh, 2015). Philippine mining companies showed varying ways of disclosure as

well, but 90% of which have rehabilitation programs and 60% showed compliance with IFRIC 5—rights to interests arising from decommissioning, restoration, and environmental rehabilitation funds (Aquino, 2009).

The article of Hamilton (2012) supported the institutional theory that firms are sometimes just pressured to adopt principles regarding disclosure requirements. Overall, studies suggest that because of the lack of established standards and freedom of firms to decide whether or not to report and disclose environmental information, firms showed differences in disclosure patterns and costs recognition. This also posed a minimal level of environmental accounting implementation across countries and industries.

Environmental Accounting and Firm Profitability

The main focus of this paper is to determine the effect of environmental accounting on a firm's profitability. In the study of Che-Ahmad et al. (2015) on the correlation of environmental disclosure and firm profitability in Nigeria, they found no significant relationship unless these are moderated by firm size, auditor-type, and industry-type with firm size being the only variable to show negative relationship supporting the shareholder perspective. This is consistent with the study of listed companies in the Bombay Stock Exchange in India that also showed no significant relationship between environmental cost recognition and firm profitability (Makori & Jagongo, 2013) and the study of Yeom (2012) on corporate social and environmental accounting, physical performance, and reputation.

Contrarily, a study of oil and gas companies in Nigeria (Bassey et al., 2013) and listed firms in the Lisbon Euronext Stock Market (Carreira, Damião, Abreu, & David, 2014) showed a significant relationship between environmental disclosure and firm profitability. They also proposed an environmental disclosure index to measure the extent of information presented on selected firms' annual reports. Environmental accounting and firm value also showed a positive relationship in a study of Thai companies (Connelly & Limpaphayom, 2004). Simultaneous analysis of environmental disclosure, environmental performance, and firm profitability showed significant positive interrelations between the three (Al-Tuwaijria, Christensen, & Hughes, 2004). Accordingly, the market views a negative association between pollution and economic performance in pulp and paper firms (Jaggi & Freedman, 1992).

Throughout the years, different researchers have come up with different results and conclusions, depending on the variables used and entity setting. Other factors, such as the economic status of the nation and existing environmental laws, also affect such studies. This paper aims to be an addition in the existing pool of related studies and help in giving a clear relationship of environmental accounting and firm profitability on publicly listed firms in the Philippines.

Environmental Accounting and Firm Value

The study of Iatridis (2013) showed that superior environmental accounting, particularly disclosures, are seen by investors as value relevant; thus, it increases not only firm performance but also firm valuation. Similarly, as discussed earlier in this paper, Connelly and Limpaphayom's (2004) research supports that of Iatridis (2013) that environmental accounting disclosures have a significant positive relationship with the market valuation.

Interestingly, the research of Qiu, Shaukat, and Tharyan (2016) found no link between environmental disclosures and firm value. They attributed this unexpected result to differences in disclosure indexing, limits in the importance of environmental accounting to the sectors involved, and investors' perception of the company's environmental activities.

Methods

Research Design

This paper used both causal and exploratory research design. It aimed to know the effect of environmental accounting in terms of environmental cost recognition and environmental disclosures to firm profitability measured as net profit margin and return on equity and firm value measured through Tobin's Q. It is also an addition to the limited researches on environmental accounting in the Philippines using analysis of issued financial statements over the years 2012 to 2016. The population consisted of 24 publicly listed companies (PLCs) in the Philippine Stock Exchange under the mining and oil sector. This is subdivided into two subsectors: 20 companies in the mining subsector and four companies in the oil subsector.

Regression Analysis

To analyze the effect of environmental accounting on the 24 PLC's performance over time, panel

regression analysis was used due to the dataset being cross-sectional and time-series in nature. Using the data extracted from the annual reports, the following models representing the hypotheses to be tested were applied through the statistical software, Stata13:

Environmental accounting on firm profitability uses the following equations:

$$NPM_{it} = \beta_0 + \beta_1 EAD_{it-1} + \beta_2 EAD_{it-1} * AUDFT_{it-1} + \beta_3 EAD_{it-1} * SIZE_{it-1} + \beta_4 EAD_{it-1} * BOD_{it-1} + \beta_5 EAD_{it-1} * YLIST_{it-1} + \beta_6 EAD_{it-1} * LOC_{it-1} + \mu_{it-1} \quad (\text{Model 1})$$

$$NPM_{it} = \beta_0 + \beta_1 EC_{it-1} + \beta_2 EC_{it-1} * AUDFT_{it-1} + \beta_3 EC_{it-1} * SIZE_{it-1} + \beta_4 EC_{it-1} * BOD_{it-1} + \beta_5 EC_{it-1} * YLIST_{it-1} + \beta_6 EC_{it-1} * LOC_{it-1} + \mu_{it-1} \quad (\text{Model 2})$$

$$ROE_{it} = \beta_0 + \beta_1 EAD_{it-1} + \beta_2 EAD_{it-1} * AUDFT_{it-1} + \beta_3 EAD_{it-1} * SIZE_{it-1} + \beta_4 EAD_{it-1} * BOD_{it-1} + \beta_5 EAD_{it-1} * YLIST_{it-1} + \beta_6 EAD_{it-1} * LOC_{it-1} + \mu_{it-1} \quad (\text{Model 3})$$

$$ROE_{it} = \beta_0 + \beta_1 EC_{it-1} + \beta_2 EC_{it-1} * AUDFT_{it-1} + \beta_3 EC_{it-1} * SIZE_{it-1} + \beta_4 EC_{it-1} * BOD_{it-1} + \beta_5 EC_{it-1} * YLIST_{it-1} + \beta_6 EC_{it-1} * LOC_{it-1} + \mu_{it-1} \quad (\text{Model 4})$$

Environmental accounting on firm value uses the following equations:

$$TQ_{it} = \beta_0 + \beta_1 EAD_{it-1} + \beta_2 EAD_{it-1} * AUDFT_{it-1} + \beta_3 EAD_{it-1} * SIZE_{it-1} + \beta_4 EAD_{it-1} * BOD_{it-1} + \beta_5 EAD_{it-1} * YLIST_{it-1} + \beta_6 EAD_{it-1} * LOC_{it-1} + \mu_{it-1} \quad (\text{Model 5})$$

$$TQ_{it} = \beta_0 + \beta_1 EC_{it-1} + \beta_2 EC_{it-1} * AUDFT_{it-1} + \beta_3 EC_{it-1} * SIZE_{it-1} + \beta_4 EC_{it-1} * BOD_{it-1} + \beta_5 EC_{it-1} * YLIST_{it-1} + \beta_6 EC_{it-1} * LOC_{it-1} + \mu_{it-1} \quad (\text{Model 6})$$

where NPM_{it} is the net profit margin, ROE_{it} is the return on equity, TQ_{it} is the firm value based on Tobin's Q, EAD_{it-1} is the environmental accounting disclosure, EC_{it-1} is the environmental cost, $AUDFT_{it-1}$ is the auditor firm type, $SIZE_{it-1}$ is the firm size, BOD_{it-1} is the board size, $YLIST_{it-1}$ is the number of years listed in the PSE, and LOC_{it-1} is the firm location.

Results

Descriptive Statistics

As shown in Table 1, the net profit margin has a wide range of values from -360.08 to 4,409.80, but averaging only 42.57. Return on equity also shows both positive and negative values, from -662.42 to 606.45, with an average of -6.81. These values reflect the presence of net income and net losses of the PLCs

Table 1
Descriptive Statistics

	NPM	ROE	TQ	EAD	EC	SIZE	BOD	YLIST
standard deviation	404.87	104.18	10.05	0.16	159,824,515.02	17,289,480.87	1.66	21.85
mean	42.57	-6.81	4.06	0.35	62,490,426.19	10,660,953.26	8.92	34.73
Minimum	-360.08	-662.42		0.06	0.00	8.00	5.00	0.00
maximum	4409.80	606.45	81.06	0.72	1,446,859,000.00	73,899,134.00	11.00	69.72

*NPM-Net Profit Margin, ROE-Return on Equity, TQ-Tobin's Q, EAD-Environmental Accounting Disclosures, EC-Environmental Costs Reporting, SIZE-Firm Size, BOD-Board Size and YLIST-Number of Years Listed in the PSE

over five years. Notice that Tobin's Q's maximum value is 81.06 but does not have a minimum value. This is because one of the companies was listed in the PSE only in 2012, and such amounts are based on stock prices and market values from 2012-2016.

Environmental accounting disclosures is the percentage of scores obtained by the companies using the environmental index checklist suggested in the study of Villiers and Staden (2006) and used in the study of Aquino (2009). Of the 18 scores, the highest obtained was 13 and the lowest, 2 (See Appendix A). This gives the percentage value of 72% and 6%, respectively. The environmental accounting disclosures percentage mean is at 35%, which means that, on average, a company discloses six out of the 18 information in the disclosure checklist. We can derived that based on the checklist used, environmental disclosures of these firms are minimal, and most of which are descriptive in nature.

Environmental costs reporting shows the absolute amount of explicit environmental costs incurred in a given year as disclosed by a company. As some entities find it insignificant to disclose this amount, the lowest value showed Php0. For these entities, their environmental costs are just a part of their miscellaneous expenses. However, companies spend as much as Php1.447B a year for environmental protection and rehabilitation, averaging Php67M for the five-year period of the 24 PLCs. This amount is greatly affected by the regulation monitoring

and penalty implementations being done by the Department of Environment and Natural Resources, Mines and Geosciences Bureau, and other related government agencies. The Php1.447B cost reported, for example, was a product of a penalty imposed due to an environmental policy violation.

Firm size is a measure of the total assets of the companies, ranging from PhP8.00 to PhP73.9M, as presented in their audited financial statements. Board size, representing the number of directors, ranges from five to 11 directors. During the data gathering, it became noticeable that most companies prefer an odd number of board of directors, which can be explained by the convenience of reaching a decision without the votes being split equally. The number of years listed is counted from the listing date of the PLC in the public market to the year-end of 2012-2016. This averaged 22 years because, again, one of the companies was listed in 2012 only; thus, the lowest value is 0.

The variable auditor firm type was not presented because we used dichotomous variables for this. As it turns out, 15 out of 24 PLCs are being audited by the Big Four namely, SyCip Gorres Velayo & Co., Isla Lipana & Co., Manabat Delgado Amper & Co., and Punongbayan & Araullo. Location was also not included because dummy variables were used for the 18 regions of the Philippines. In the data gathered, most companies are operating in Region XIII – Caraga Region due to its abundance in mineral resources such as iron, gold, silver, nickel, and copper.

Panel Regression

Table 2

Model 1 Regression Results for OLS Estimation (NPM)

Variable	Coefficients	Std. Error	t-ratio	p-value
Constant	60.2668	115.2220	0.5230	0.6021
EAD_1	-1262.9700	929.5200	-1.3590	0.1774
EAD*AUDFT_1	374.4810	320.0680	1.1700	0.2449
EAD*SIZE_1	-7.87e-06	9.48e-06	-0.0831	0.4083
EAD*BOD_1	119.8720	103.0430	1.1630	0.2476
EAD*YLIST_1	-6.12782	5.7905	-1.0580	0.2926
EAD*LOC_1	16.8499	26.9526	0.6252	0.5333
Adjusted R-squared	-0.0247			

**NPM-Net Profit Margin, EAD-Environmental Accounting Disclosures, AUDFT-Auditor-firm Type, SIZE-Firm Size, BOD-Board Size, YLIST-Number of Years Listed in the PSE and LOC-Location*

As shown in Table 2, environmental accounting disclosure, by itself and as moderated by auditor firm type, firm size, board size, number of years listed in the PSE, and location, has no significant effect on net profit margin; thus, we fail to reject the null hypothesis for all the variables used in Model 1.

This regression relationship implies that mining and oil companies with a higher quality of environmental accounting disclosures will have a lower net profit margin. This can be due to the fact the disclosing environmental information triggers disbursement of funds, especially for environmental protection and rehabilitation. Auditor firm type's and board size's positive relationship to net profit margin suggests that firms audited by the Big Four and a larger number of board members positively affect net profit margin. In relation to environmental accounting, the assignment of a director to environmental reporting can be helpful for a company in risk mitigation and operation's control to reduce environmental impact; thus, reduce costs incurred.

Table 3 shows the panel regression analysis of environmental costs reporting and net profit margin. Among the p-values, only environmental costs reporting moderated by the number of years listed in the PSE showed a significant value of 0.0690 at a 10% level of significance. Thus, we reject the null hypothesis for environmental costs reporting moderated by the number of years listed in the PSE and fail to reject the null hypothesis for the rest of the regressors.

Interestingly, analysis of the data gathered on a firm's age and environmental costs reported showed a positive relationship. This means that as companies grow older, higher amounts of environmental costs are incurred. As such is an expense account, higher environmental costs incurred results to lower income. This explains the significant negative relationship of environmental costs reported, moderated by the number of years listed in the PSE to net profit margin. These amounts are, however, affected by penalties imposed on environmental violations explaining the sudden fluctuations.

Contrast to the analysis of the data gathered is the study of Abdo and Al-Drugi (2012), suggesting a significant negative relationship between a firm's age and level of environmental accounting. This means that the older a company is, the lesser quality of environmental accounting can be expected. This is proven during data gathering when we performed a content analysis of annual reports and audited financial statements. Most companies disclose repeated environmental reports yearly and only change the amounts of environmental protection and rehabilitation costs incurred for a given year. However, it still supports our model with a significant negative relationship between environmental costs reported moderated by the number of years listed in the PSE and net profit margin. Lesser environmental information gathered means lesser costs allotted for environmental reporting, and this is expected to increase the profitability of companies because such is an expense account.

Table 3

Model 2 Regression Results for REM Estimation (NPM)

Variable	Coefficients	Std. Error	z-value	p-value
Constant	-44.3015	38.5532	-1.1500	0.2510
EC_1	6.5708	11.9741	0.5500	0.5830
EC*AUDFT_1	1.7721	2.1479	0.8300	0.4090
EC*SIZE_1	-0.2254	1.5879	-0.1400	0.8870
EC*BOD_1	0.3724	0.5892	0.6300	0.5270
EC*YLIST_1	-0.0688	0.0378	-1.8200	0.0690
EC*LOC_1	-0.0659	0.1496	-0.4400	0.6600
Overall R-squared	0.1595			

**NPM-Net Profit Margin, EC-Environmental Costs Reporting, AUDFT-Auditor-firm Type, SIZE-Firm Size, BOD-Board Size, YLIST-Number of Years Listed in the PSE and LOC-Location*

Table 4*Model 3 Regression Results for REM Estimation (ROE)*

Variable	Coefficients	Std. Error	z-value	p-value
Constant	-14.5372	26.9893	-0.5400	0.5900
EAD_1	-274.8430	189.1013	-0.1450	0.1460
EAD*AUDFT_1	94.9474	69.9916	1.3600	0.1750
EAD*SIZE_1	8.22e-07	2.00e-06	0.4100	0.6810
EAD*BOD_1	14.0154	20.7942	0.6700	0.5000
EAD*YLIST_1	-2.3443	1.3472	-0.1740	0.0820
EAD*LOC_1	15.9374	5.9367	2.6800	0.0070 ***
Overall R-squared	0.1075			

*ROE-Return on Equity, EAD-Environmental Accounting Disclosures, AUDFT-Auditor-firm Type, SIZE-Firm Size, BOD-Board Size, YLIST-Number of Years Listed in the PSE and LOC-Location

Table 4 presents the panel regression analysis for environmental accounting disclosures on return on equity. As shown, only location has a significant p-value of 0.007 at a 1% level. This means that we reject the null hypothesis for environmental accounting disclosures moderated by location, but we fail to reject the rest of the null hypotheses. It is then safe to say that environmental accounting disclosures does not have a significant effect on both net profit margin and return on equity. This supports the study of Galani, Gravas, and Stavropoulos (2012) that environmental accounting disclosures has no significance on firm profitability.

However, location proves to be significant in this case, a variable not used by any prior researcher. During data gathering, it was found that 11 out of 18 regions of the Philippines are being used as a major source of mineral resources by these PLCs. Caraga, Cordilleras, MIMAROPA, and Central Luzon are where 16 out of 24 (66.67%) listed mining and oil companies operate. The concentration of mining and oil extraction in these regions can be attributed to the fact that mineral resources are concentrated on these areas and sites for large-scale mining and oil extraction is limited by Executive Order No. 79 (2012). Thus, greater environmental compliance is expected from companies that operate in these areas. It would motivate managers to provide a higher quality of sustainability disclosures to avoid attracting political

and regulatory attention and penalties and additional costs, which explains the positive relationship to return on equity (Iatridis, 2013).

Table 5 is the result of the panel regression analysis of environmental costs reporting on return on equity. P-values show that environmental costs reporting at 0.0140 is significant at 5%, environmental costs reporting moderated by firm size at 0.0050 is significant at 1%, and environmental costs reporting moderated by location at 0.0730 is significant at 10%.

The coefficient of environmental costs reporting shows a significant inverse relationship to return on equity. As explained, these costs are highly affected by penalties imposed on environmental violations. Mining and oil extraction violations can cost as high as PhP189M, as in the case of tailings spill in Itogon, Benguet, in 2014. Its significance suggests that the average environmental costs reporting of PhP62M, as presented in Table 1, can be considered a material amount. Also, as such is an expense account, it is reasonable that an increase in environmental costs reporting will result in a decrease of return on equity, thus, the negative relationship. This supports the study of Yeom (2012) that environmental reporting has a negative effect on earnings. This also supports the study of Bassey, et al. (2013) that environmental costs reporting has a significant effect on a firm's profitability.

Environmental costs reporting moderated by firm size is also significant to return on equity in this model. Larger firms have more capacity to disclose environmental information (Razeed, 2009). This also includes the ability to perform extensive environmental reporting and allocate greater funds for environmental protection and rehabilitation. In relation to profitability, the significant positive relationship supports the study of Nurhayati, Taylor, and Tower (2015), concluding that profitability directly affects the importance of environmental issues. Large firms also tend to disclose

sufficient financial, environmental information to avoid political costs and concerns at local and national levels (Iatridis, 2013).

Table 6 is the panel regression analysis of environmental accounting disclosures on Tobin's Q. As shown by all the high p-values, none of the variables used are significant to Tobin's Q. Thus, we fail to reject all null hypotheses related to the effect of environmental accounting disclosures on Tobin's Q. These results contradict the study of Connelly and Limpaphayom (2004) that environmental reporting has

Table 5

Model 4 Regression Results for REM Estimation (ROE)

Variable	Coefficients	Std. Error	z-value	p-value	
Constant	88.9009	102.6728	0.8700	0.3870	
EC_1	-74.4480	30.2221	-2.4600	0.0140	**
EC*AUDFT_1	-4.4017	4.8723	-0.9000	0.3660	
EC*SIZE_1	10.6861	3.8144	2.8000	0.0050	***
EC*BOD_1	-1.5850	1.3412	-1.1800	0.2370	
EC*YLIST_1	-0.0086	0.0874	-0.1000	0.9220	
EC*LOC_1	0.5960	0.3320	1.8000	0.0730	*
Overall R-squared	0.2498				

*ROE-Return on Equity, EC-Environmental Costs Reporting, AUDFT-Auditor-firm Type, SIZE-Firm Size, BOD-Board Size, YLIST-Number of Years Listed in the PSE and LOC-Location

Table 6

Model 5 Regression Results for REM Estimation (TQ)

Variable	Coefficients	Std. Error	z-value	p-value	
Constant	6.8377	4.0145	1.7000	0.0890	*
EAD_1	-24.6491	28.0634	-0.8800	0.3800	
EAD*AUDFT_1	-11.5731	10.4097	-1.1100	0.2660	
EAD*SIZE_1	-2.53e-07	2.59e-07	-0.9800	0.3290	
EAD*BOD_1	4.3252	2.9876	1.4500	0.1480	
EAD*YLIST_1	0.0635	0.2028	0.3100	0.7540	
EAD*LOC_1	-1.1689	0.8845	-1.3200	0.1860	
Overall R-squared	0.1457				

*TQ-Tobin's Q, EAD-Environmental Accounting Disclosures, AUDFT-Auditor-firm Type, SIZE-Firm Size, BOD-Board Size, YLIST-Number of Years Listed in the PSE and LOC-Location

a significant relationship with market valuation. It also contradicts the apriori expectations for the moderating variables in the study of Che-Ahmad, et al. (2015) for auditor firm type, and Omnamasivaya and Prasad (2016a) for the number of years listed in the PSE.

If environmental accounting disclosures does not significantly affect Tobin's Q, a business owner's environmental accounting disclosures would only be limited to the requirements of the government because it would not be advantageous nor disadvantageous to the firms. This challenges the expectation that users of financial statements value the quality of environmental accounting disclosures and positively impacts firm value. It implies that the public does not give much attention to environmental accounting disclosures; thus, it does not affect market value.

None of the moderating variables also helped in proving that environmental accounting disclosures affects firm value. This suggests that firm-specific variables in environmental disclosures will not help improve market valuation in terms of Tobin's Q. The same can be said for profitability, as presented in the panel regression results of Model 1.

In Table 7, looking at the p-values, environmental costs reporting moderated by firm size at 0.0580 is significant at 10%. According to Elsayed and Hoque (2010), large firms are more visible and exposed. They would then be inclined to report more financial information relating to environmental

reporting. However, this can trigger public scrutiny and investigation. The government may even closely monitor large firms than small ones for the greater scope of damages they may cause and higher amounts of penalties that may be imposed. As such are normally publicized, the market is easily affected; thus, the negative relationship to firm value.

Also, environmental costs reporting moderated by board size at 0.0380 is significant at 5%. A larger number of board of directors gives the opportunity to assign one of them to environmental protection and monitoring, as suggested by Villiers and Staden (2006). This can also give rise to the presence of an environmental committee that monitors environmental impact and brings about transparency in both financial and non-financial information reporting (Ionel-Alin, 2012). This is considered value-relevant by the public; hence, the significant positive relationship to market value.

Hypothesis Testing

Table 8 shows the summary of the hypothesis testing done. Expanded with the moderating variables used, this table generated from the regression analysis shows that we fail to reject the null hypothesis for environmental accounting disclosures to all dependent variables. We also fail to reject the null hypothesis for environmental costs reporting except for its significance to return on equity. Lastly, we fail to

Table 7
Model 6 Regression Results for REM Estimation (TQ)

Variable	Coefficients	Std. Error	z-value	p-value	
Constant	-6.6167	11.4220	-0.5800	0.5620	
EC_1	5.3752	4.6447	1.1600	0.2470	
EC*AUDFT_1	-0.7306	1.0402	-0.7000	0.4820	
EC*SIZE_1	-1.2781	0.6752	-1.8900	0.0580	*
EC*BOD_1	0.6158	0.2964	2.0800	0.0380	**
EC*YLIST_1	0.0000	0.0195	0.0000	0.9990	
EC*LOC_1	-0.0242	0.0793	-0.3100	0.7600	
Overall R-squared	0.2851				

**TQ-Tobin's Q, EC-Environmental Costs Reporting, AUDFT-Auditor-firm Type, SIZE-Firm Size, BOD-Board Size, YLIST-Number of Years Listed in the PSE and LOC-Location*

Table 8*Summary of Hypothesis Testing Results*

	Hypothesis	Result
H ₀₁	Environmental Accounting Disclosure on Net Profit Margin	fail to reject
	Environmental Accounting Disclosure	fail to reject
	Auditor Firm-Type	fail to reject
	Firm Size	fail to reject
	Board Size	fail to reject
	Years Listed in the PSE	fail to reject
	Location	fail to reject
H ₀₂	Environmental Costs Reporting on Net Profit Margin	fail to reject
	Environmental Costs Reporting	fail to reject
	Auditor Firm-Type	fail to reject
	Firm Size	fail to reject
	Board Size	fail to reject
	Years Listed in the PSE	reject the null
	Location	fail to reject
H ₀₃	Environmental Accounting Disclosure on Return on Equity	fail to reject
	Environmental Accounting Disclosure	fail to reject
	Auditor Firm-Type	fail to reject
	Firm Size	fail to reject
	Board Size	fail to reject
	Years Listed in the PSEW	fail to reject
	Location	reject the null
H ₀₄	Environmental Costs Reporting on Return on Equity	fail to reject
	Environmental Costs Reporting	reject the null
	Auditor Firm-Type	fail to reject
	Firm Size	reject the null
	Board Size	fail to reject
	Years Listed in the PSE	fail to reject
	Location	reject the null
H ₀₅	Environmental Accounting Disclosure on Tobin's Q	fail to reject
	Environmental Accounting Disclosure	fail to reject
	Auditor Firm-Type	fail to reject
	Firm Size	fail to reject
	Board Size	fail to reject
	Years Listed in the PSE	fail to reject
	Location	fail to reject
H ₀₆	Environmental Costs Reporting on Tobin's Q	fail to reject
	Environmental Costs Reporting	fail to reject
	Auditor Firm-Type	fail to reject
	Firm Size	reject the null
	Board Size	reject the null
	Years Listed in the PSE	fail to reject
	Location	fail to reject

reject the rest of the null hypotheses except for a few moderating variables in Models 2, 3, 4, 6, and 7. These moderating variables are the firm size for return on equity and Tobin's Q, board size for Tobin's Q, years listed in the PSE for net profit margin, and location for return on equity and Tobin's Q.

Discussion

In the business of mining and oil exploration, pressure on business owners exists as stakeholders expect their reports to be complete and comprehensive. Added pressure occurs in this particular field because of the public's and government's negative views on the actual destruction of the environment and its subsequent effects, especially on the local community where it operates. However, in places like the Philippines, where it is abundant in natural resources, such as mineral and non-mineral products, social and economic responsibilities must be balanced.

This study shows that, in general, environmental accounting is not significant in both firm profitability and firm value. No p-value related to environmental accounting disclosure in any of the six models proved to be significant. Environmental costs reporting, on the other hand, is only significant on return on equity at 1% with a p-value of 0.0140, with indicated negative correlation. This means that whether or not the company discloses environmental financial and non-financial information, it will not affect the firm's profitability and value. Still, the Securities and Exchange Commission highly encourages firms to fully disclose their environmental practices.

However, when environmental accounting disclosure and environmental costs reporting are moderated by certain variables, environmental accounting is significant. The moderating variables location, firm size, number of years listed in PSE, and board size are significant to return on equity, return on equity to Tobin's Q, net profit margin to Tobin's Q, respectively. Location is significant in two of the six models, environmental accounting disclosure to return on equity and environmental costs reporting to return on equity. This means that companies must consider where to operate, focusing on the Caraga Region, Cordillera Administrative Region, MIMAROPA, and Central Luzon, where mineral resources are concentrated, as 66.67% of these PLCs operate in the said regions. However, due to limited

areas where large-scale mining and oil extraction is permitted and these areas also being the center of mineral extraction catastrophes, the government through the Department of Environment and Natural Resources and Mines and Geosciences Bureau expects such companies for higher compliance and closer monitoring. This means sufficient environmental reporting and disclosures for the companies and greater environmental costs reporting. The significant positive relationship of environmental accounting disclosure and environmental costs reporting moderated by location suggests that a higher level of environmental accounting in large-scale mining and oil extraction sites will result in a higher return on equity.

Another significant moderating variable is firm size. The study of Makori and Jagongo (2013) concluded that large companies tend to report more environmental disclosures in their annual report. Firms with larger assets have more capacity to report extensive environmental disclosures and specific environmental costs. Also, given their large size, they are more visible and prone to regulatory attention and public scrutiny, explaining the significant negative relationship to firm value. However, as profitable firms are more likely to provide a better quality of environmental costs reporting (Mangos & Lewis, 1995), this supports the significant positive relationship to return on equity.

Number of years listed in PSE is another significant moderating variable that shows a negative relationship to profitability in terms of net profit margin. The companies that are listed in the PSE for a long time tend to disclose less information as they do not find the value of disclosing more information if they are already profiting in their operations. Lesser costs allocated to environmental reporting results in higher income explains the significant negative relationship to profitability.

Board size is also a significant moderating variable. A large number of board of directors give the possibility to appoint one of them to environmental protection and rehabilitation and creating an environmental committee, as suggested by Villiers and Staden (2006). Ionel-Alin (2012) also mentioned that the size of the board is a corporate governance variable that could explain environmental reporting, allowing the presence of a committee for environmental safety and responsibility and ensuring the sufficient unbiased and independent votes in solving the potential conflict of

interests. This supports institutional and stakeholder theory. With these, there will be more focus on the company operations' effect on the environment. Thus, as the public appreciates the attention given to environmental reporting, it helps in building firm value.

The annual reports, where this information is already presented by some extends, is the company's recognition of their obligation to all and the importance of environmental protection. This act of environmental accounting disclosures and costs reporting is a form of acknowledging accountability, which somehow humanizes the activity of taking natural resources from Earth, showing that although economic progression is vital, social and environmental responsibility is as equally important. Thus, whether it is negative or positive news, the public has the right to know and the company has the responsibility to disclose everything that their activity causes to the environment.

Conclusion

This study was made with the objective of knowing the effect of environmental accounting on the firm's profitability and value, and the effects of the moderating variables used as listed. Independent variables used were environmental accounting disclosures and environmental costs reporting. These were moderated by auditor firm type, firm size, board size, number of years listed in the PSE, and location. On the other hand, the dependent variables used were the net profit margin and return on equity for profitability and Tobin's Q for firm value. As the study covers 24 publicly-listed mining and oil companies for the years 2012-2016, panel regression analysis was utilized.

As presented, environmental accounting disclosure in itself is not significant to any of the dependent variables. However, when moderated by location, it is significant to return on equity. On the other hand, environmental costs reporting in itself is only significant to firm profitability in terms of return on equity. But, when moderated by number of years listed in PSE, it is significant to net profit margin. When environmental costs reporting is moderated by firm size and location, it is also significant to return on equity. Lastly, when environmental costs reporting is moderated by firm size and board size, it is a significant firm value measured as Tobin's Q.

Another objective of this study is to differentiate companies with environmental accounting for those that do not. Based on annual report content analysis, we found out that all Philippine mining and oil PLCs have environmental accounting disclosures and costs reporting at varying levels, so the difference cannot be determined. Most of these environmental reportings are in the form of environmental violation penalties, rehabilitation, and tree planting activities used to support the local community in which they operate. They also set aside a provision for rehabilitation to restore the mining sites to its former form upon cessation of operations. According to their annual reports, aside from compliance with environmental laws and regulations, they also recognize the negative effects of their actions on the environment and the communal areas affected. These motivate them to practice environmental protection and rehabilitation.

Lastly, though the Securities and Exchange Commission encourages environmental accounting, they do not have a required list of disclosures for environmental accounting; thus, this is still a prerogative of the reporting entity. However, Mines and Geosciences Bureau requires mining and oil companies to submit environmental reports such as, but not limited to, Annual Environmental Protection and Enhancement Program (EPAP), which is commonly discussed in the annual reports; semi-annual report on mine, waste and mill tailings produced, contained, or utilized; and report on claims for compensation for damages. These reports being regularly monitored are the source of rehabilitation costs reported by the PLCs.

Declaration of ownership

This report is our original work.

Conflict of interest

None.

Ethical clearance

This study was approved by the institution.

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APPENDIX A

Environmental Accounting Disclosure Index

Villiers and Standen's Proposed Environmental Checklist (2006)	PCL1	PCL2	PCL3	PCL4	PCL5	PCL6	PCL7	PCL8	PCL9	PCL10	PCL11	PCL12
General Information												
Environmental infor in annual report	1	1	1	1	1	1	1	1	1	1	1	1
Corporate mission statement have a policy on environment					1	1						
Separate environment policy						1			1			
Executive director entrusted with environmental responsibility												
One of senior management entrusted with environmental responsibility												
Environmental audit mentioned												
External awards for environmental activities			1									
Mention of sustainability or sustainable development		1	1		1	1						
Accounting policy notes on environmental accounting	1	1	1	1	1	1	1	1	1	1	1	1
Specific Information												
Quantitative information	1	1	1	1	1	1		1		1	1	1
Measurable standards for environmental objectives		1	1		1	1						
Disclose achievement of objectives		1	1		1	1						
Mention of environmental risks and impacts	1	1					1		1	1		
Impacts and risks site-by-site basis												
Mention of negative aspects of environmental activities	1	1					1		1	1		
Environmental audit attested independently (external)												
Quantitative non-financial infor disclosed		1	1		1	1						
Financial environmental information	1	1	1	1	1	1		1		1	1	1
TOTAL RAW SCORE	6	10	9	4	9	10	4	4	5	6	4	4
Percentage	0.33	0.56	0.50	0.22	0.50	0.56	0.22	.022	0.28	0.33	0.22	0.22

Environmental Accounting Disclosure Index

Villiers and Standen's Proposed Environmental Checklist (2006)	PCL13	PCL14	PCL15	PCL16	PCL17	PCL18	PCL19	PCL20	PCL21	PCL22	PCL23	PCL24
General Information												
Environmental infor in annual report	1	1	1	1	1		1	1	1	1	1	1
Corporate mission statement have a policy on environment			1									
Separate environment policy	1	1	1	1		1	1	1		1		
Executive director entrusted with environmental responsibility												
One of senior management entrusted with environmental responsibility												
Environmental audit mentioned												
External awards for environmental activities			1									
Mention of sustainability or sustainable development			1		1		1	1		1		
Accounting policy notes on environmental accounting	1	1	1	1	1	1	1	1	1	1	1	1
Specific Information												
Quantitative information	1	1	1	1	1		1	1		1		1
Measurable standards for environmental objectives	1		1					1		1		1
Disclose achievement of objectives	1		1					1				1
Mention of environmental risks and impacts	1		1		1		1	1		1		
Impacts and risks site-by-site basis									1			
Mention of negative aspects of environmental activities	1		1		1		1	1				
Environmental audit attested independently (external)												
Quantitative non-financial infor disclosed			1					1				1
Financial environmental information	1	1	1	1	1		1	1		1		1
TOTAL RAW SCORE	9	5	13	5	7	2	8	11	3	8	2	7
Percentage	0.50	0.28	0.72	0.28	0.39	0.11	0.44	0.61	0.17	0.44	0.11	0.39