

## THE NEXUS BETWEEN ENVIRONMENTAL MANAGEMENT ACCOUNTING PRACTICES AND FINANCIAL SUSTAINABILITY OF CEMENT AND MINING COMPANIES IN SOUTH AFRICA

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Volume: 4

Number: 1

Page: 18 - 26

### Article History:

Received: 2022-10-20

Revised: 2022-12-13

Accepted: 2023-01-17

### Abstract:

The primary purpose of the study is to investigate the relationship between environmental management accounting practices (EMAP) and the financial performance of South African cement and mining companies. To attain the primary objective of the research, three hypotheses were tested based on data from 45 JSE-listed cement and mining companies from 2010 to 2021. Multiple regression analyses with IBM SPSS Statistics 24 were also used to test the hypotheses. The study found that two accounting measures, namely return on assets and net profit margin, had no significant relationship with EMAP. However, the study also revealed that one accounting-based measure, namely returns on equity, had a positive and significant relationship with EMAP. This signifies that EMA is still at its primary stages in South Africa. In addition, the results also suggest that EMA is essential to accomplish sustainability. The results provide managers with empirical evidence of EMAP that increases financial sustainability in an emerging economy such as South Africa.

**Keywords:** Environmental management accounting, environmental management accounting practices, environmental costs, financial performance, South Africa

Cite this as: ANYAHUNA, T.<sup>1</sup>, DOORASAMY M<sup>2</sup> (2022). "The Nexus Between Environmental Management Accounting Practices And Financial Sustainability Of Cement And Mining Companies In South Africa." International Journal of Environmental, Sustainability, and Social Sciences, 4 (1), 18 - 26.



## INTRODUCTION

Environmental issues in literature have mainly been identified as responsible for the financial sustainability of various industrial sectors worldwide. This forces corporate organizations to focus on environmental matters to improve financial sustainability. However, organizations in Sub-Saharan countries such as South Africa have yet to be made aware of how their environmental issues affect financial performance (Nyide, 2019). As a result, these organizations need to give more attention to environmental matters. This partly explains why organizations in developing countries ignore climate change issues. However, various initiatives such as environmental management accounting practices (EMAP) were implemented as vital tools to improve environmental and financial performance.

EMAP can be tools, actions or initiatives adopted by an organization to reduce environmental impacts or improve environmental performance (Dhar, 2021). The impact of EMAP on corporate financial performance has been documented in developed countries, leaving emerging markets such as South Africa less and rarely documented. Conversely, several South African environmental management accounting (EMA) studies (Doorasamy, 2019; Nyahuna & Doorasamy, 2021; Nyide's, 2019) are mainly conceptual or descriptive instead of insightful. This is majorly explained by the fact that EMA is still in its initial stages in developing countries (Fuji et al., 2019). This leaves corporate managers without sufficient empirical proof of the importance of addressing their environmental matters to increase financial performance.

Furthermore, the outcomes of the studies on the relationship between EMAP and financial performance from the various studies in developed countries must be converged. Three groups of results on the same study from the literature review can be found: positive, negative and no or neutral relationship. This leaves a gap in the relationship between EMAP and financial sustainability and calls for further studies (Ong et al., 2020). Hence, Fuzi et al. (2019) contend that the relationship between EMAP and financial performance remains empirically undocumented in developing countries. This suggests that despite EMA improving financial performance, studies on the link between EMAP and financial sustainability in developing countries have yet to receive much attention from scholars.

The cement and mining companies in South Africa remain among the sectors with high negative environmental impacts due to the nature of their operations. Interestingly, the two sectors in South Africa are also facing financial sustainability challenges. Therefore, studying how their EMAP relates to financial performance is essential. In this case, from a practitioner's perspective, the empirical research results will provide suggestions for cement and mining companies' managers to understand the effectiveness of various EMAP on financial performance. In addition, there has been a large number of EMAP available to managers (Iredale et al., 2017) but adopting a "whole set" of EMAP seems impractical due to time and resource availability. In that context, it is anticipated that the outcome of this research will assist managers in making better choices of EMAP and subsequently lead to better financial performance activities.

**METHODS**

**Data Collection.** The study focuses on 12 years from 2010 to 2021, utilizing secondary data only. The data for evaluation were extracted from the annual financial statements of 45 listed cement and mining companies on the Johannesburg Stock Exchange (JSE).

**Sample and population.** The study population involves 45 cement and mining companies listed on the JSE as of December 31, 2021. Gay, Mills and Airasian (2009) suggest that if a target population is less than 100 participants or units, it is best to sample the whole population. Consequently, this study used the whole population of 45 listed cement and mining companies.

**RESULT AND DISCUSSION**

The hypotheses framed in this research are tested with multiple linear regression analysis.

**Hypothesis 1**

Ho: There is a significant relationship between EMAP and financial performance that is proxied by the return on assets of South African cement and mining companies.

**Table 1.** ANOVA table

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	19.957	4	4.875	100.468	.000 <sup>b</sup>
	Residual	.073	535	.001		
	Total	20.030	539			
2	Regression	19.285	7	1.487	61.786	.581 <sup>c</sup>
	Residual	.745	532	.001		
	Total	20.030	539			

- a. Dependent Variable: Return on assets
- b. Predictors: (Constant), Debtratio, Leverage, LogEmployees, LogYears

c. Predictors: (Constant), Debt ratio, Leverage, LogEmployees, LogYears, Log\_EVIRONTRAI, Log\_ENERGYEFF, Log\_ENVIRONAU

The addition of the three EMAP was not significant  $F(7, 532) = 61.786, p = .581$  (insignificant) in their capacity to predict financial sustainability performance (return on assets). This was described to highlight that the observed low improvement emanating from the addition of EMAP into the ROA model could have happened by coincidence. In summary, Table 1 shows that the regression model forecasts the dependent variable (return on assets) significantly well, with  $p < .005$ . This means that the regression model is a good fit for the data.

**Regression coefficient<sup>a</sup>**

**Table 2.** Coefficients of dependent variable: Return on assets

Model	Unstandardized Coefficients		Std. Coefficient	Sig.	Collinearity Statistics	
	B	Std. Error			Tolerance	VIF
(Constant)	.271	.198	-1.252	.002		
Log_EVIRONTRAI	.007	.163	.1737	.631	.6951	1.438
Log_ENERGYEFF	-.471	.043	.152	.877	.5341	1.872
Log_ENVIRONAU	.008	.879	.916	.423	.8981	1.113
Log_YearsonJSE	.084	.834	.374	.234	.5671	1.765
Log_Employees	.031	.997	.775	.876	.6461	1.548
Debt ratio	-.856	3.590	-.838	4.186	.8651	1.156
Leverage	.021	.321	.103	.023	.5491	1.821

a. Dependent variable: Return on assets

The parameters in the ROA model were analyzed. Table 2 displays the coefficients table results from IBM SPSS Statistics 24. It also shows the coefficient from the t-test using a significant value of  $p = .05$ . The coefficient table explains the degree to which “the individual predictor variable contributes to the model” (Mikal *et al.*, 2019).

There is substantial proof that the ROA model has explanatory power ( $p = .002$ ). Table 2 shows that Log\_EVIRONTRAI ( $p = .631$ ), Log\_ENERGYEFF ( $p = .877$ ), and Log\_ENVIRONAU ( $p = .691$ ) were not significant in their capability to predict financial sustainability proxied by ROA; therefore Hypothesis 1 is rejected. This shows that in the summary of the coefficients in Table 2, no individual EMAP significantly predicted a measure of financial sustainability performance. So, it is accepted that there is no statistically significant relationship between EMAP and ROA.

**Hypothesis 2**

Ho: There is a significant relationship between EMAP and financial performance proxied by the net profit margin of South African cement and mining companies.

The addition of the EMAP (the independent variables) into the NPM model failed to achieve a material improvement in the explained variation,  $F(3, 532) = 2.765, p = .340$ . This means that there is an insignificant relationship between the three EMAP and financial sustainability performance (net profit margin).

There was enough evidence that the NPM model had explanatory power ( $p = .004$ ). Table 4 shows the three EMAP (LogENVIRONTRAIN,  $p = .673$ ; LogENERGYEFF,  $p = .634$ ; and LogENVIRONAUD,  $p = .651$ ) were not significant in their aptitude to predict financial sustainability performance (net profit margin). Also, as reflected in Table 3, EMAP could not significantly predict the NPM,  $F(7, 532) = 2024.78$ ,  $p = .340$ . Therefore, Hypothesis 2 is rejected, indicating no significant relationship between EMAP and financial sustainability performance proxied by NPM.

**Table 41.** Coefficients of dependable variable – net profit margin

Model	Unstandardized Coefficients	Std. Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta		Tolerance	VIF
(Constant)	-.309	.031		-1.421	.004	
LogENVIRONTRAIN	.013	.154	.027	1.893	.673	1.638
LogENERGYEFF	.065	.132	.382	1.194	.634	1.702
LogENVIRONAUD	.015	.021	.007	4.783	.651	1.153
LogYearsonJSE	-.003	.494	-.001	-.884	.049	1.665
LogEmployees	.021	.667	.875	-.956	.065	1.658
Debt ratio	.654	1.630	-.938	1.086	.765	1.116
Leverage	-.032	.342	.001	.432	.043	1.023

**Hypothesis 3**

*Ho: There is a significant relationship between EMAP and financial sustainability proxied by the return on equity of South African cement and mining companies.*

**Table 5.** ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	.046	4	.002	5.897	.000
1 Residual	.072	535	.000		
Total	.118	539			
Regression	.034	7	.001	3.543	.013
2 Residual	.084	532	.000		
Total	.118	539			

Once the control variables were added onto the model (i.e., Step 1), the ROE was extremely forecasted by these control variables,  $F(4, 535) = 5.897$ ,  $p < .001$ . The addition of the EMAP (the independent variables) culminated in the improvement in the described difference,  $F(7, 532) = 3.543$ , significant,  $p = .013$ . As well as, the EMAP similarly forecasted significantly after isolating the impacts of the control variables, R-square change = .017,  $F(3, 532) = .843$ ,  $p = .013$ . For the results, the EMAP seems to avail significant extra predictive power further than what is

contributed by the control variables, with additional 1.7% variations in the NPM explained by the EMAP in Table 6.

**Table 6.** Return on equity – Model summary

Model Summary										
Model	R	R-square	Adjusted R-square	Std. The error in the Estimate	R-Square Change	Change Statistics F	df1	df2	Sig. F	Durbin-Watson
1	.629 <sup>a</sup>	.396	.341	.02023	.341	5.8976	4	535	.000	
2	.643 <sup>b</sup>	.413	.294	.02044	.017	.843	3	532	.013	2.165

Note:

- a. Predictors: (Constant), LogYearsonJSE, LogEmployees, Debratio, Leverage
- b. Predictors: (Constant), LogYearsonJSE, LogEmployees, Debratio, Leverage, LogEnvironTra, LogEnviroAud, LogEnergyEffe.
- c. Dependent variable: Return on equity

Table 6 depicts that the EMAP predicted significantly after isolating the impacts of the control variables, R-square change = .017, F (3, 532) = .843, p = .013. Relying on these findings, the EMAP seems to make available significant extra predictive power further than what is contributed by the control variables, with a further 1.7% variation in ROE described by the EMAP.

Based on the results of the three hypotheses tested, two accounting-based measures (ROA and NPM) appear not to relate significantly with the EMAP of the cement and mining companies in South Africa. Only ROE was significantly and positively associated with EMAP in this study. Overall, this study shows a no or neutral relationship between EMAP and financial performance. This suggests that an upsurge in the EMAP cannot affect the financial performance of corporate companies. This means that cement and mining companies in South Africa have to identify and adopt EMAP, which can significantly affect their financial performance. The results seem to imply that not all EMAP employed by the cement and mining companies in South Africa results in measurable material enhancement. This call into scrutiny the strategic standpoint of such activities by the cement and mining companies as there is no significant positive impact on financial performance. This conflicts with the strategic consequence of adopting EMAP and may inhibit the companies from accomplishing their economic responsibility.

Following arguments by Iredale et al. (2017) and the point of view of Ullmann (1985) indicate that the neutral relationship between EMAP and NPM can be attributed to the absence of a generally accepted standard to define EMAP, which may differ from accountants to environmental personnel. In addition, the results further affirm Friedman's (1970) school of thought that any environmental expenditure contradicts the shareholders' interests and leads to weakening a company's performance. Although the overriding perception is that enhanced environmental performance improves a company's financial performance, the proof still needs to be more conclusive.

This finding of no significant relationship between EMAP and financial performance is consistent with studies such as Şimşek and Öztürk (2021), Dhar (2021), Jamil et al. (2020), Iredale et al. (2017), Nyirenda et al. (2013), Kamande and Lokina (2013), Neeveditah et al. (2017), and Mukeredzi (2019) that found no significant relationship between environmental management practices and financial performance.

Theoretical arguments on the no significant relationship can also be made because there is a difference in the timing of benefits and costs of EMAP (Hart & Ahuja, 1996). Hart and Ahuja (1996) note that the delay in attaining economic benefits from environmental initiatives may be ascribed to growing short-term environmental expenditure caused by restructuring in the company. A study of 127 companies listed on the S&P 500 indicates that one to two years are required for environmental performance to positively influence company performance as proxied by ROA and ROE. In such circumstances, it is essential for proper management of the time lags because Dhar (2021) posits that, at times investing in EMAP may not pay back instantly but ought to be beneficial in the upcoming years. This can be because the sampled cement and mining companies have yet to earn benefits from the environmental investment. However, because adopting EMAP is reflected to have some costs, a no significant relationship can only be seen once benefits equal costs. If this is not the case, then companies must ascertain the type of suitable EMAP concerning different stakeholders "because the process of generating profits is complicated by increased environmental costs" (Şimşek & Öztürk, 2021).

Another possible justification for the lack of a relationship between EMAP and financial performance is that EMA needs to be strategically implemented in this sample at a statistically significant level. Inferences are that government regulation in South Africa still needs to be improved for EMA adoption in the cement and mining companies. This suggests that the current EMAP used in the sampled companies needs to be revised to improve profitability as measured by ROA and NPM or EMA is new to the cement and mining companies. Alternatively, cement and mining companies are only starting to participate in EMAP. As a result, Qian et al. (2019) argue that this leads to environmental and financial performance being administered unconnectedly. This implies that environmental initiatives may contribute less to financial performance in such a situation.

## CONCLUSION

The relationship between EMAP and financial performance has been established using data from cement and mining companies in South Africa. This study has been instrumental in documenting the EMAP that best improves financial performance within the cement and mining companies in South Africa. From the research outcome, EMAP seems only significantly and positively related to ROE. This leaves two accounting measures, ROA and NPM, not significantly related to EMAP used in this study. The study has, in a way, contributed to extant literature: the study used data from the cement and mining companies in South Africa to explore the relationship between EMAP and financial performance, which has so far not been undertaken in literature. The repercussion of this study lies in cement and mining companies in South Africa to identify EMAP that helps to increase financial performance instead of using the "whole set" of EMAP. This saves time and resources. Further studies can focus on identifying EMAP in non-listed cement and mining companies.

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