



A Study on the Operationalization of Environmental Management Accounting within Sierra Mineral Holdings Limited in Sierra Leone

Abu Kai Kamara, Eugene Efayomi Pratt

Department of Accounting and Finance, Fourah Bay College, School of Post Graduate Studies, University of Sierra Leone, Freetown, Sierra Leone
Email: postgraduate@usl.edu.sl

How to cite this paper: Kamara, A.K. and Pratt, E.E. (2023) A Study on the Operationalization of Environmental Management Accounting within Sierra Mineral Holdings Limited in Sierra Leone. *Open Access Library Journal*, **10**: e9825.
<https://doi.org/10.4236/oalib.1109825>

Received: January 31, 2023

Accepted: March 28, 2023

Published: March 31, 2023

Copyright © 2023 by author(s) and Open Access Library Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

This study provides an assessment of the operationalization of Environmental Management Accounting (EMA) at Sierra Mineral Holdings Limited in Sierra Leone. Explicitly, this piece of work suggests strategies for the application of environmental management accounting systems practices that have been adopted by the management and how corporate social responsibilities are adopted. The findings of this study indicated that there is a high responsiveness to the importance and effectiveness of environmental management accounting and the application of codes of best practices to environmental practice. However, the government being the regulatory body should require the mining company to have a mitigation plan with clearly mapped out strategies that would be implemented to minimize the misery to endanger species not to be extinct in the near future, and Topography and Noise performance indicators should be closely monitored by the government. The poor performance of the company not having a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level should also be monitored by the government as these factors have the potential to cause serious environmental degradation and will have a negative effect on human lives in the community. The management of Sierra Mineral Holdings Limited should prepare a mitigation plan with clearly mapped-out strategies with deliverable timelines on the Wildlife Protected Areas and Cultural Properties protection; and enhance Topography and Noise indicators to improve the application of the Code of Best Practice and application of Environmental Management Accounting to an acceptable norm.

Subject Areas

Accounting

Keywords

Environmental Management Accounting (EMA), Operationalization, Environmental Stakeholders

1. Introduction

Business organizations may be classified as the “bad players” in climate change as most of the environmental issues are created by their activities, and that is the more reason why these organizations are subjected to growing pressures to reduce the environmental impacts resulting from their economic activities (Qian & Burritt, 2009) [1]. The pressure on firms comes from environmental stakeholders such as legislators, customers, green groups, the community, bankers, shareholders, and acquirers (Medley, 1997 [2]; Schaltegger and Burritt, 2006 [3]) and the pressure is both inside and outside the country which they operate to produce environmentally friendly products (Ismail *et al.* 2014 [4], Eltayeb *et al.*, 2010 [5]); the human factor also causes environmental degradation in the form of deforestation, pollution and carbon emissions resulting to climate change that have a bad effect on living life on earth (Ismail *et al.* 2014) [4]. The pressures from environmental stakeholders on organizations for their activities to be environmentally friendly and environmental sustainability have embedded benefits that include the most common environmental strategic objective of organizations to be compliant with the statutory requirement (Dias-Sardinha & Reijnders, 2001) [6], regulatory bodies, and business case, responding to stakeholder influences and achieving competitive advantage (IFAC, 2005 [7]; Schaltegger and Burritt, 2006 [3]; Doody, 2010 [8]; Ismail *et al.* 2014 [4]).

The operationalization of environmental accounting is beneficial both to internal and external users. The internal users benefit from the operationalization of environmental accounting from the statutory point of view of not being found wanting for not abiding by the rules of environmental safety, which can slam them to penalty if found wanting. The operationalization of environmental accounting will attract consumers to the company’s products; though, it is the company’s corporate social responsibility to keep the environment safe in their operational environment. In the case of the external stakeholders such as the government, community, and consumers, it ensures the safety of the stakeholders as the organization is in compliance with environmental safety. The contribution of companies to a clean environment will bring environmental progress to an economy and society hence; improved environmental performance would induce cost savings and increase sales and thus improve economic performance

(Schaltegger & Synnestvedt 2002) [9].

Environmental costs include both internal and external costs which are connected with environmental determination and protection, as well as environmental costs include all the expenditures required in order to cover the measures meant for environmental protection taken by the economic entity in order to prevent, produce, control, and register within documents those aspects regarding the environment, the impact, and the risk; the same is valid in case of ecological storage, treating or reconstructing. The first step in administrating waste, namely treating polluting emissions, implies modernizations required in order to treat emissions and waste storage. Companies should take responsibility for the negative externalities created by them and have an adverse effect on the environment through environmental degradation and society through health hazards that cause declining health conditions and physical discomfort (Mokhta *et al.* 2016) [10]. The environmental costs include both internal and external costs incurred by companies to mitigate the adverse effect on the environment, and adherence to standards and statutory requirements are expected from companies, otherwise penalties are imposed on companies. Such costs should be internalized and environmental awareness organizational culture, and skills among employees are a fundamental element in achieving eco-efficiency and economic growth (Mokhtar *et al.* 2016) [10]. Management commitment to the implementation of environmental management accounting practice entails the concerted effort of employers and employees to achieve organizational targets and goals (Fuzi *et al.* 2018 [11]; Gunarathne and Lee, 2015 [12]), on the other hand, management commitment involves management engagement in having companies for a clean environment and ensuring its management (Kim *et al.* 2015) [13].

Waste costs have a double meaning; they represent material losses of the technological flow and show the efficiency or inefficiency of the technologies characterized by a productivity type index. Material flows also include water and energy. There is a second category of waste; it includes the cost of waste materials and the equivalent of the capital and labour consumed by such waste. When the economic entity's accounting implements environmental management accounting, two groups of experts work in the field, namely:

- The accounting group (accountants) whose responsibility is to evaluate, survey, and register product sales (input-output), the incomes registered according to cost centers, and acquisition costs (sale prices, internal prices, the calculation of taxes).
- The technological group (technologists) whose responsibility is to elaborate balances for materials, water, energy, waste, and emissions expressed in physical units and as costs, to identify the costs of emissions catching equipment to implement clean technologies, to evaluate the number of labour hours, the operations required in order to distribute costs according to various levels of environment approaching.

Good knowledge of environmental costs may improve the efficiency of a

waste administration policy. Accordingly, the economic entity can direct its decision towards an antipollution measure which, at first sight, may seem more expensive but which proves to be less onerous when employed. When choosing an anti-polluting technology, the savings that regard waste administration should be compared with the whole costs that emerge from adopting the anti-polluting technology. Environmental safety is the safety awareness that enables industries to conduct themselves in a secure environment to improve the company's performance (Fuzi *et al.* 2018 [11], Line and Albrechtsen, 2016 [14]). According to the principal polluter pays, the cost of environmental protection should be included in the price of the product, which leads to a price increase, and if entities in the same field of activity do not implement the same measures regarding the environment, the pioneering entity in environmental protection is less favoured when compared with its competitors as the sale prices of its products are higher (Vasile & Man, 2012) [15].

This article is focused on the operationalization and adherence to Environmental Management Accounting (EMA) at Sierra Mineral Limited. This piece of work also intends to give a detailed description of how the provisions of the Sierra Mineral Limited provide assurances for each constituent of stakeholders.

2. Research Aim Research Objectives and Research Question

2.1. Research Aim

- To determine the level of operationalization and effectiveness of EMA and to identify the Provisions made by the management of Sierra Mineral Holdings to provide adequate assurances to each constituent of stakeholders.

2.2. Research Objectives

- To evaluate the importance and effectiveness of the operationalization of Environmental Management Accounting Systems in Sierra Mineral Holdings Limited.
- To identify the various stakeholders' interests and the provisions made by the management of Sierra Mineral Holdings Limited for each category of stakeholders.
- To suggest strategies for the application of Environmental Management systems in Sierra Mineral Holdings Limited.

2.3. Research Question

What are the implementation strategies of Sierra Mineral Holdings Limited for the operationalization of EMA and what are the provisions made for each category of stakeholder?

3. Research Methodology

The research adopts exploratory and ex-post facto design and benchmarking.

The exploratory design was used to gather relevant materials from existing literature and data such as from related articles, journals, the internet, and the data collected from the Sierra Mineral Holdings Limited records (financial, consultant reports, and management reports). The ex-post factor design was adopted however, does not provide the study the opportunity to control the variables as they have already occurred and cannot be manipulated. The benchmarking process for this research will be as follows: a collection of information from literature and the company (quantitative, and qualitative data), and the analyses of information collected against good practice drawn from the literature this approach will help our understating of establishing gaps between good practice and what the company has done and will inform our conclusion on the operationalization of Environmental Management Accounting within Sierra Mineral Holdings Limited in Sierra Leone.

4. Literature Review

The literature review revealed that sustainability control systems do not only play a role in facilitating top management's execution of sustainability initiatives by promoting sustainability core values and measuring sustainability performance but also by diminishing sustainability strategic risks, mitigating uncertainties associated with sustainability strategies, and acting as a control mechanism to alleviate the agency costs of shareholders (Asiaei *et al.*, 2021 [16]; Arjaliès & Mundy, 2013 [17]; Gond *et al.*, 2012 [18]; Henri & Journeault, 2010 [19]). EMA also supports companies to handle sustainability threats and opportunities and to reduce agency costs by improving the transparency and accountability of operational practices (Asiaei *et al.*, 2021 [16]; Traxler *et al.*, 2020 [20]; Wijethilake, 2017 [21]). The design of environmental accounting is applicable to external and internal users (Vasile & Man, 2012) [15]. Environmental administration requires the appointment of an environmental officer to safeguard legal compliance, and the officer is tasked with the supervision of emission standards, regulations, and formal company internal procedures and protocols (Schaltegger, 2002) [9]. The operationalization of environmental accounting should be seen by organizations that are prone to environmental degradation as a duty of responsibility and not a defensive mechanism as environmental administration stresses the conservation aspect of environmental issues and nature and organizations should not only be seen to adhere to the rules and regulations but should be actors of trustee for nature; the bureaucratic structures and procedures of organizations to operationalize environmental accounting could be reduced if organizations would take a step forward as actors of trustee for the environment (Schaltegger, 2002) [9]. The administration of environmental administration should be part of governance responsibility this includes the senior management and board of directors; the complexity and the setting of goals to achieve environmental responsiveness should be discussed at the governance level of the organization with clearly set targets to be implemented and operationalization of environmental accounting

as the meeting of not only the statutory requirement but seen as actors to prevent the environmental crisis. The senior management should monitor implementation and report to the board of directors (Kirschke & Newig, 2017) [22].

Vasile & Man (2012) [15] in their article titled “Current Dimension of Environmental Management Accounting” stressed protection costs due to the fact that other indicators such as raw materials, waste issuing, and stocking, pollution of environment factors, expenditures, and the like do not really show the value society has to bear but rather indicates the statutory requirement and standard to adhere to. Companies use success factors as a way to garner information requirements, improve the company’s objectives in decision making and measure performance to achieve goals and targets set by the organization. Environmental safety also assists the organization to implement safety in EMAP to improve environmental management (Fuzi *et al.*, 2018) [11]. Critical success factors that might affect the success of Management Accounting Practice (EMAP) have been identified in the body of literature (Fuzi *et al.* 2018 [11]; Gunarathne & Lee, 2015 [12]); these costs are environmental cost; environmental regulation; environmental safety; management commitment; and, focus on customer needs and satisfaction in achieving organizational goals (Mokhtar, 2013) [23]. The different ways of identifying environmental costs are also found in the literature and these costs include production processes, product costs, cost management, and saving identified in the implementation of EMAP and the identification of these costs speedily facilitates the decision-making process (Velasquez *et al.*, 2015) [24]. Petcharat and Mula (2012) [25] in their research state that environmental cost measures the reduction of input materials, energy, and waste in reducing production costs. The environmental cost is one of the key dimensions of EMAP and relates to the practices of environmental management (Fuzi *et al.* 2018) [11]. When organizations are in compliance with environmental safety requirements as laid down by statutory requirements of various governments and international standards will improve environmental safety hence the operationalization of EMAP is related to environmental safety as cited in the literature and employers should ensure that the guidelines and procedures for environmental safety can reduce the effect of environmental issues (Fuzi *et al.* 2018 [11], Taufek *et al.*, 2016 [26]).

The increasing body of knowledge on academic and applied research provides a large number of contributions made to the progression of EMA in developed countries (Asiaei *et al.*, 2021 [16]; Qian & Burritt, 2009 [1]; Deegan, 2003 [27]; Schaltegger & Burritt, 2000 [28]; Bailey & Soyka 1996 [29]; Epstein, 1996 [30]; Schaltegger, Muller & Hindrichsen, 1996 [31]; Tuppen, 1996 [32]). As evidenced in the literature the unabated attention is due to the environmental crisis that the activities of firms (e.g. in the mining and manufacturing) that has created significant financial consequences for various organizations that need to be managed (Asiaei *et al.*, 2021 [16]; Schaltegger & Burritt, 2000 [28]). However, while EMA practices in developed countries have improved as a support mechanism to

manage environmental issues, firms on the African continent are burdened with multiple challenges resulting from environmental degradation and have underutilized the environmental tools (Asiaei *et al.*, 2021 [16]; Nyirenda, Ngwakwe & Ambe, 2014 [33]).

5. Operationalization of Environmental Management Accounting

The environmental management accounting system can be defined as the process of identification, collection, calculations (estimation), analysis, internal reporting, and use of information regarding materials and energy, environmental costs as well as other data regarding costs within the decisional process in order to adopt convenient decisions capable to contribute to environment protection (Vasile & Man, 2012) [15].

The main objective of environmental accounting is to use the data garnered for management decision-making with respect to environmental standards and statutory compliant requirements of stakeholders (customers, government, local community, and the like) and the accounting provides the sustainable development of the activity, the contributions of high level acknowledge on environmental taxes, capital expenditures, and exploitation generated by using certain pollution control equipment (Vasile & Man, 2012) [15]. Environmental costs can be analyzed either from the point of environmental protection or according to their connection with the flux of materials and energy and environmental accounting provides the sustainable development of practices and policies on pollution control, choosing the materials that ensure cost minimization, and looking for possible recycling alternatives (Vasile & Man, 2012) [15].

According to Vasile & Man (2012) [15], there are stages an economic entity should follow in order to operationalize an EMA such as getting the support of top management; defining the limits of the system that is going to be implemented; identifying the significant influences the economic entity exerts upon the environment; determining, according to the case, the already registered forms of impact upon the environment; defining environmental costs; gathering the analysis team; reviewing the existing accounting system; identifying the opportunities of profit or savings (expenditure cuts) which are not considered yet; issuing proposals regarding the modification of the existing accounting system; testing the system of environmental management accounting. Three aspects should be considered to determine the most efficient methods of implementing environmental accounting that should be embedded in the routine activities of an organization; these activities include identifying the significant issues regarding the environment, that the economic entity wants to quantify through cost associations (environmental cost objects); identifying relevant data in order to include these objects within costs; defining the systems of collecting those data.

The identification and collection of accurate physical and financial data en-

hance the decision-making process within the economic entity and the same is true for data collection for EMA decision-making as it increases efficiency and improves the management approach in carrying out businesses. Environmental accounting provides additional information to the management by identifying and quantifying measures such as obligations associated with the significant influences exercised upon the environment; the cost of legal stipulations in the field; the benefits (or cost savings) achieved as a result of implementing the environmental management systems; the economic advantages of other initiatives (an increase of efficiency and improvement in carrying out businesses) (Vasile & Man, 2012) [15].

Vasile & Man (2012) [15] in their research identify the benefits that come along with the implementation of environmental management accounting that can either be direct or indirect:

- the decisional process is the beneficiary of improved informational support: the separate registering of environmental costs (which are hidden by the classical accounting systems) is going to determine the improvement of data provided to decisional staff and consequently influence profitability increase;
- improving price policy;
- support during the process of data reporting: the identification of environmental costs supports the economic entities in collecting data about the environmental impact which is required by internal/external reports;
- new opportunities are discovered: while the analysis of environmental costs can identify new opportunities, they may be employed for making savings through resources recycling or re-using them for other activities;
- increase of competitive advantage: due to the incipient stage of development of environmental management accounting, its use, and proper advertising may determine a competitive advantage of a certain economic entity;
- improvement of the economic entity's image: the efforts meant to decrease environmental costs represent a valuable image capital;
- attracting and motivating the staff: it is generally considered that in case an economic entity tries to evaluate the effects its operations have upon the environment, it attracts better-qualified employees; as a result, it will be the beneficiary of a highly motivated staff;
- social benefits: the efforts of diminishing costs and the influences upon the environment (that are going to create a 'cleaner environment') will generate benefits for the entire mankind.

Quantifying costs under environmental accounting is quite different from the approach used under the traditional method of accounting that classify costs according to materials and direct labour, indirect production expenditures, distribution costs, administration general costs, and research/development costs (Vasile & Man, 2012) [15]. On the contrary, the aim of identifying environmental costs is to unravel hidden costs or improperly allocated ones due to traditional

methods, evaluate them, and distinctly report them as being different from the other types of costs and such costs are losses determined by the deterioration or the inefficient use of raw materials and materials, of utilities (water, energy, natural resources), by the diminished use of non-regenerating resources, by the decrease of the costs required by normative documents (costs determined by the publishing of planning data, taxes, employees training expenditures, to mention but few) (Vasile & Man, 2012) [15]. If organizations could understand the pressure coming from the environmental stakeholders to be environmentally friendly and to pursue environmental sustainability as a motivation that is legislative or market-based motivations (Gray & Walters, 1993) [34] to protect the environment (legislative and implementation of best codes practice) and a source of additional revenue streams and cost-saving opportunities for an organization (Coltman, 1994 [35]; Bennett *et al.*, 2002 [36]; Schaltegger and Burritt, 2006 [3]; Doody, 2010 [8]; Godschalk, 2010 [37]; Lee, 2011 [38]) then business organizations in the mining, manufacturing and firms whose activities have an effect on the environment would embarrass the implementation of activities that lead to green climate. Theoretical evidence within the management accounting literature, reveals that companies are oriented toward adapting design that is consistent with strategic directions and priorities such as sustainability initiatives (Asiaei, *et al.*, 2021) [16]. The exception in the operationalization of EMA is that most organizations do not take into account the costs incurred nor the benefits that may come along with being an actor in minimizing environmental degradation (Vasile & Man, 2012) [15].

The prime concern of ISO 14001 is the handling of environmental management systems. Business organizations that are to be effective in the management and handling of environmental issues should understand the details of ISO 14001 as it is designed to introduce environmental improvement in the entire organization's operations and enable organizations to incorporate environmental issues into the corporate decision-making process (Ismail *et al.* 2014) [4]. There are benefits to be derived by business organizations that are ISO 14001 certified organizations such as improvement in environmental performance (Ann & Wahid 2006) [39] minimization of waste, conservation of energy and water, and enhancement of corporate image (Bansal and Bogner, 2002) [40], reduction in environmental risks and incidents, and compliance of legislation (Cassells, Lewis and Findlater, 2011) [41].

Corporate environmentalism is of both theoretical and practical importance, and understanding its determinants and consequences has been the subject of considerable research in the past two decades (Asiaei *et al.*, 2021) [16]. Business organizations should not only rely on their intangible assets such as know-how, networks, procedures, and information systems but should endeavour to develop public natural resources through their actions, such as environmental protection (Lopez-Gamero *et al.*, 2011 [42]; Massaro *et al.*, 2018 [43]; Asiaei *et al.*, 2021 [16]) and be in tandem in recognitions with tangible or intangible assets as the

alignment between environmental resources and appropriate use of management accounting systems facilitates the management of green resources as well as supports the achievement of strategic objectives by mitigating risks and uncertainties, which in turn results in enhancing sustainability performance (Asiaei *et al.*, 2021 [16]; Wijethilake, 2017 [21]).

6. An Evaluation of the Importance and Effectiveness of the Environmental Management Accounting Systems in Sierra Mineral Holdings Limited (SMHL)

The benchmarking analysis explains the qualities and competencies that good environmental management accounting systems should have. It was easy to measure the performance of a mining company as its main objective is to maximize profit. To determine how important and effective the environmental management accounting principles are, the study made an assessment of the areas that Sierra Mineral Holdings Limited (SMHL) is compliant with and where they are not compliant, and we made an evaluation of the compliance level by attaching scores that totaled to one for each category given in **Table 1**.

The evaluation was made using the criteria in **Table 1** such as Topography, Geology, Air, Noise, Surface Water, Visual Resources, Accidental Release of Sludge from TSF, Wildlife Protected Areas and Cultural Properties, Borrow Pits and Quarry Sites, and Flora and Fauna. The analysis in **Table 1** indicated an above-average rating of 70.50 percent, an equivalent of 253.8 degrees. However, a vital indicator of Wildlife Protected Areas and Cultural Properties rating is very low at 1 percent, and Topography and Noise rated at 60 percent respectively. This is a clear indication that the environmental community in which Sierra Mineral Holdings Limited does its mining activities is prone to disaster and environmental degradation in the long run. Wildlife Protected Areas and Cultural Properties are far below an acceptable rating that may render the mining activities of Sierra Mineral Holdings Limited a misery to endanger species and be extinct in the near future; this singular act of Sierra Mineral Holdings Limited should render their mining activities invalid. The continuity in the operations of Sierra Mineral Holdings Limited will depend on the clearly mapped out strategies on how the Wildlife Protected Areas and Cultural Properties indicator would be managed and enhanced; in addition, improvement on the performance indicators of Topography and Noise as the overall rating for the two indicators is weak.

Table 1 indicates the summarized scores analyses and reflecting the extent of the Application of the Code of Best Practice at Sierra Mineral Holdings and further interpreted in the graph. **Figure 1** indicates a high rating of 70.50% an equivalent 253.8 degrees but does not guarantee the environmental safety in the community; as a vital indicator of Wildlife Protected Areas and Cultural Properties rating is very low at 1 percent, and in addition Topography and Noise rated at 60 percent respectively.

Table 1. The extent of the application of the code of best practice at sierra mineral holdings (SMHL).

| No. | Criteria | Compliant (Yes) | Compliant (No) | Total | Comments |
|-----|--|-----------------|----------------|-------|--|
| 1 | Topography | 0.6 | 0.4 | 1 | Reclaimed mined-out areas. Reclaim stockpile areas. Use designated roots in wet seasons. |
| 2 | Geology | 0.8 | 0.2 | 1 | Separation of super soil from subsoil during removal. Proper grading and reshaping of the disturbed. |
| 3 | Air | 0.7 | 0.3 | 1 | Dust Suppression in the Dry season, Provision of masks to employees in dusty areas, Reduce speed limits. |
| 4 | Air | 0.6 | 0.04 | | Future facilities with high noise impacts should be located well away from noise-sensitive areas. |
| 5 | Surface Water | 0.85 | 0.15 | 1 | Waste oil, fuel, and other lubricants should be stored in strong containments. |
| 6 | Visual Resources | 0.75 | 0.25 | 1 | Impoundment dams should be rehabilitated to meet international standards. |
| 7 | Accidental Release of Sludge from TSF | 0.90 | 0.01 | 1 | Rehabilitation, development, and implementation of the Tailings Management Plan coupled with a regular inspection program. |
| 8 | Wildlife Protected Areas and Cultural Properties | 0.01 | 0.90 | 1 | Not Frequently used. |
| 9 | Borrow Pits and Quarry Sites | 0.85 | 0.15 | 1 | The pits should be closed up immediately after use Quarry sites must be included in mines closure and reclamation plans |
| 10 | Flora and Fauna | 0.9 | 0.01 | 1 | Prompt mine reclamation activities in the mined-out areas should be enhanced.. |
| | Total | 7.05 | 2.95 | 10 | (Approximation) |
| | In Percentage | 70.50% | 29.50% | 100% | (Approximation) |
| | In Degrees | 253.8 | 106.2 | 360 | (Approximation) |

Source: Developed by the researchers from TEDA report November 2021 [44]. Key to Table Analysis: A checklist was used to score The Extent of the Application of the Code of Best Practice at Sierra Mineral Holdings (SMHL) as indicated below: 100% = Complete adherence to the criterion of the Code of Best Practice. 70% - 90% = Incomplete adherence to the criterion of the Code of Best Practice though the performance rating is at an acceptable level. 60% - 50% = Weak Adherence to the criterion of the Code of Best Practice criterion. 40% - 50% = Unacceptable Adherence to the criterion of the Code of Best Practice criterion. 0 = Non Adherence to Adherence to the criterion of the Code of Best Practice criterion.

Achievements in Environmental Management Accounting at Sierra Mineral Holdings Limited (VIMETCO SL LIMITED)

The achievements of Sierra Mineral Holdings Limited in Environmental Management Accounting are analyzed in **Table 2**.

The achievements of Sierra Mineral Holdings Limited in Environmental Management Accounting were mentioned against the following targets: Policies,

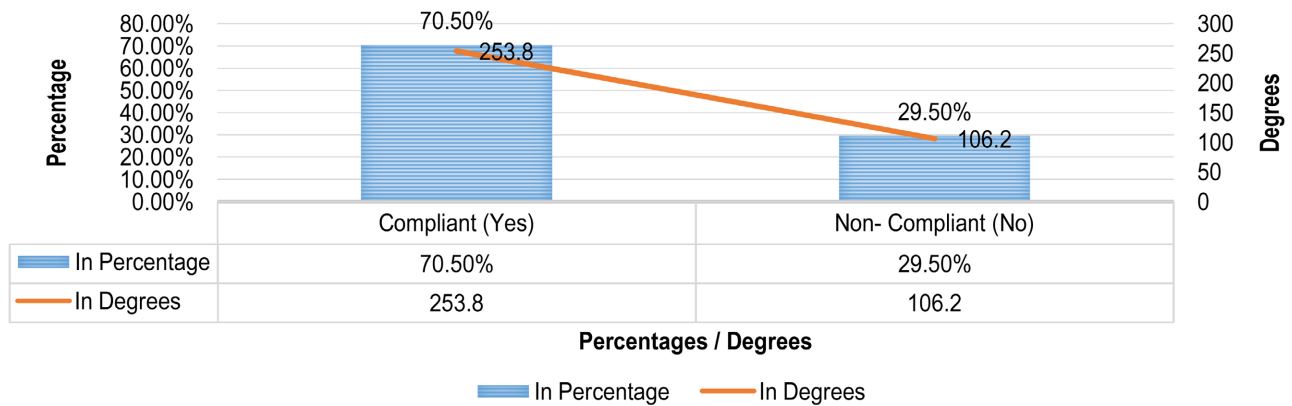


Figure 1. Compliant/Non compliant graph. Source: Developed by the researchers.

Plans & Procedures, Targets, Environmental Management Systems, Monitoring & Documenting Performance, Health & Safety indicators, Resource Management, Environmental Performance Indicators, Emission Controls & Reduction, Environmental Expenditures, and Incidents & Remediation. The company scored very good grades in most of the targets used to evaluate the company's performance in Environmental Management Accounting with an overall grade of 80%, an equivalent of 288 degrees, however, performed poorly on Environmental Management Accounting Systems and Emission Controls and Reduction. The poor performance of the company in these two fundamental targets shows the clear breakdown in the handling of EMA as the company does not have a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level and the emissions reduction is not been properly handled by the company; these breakdowns in the EMA requires the immediate attention of the board of directors and management to put strategies in place that would reduce emission to a tolerable level and implementation to be effected by management and government been the regulatory body perform the monitoring to ensure the implementation is done at an acceptable standard. The company not having a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level will cause serious environmental degradation and will have a negative effect on human lives in the community.

Figure 2 shows the summary of the overall achievement of Sierra Mineral Holdings Limited in the handling of Environmental Management Accounting practice/systems and reflects an impressive achievement of EMA at an overall rating of 80% and the equivalent of 288 degrees however, the company not having a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level will cause serious environmental degradation and will have a negative effect on human lives in the community and may truncate economic growth if resource which may have been used by the government for instant in agriculture is used in the future on the health system strengthening as a result of environmental degradation that impacted negatively

Table 2. Achievements in environmental management accounting at sierra mineral holdings limited (Vimetco SL) Limited.

| NO. | Target | Achievements Yes (1) | No (0) | Total | Objectives |
|-----|---|-------------------------|--------|-------|--|
| 1 | Policies, Plans, and Procedures | 1 | | 1 | To create structured environmental management policies, plans, and procedures |
| 2 | Targets | 1 | | 1 | To set targets that are Specific, measurable, Attainable, Realistic, and time-bound. |
| 3 | Environmental Management Systems | | 0 | 0 | To have a well-coordinated environment system in place |
| 4 | Monitoring & Documenting Performance | 1 | | 1 | To ensure that there is adequate monitoring and documentation of performance |
| 5 | Health & Safety indicators | 1 | | 1 | To give guidance on all health and safety matters |
| 6 | Resource Management | 1 | | 1 | To ensure that resources are fully utilized and well managed |
| 7 | Environmental Performance Indicators | 1 | | 1 | To ensure that both financial and non-environmental performance indicators are used |
| 8 | Emission Controls and Reduction | | 0 | 0 | To control and reduce emissions to a tolerable level |
| 9 | Environmental Expenditures | 1 | | 1 | To properly classify environmental expenditures |
| 10 | Incidents & Remediation | 1 | | 1 | The aim of this is to put in place adequate preventive and corrective measures |
| | Total | 8 | 2 | 10 | |
| | In Percentage | 80% | 20% | 100 | Approximation |
| | In Degree | 288 | 72 | 360 | Approximation |

Source: Developed by researchers. Key to Table Analysis: A checklist was used to score the achievements in Environmental Management Accounting at Sierra Mineral Holdings Limited as indicated below: 1 = Complete adherence to the criterion of EMA. 2 = Incomplete adherence to the EMA criterion though the performance rating is at an acceptable level. 3 = Weak Adherence to the EMA criterion. 0 = Non Adherence to EMA criterion and no information provided.

on human lives in the mining environments/communities of Sierra Mineral Holdings Limited.

7. 1 Impact on Stakeholders

A stakeholder is defined as “any group or individual who can affect or is affected

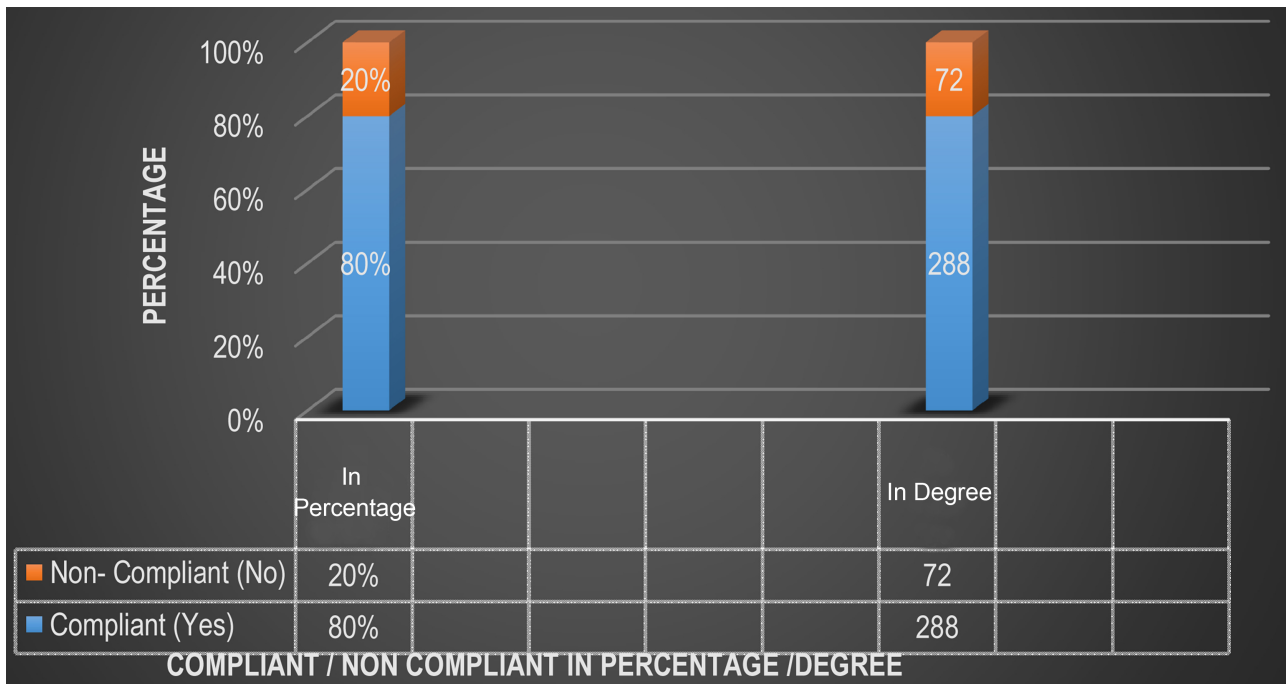


Figure 2. EMA summary achievements scores. Source: Developed by the researchers.

by the achievement of an organization's objectives" (Freeman, 2015) [45]. Organizational capabilities that foster cooperation and environmental learning are a critical part of stakeholder engagement (Roome and Wijen, 2005 [46]; Clarke and Roome 1999 [47]). Sierra Mineral Holdings has both internal and external stakeholders and its impact from mining activities on them is as follows:

Government: The government serves as the sole regulator for Sierra mineral holdings limited and all other firms within the extractive industries. The government's interest is to ensure that Sierra Mineral Holdings are compliant with the relevant laws & regulations and for them to meet their statutory obligations. The board of directors through the senior management ensures that adequate provisions are provided by ensuring that Sierra Mineral Holdings Limited is fully compliant with all the relevant laws and regulations by producing various yearly reports to the regulator and meet obligations that give permits or rights to mining. The operations of the company may have a negative effect on the government in the near future if the company does not put in place a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level will cause serious environmental degradation and will have a negative effect on human lives in the community and may truncate economic growth; as the resources which may have been used by the government for an instant in agriculture are used in the future on the health system strengthening as a result of environmental degradation that impacted negatively on human lives in the mining environments/communities of Sierra Mineral Holdings Limited. In addition, the company management of Topography and Noise and Wildlife Protected Areas and Cultural Properties is far below an acceptable rating which may

render the mining activities of Sierra Mineral Holdings Limited a misery to endanger species and be extinct in the near future and pose a threat to human lives; this singular act of Sierra Mineral Holdings Limited should render their mining activities invalid by the government except the management of the company should ensure that all compliance requirements and obligations by the government are fully met and strategies put in place and implemented to mitigate the negative impact on living lives in the environment.

Communities: The Communities want a fair and equitable share from Vi-metco SL Limited by meeting their corporate and social responsibilities. The community also wants their safety and will like to have priority for employment at Sierra Mineral Holdings Ltd. The board of directors through senior management ensures that since November 2012, the company has been financing community development initiatives within the purview of Sierra Mineral holdings foundation and also giving priority to locals in terms of job facilities. The board of directors through senior management has also ensured that the Sierra Mineral agency has reconstructed and resurfaced all roads in the lease area, and has continued to invest in the maintenance of local roads. (TEDA: Environmental Consultant, 2012, pg. 6) [44]. However, the environmental degradation caused by the company through the weak handling of topography and Noise and the company not having a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level will also cause serious environmental degradation and will have a negative effect on human lives in the community; the safety of the community is at risk. Although 1% of sales revenue is paid to the community development fund and it is controlled by community leaders is in no way a near compensation for the abnormalities in environmental management.

Management: The interest of management is to ensure that there is value for money in its service delivery. To achieve this management, have to make timely decisions to ensure efficiency is achieved. The general manager ensures control and direction flow from top to bottom as shown in the organization structure to give targets as a benchmark and ensure management decisions are approved.

Employees: The main interest of the employees is to ensure that their condition of service is attractive and there are staff-enhancing facilities. General Manager provides an exciting work environment where employees are given the opportunity to exhibit their individual talent and bring new initiative and experience to achieve team objectives. Also, the SMHL encourages employees' interest, passion, commitment, desire to learn, and enthusiasm to face challenges. (TEDA: Environmental Consultant, 2012) [44], Management provides a strong code of conduct and also ensures staff members are fully motivated to effectively work in an enabling environment. However, the environmental degradation caused by the company through the weak handling of topography and Noise and the company not having a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level will also cause serious

environmental degradation and will have a negative effect on human lives in the community including the employees.

Banks: The bank wants to provide banking services to Sierra Mineral Holding Ltd because mining companies maintain huge account balances. Their main interest is to make a profit through commissions and interests on deposits. Four commercial banks are used to provide banking services to the Sierra mineral holdings including the Sierra Leone commercial bank. General Managers can safeguard the company's interest by ensuring that their arrangements with the various banks are documented through the signing of a Memorandum of Understanding that provides a Going Concern assurance and is regularly revised and their services retained. The general manager should also ensure that the financial statements explain its going concern status which will give the banks assurance for continuity.

Suppliers: The suppliers want Sierra Mineral Holding Limited to supply them Alum with raw materials for a production activity that can bring out quality production of Aluminum to supply to the global market and the general manager in turn provides supplies to its main supplier in Romania with superior quality that can provide both primary and processed aluminum. The bauxite mines in Sierra Leone on the other hand supply all the necessary raw materials for the Romanian operations and the company provides assurance of supplying superior and quality products that can compete with international standards.

8. Suggest Strategies for the Application of Environmental Management Systems in Sierra Mineral Holdings Limited

Environmental Management Accounting (EMA) is a form of accounting that involves the dissemination of environmental information (known as environmental costs) such as quantities of waste produced, radiation levels discharged, carbon emissions released and the like to support internal decision-making within a corporation (Wachira and Wang'ombe, 2019 [48]; Schaltegger, Hahn, & Burritt, 2000 [49]).

We recommend that the company have a mitigation plan in place and clearly map out strategies for the implementation of environmental codes of best practice and the implementation of environmental accounting systems and adapt the theoretical stages in the operationalization of environmental accounting practice or systems. A theoretical review revealed that there are stages an economic entity should follow in order to operationalize an EMA such as getting the support of top management; defining the limits of the system that is going to be implemented; identifying the significant influences the economic entity exerts upon the environment; determining, according to the case, the already registered forms of impact upon the environment; defining environmental costs; gathering the analysis team; reviewing the existing accounting system; identifying the opportunities of profit or savings (expenditure cuts) which are not considered yet; issuing proposals regarding the modification of the existing accounting system;

testing the system of environmental management accounting. In addition, there are three aspects that should be considered to determine the most efficient methods of implementing environmental accounting that should be embedded in the routine activities of an organization; these activities include identifying the significant issues regarding the environment, that the economic entity wants to quantify through cost associations (environmental cost objects); identifying relevant data in order to include these objects within costs; defining the systems of collecting those data. (Vasile & Man, 2012) [15].

9. Conclusion

The analyses in **Table 1** focused on the extent to which Sierra Mineral Holdings applied the Code of Best Practice to environmental management practice; the analyses indicated an above-average rating of 70.50 percent, an equivalent of 253.8 degrees. However, a vital indicator of Wildlife Protected Areas and Cultural Properties rating is very low at 1 percent, and Topography and Noise rated at 60 percent respectively. This is a clear indication that the environmental community in which Sierra Mineral Holdings Limited does its mining activities is prone to disaster and environmental degradation in the long run. Wildlife Protected Areas and Cultural Properties are far below an acceptable rating that may render the mining activities of Sierra Mineral Holdings Limited a misery to endanger species and be extinct in the near future; this singular act of Sierra Mineral Holdings Limited should render their mining activities invalid. The continuity in the operations of Sierra Mineral Holdings Limited will depend on the clearly mapped out strategies on how the Wildlife Protected Areas and Cultural Properties indicator would be managed and enhanced. In addition, improve on the performance indicators of Topography and Noise as the overall rating for the two indicators is weak. On the other hand, the analyses in **Table 2** focused on the Achievements in Environmental Management Accounting at Sierra Mineral Holdings Limited. The company scored very good grades in most of the targets used to evaluate the company's performance in Environmental Management Accounting with an overall grade of 80%, an equivalent of 288 degrees, however, it performed poorly on Environmental Management Accounting Systems and Emission Controls and Reduction. The poor performance of the company in these two fundamental targets shows the clear breakdown in the handling of EMA as the company does not have a well-coordinated environment system in place and the control systems to reduce emissions to a tolerable level has not been handled properly by the company; these breakdowns in the EMA requires the immediate attention of the board of directors and implementation to be effected by management and government been the regulatory body perform the monitoring to ensure the implementation is done at an acceptable standard. The company not having a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level will cause serious environmental degradation and will have a negative effect on human

lives in the community.

The government being the regulatory body should require the mining company to have a mitigation plan with clearly mapped out strategies that would be implemented to minimize the misery to endanger species not to be extinct in the near future and Topography and Noise performance indicators should be closely monitored by the government. The poor performance of the company not having a well-coordinated environmental system in place and the control systems to reduce emissions to a tolerable level should also be monitored by the government as these factors as the potential to cause serious environmental degradation and will have a negative effect on human lives in the community and may truncate future economic growth if resource which may have been used by the government for an instant in agriculture is used in the future on the health system strengthening as a result of environmental degradation that impacted negatively on human lives in the mining environments/communities of Sierra Mineral Holdings Limited.

The management of Sierra Mineral Holdings Limited should prepare a mitigation plan with clearly mapped-out strategies with deliverable timelines on the Wildlife Protected Areas and Cultural Properties, Topography and Noise indicators to improve the application of the Code of Best Practice and application of Environmental Management Accounting to an acceptable norm.

Future research focuses their research on the impact of Sierra Mineral Holdings Limited activities on human lives, Wildlife Protected Areas, and Cultural Properties.

Research relating to Management Accounting (MA) has been quite considerable and cuts across different industries and different countries (Pedroso and Gomes, 2020 [50]; Ahmad and Zabri, 2015 [51]). In a nutshell, the EMA provides benefits such as providing information that contributes to the achievement of cleaner production and value chain management, helps strategic decision-making decisions at different levels of the organization that depends on environmental performance indicators that are physical and financial in nature and this information can be provided by maintaining a resilient environmental practice of environmental systems; and EMA can be a common approach to provide data derived from financial and cost accounting for key purposes, including increased material efficiency, reduced level of hazardous emissions to the environment, and decreased environmental protection costs (Thabit & Ibraheem, 2019) [52]. The achievement of these benefits requires commitment on the part of senior management and the core values of environmental management should be inculcated into the employees of the business organization and should be the responsibility of senior management and be monitored by management and environmental stakeholders (Muhammad & Iqbal, 2019 [53]; Tzempelikos, 2015 [54]).

Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Qian, W. and Burritt, R. (2009) The Development of Environmental Management Accounting: An Institutional View. In: Schaltegger, S., Bennett, M., Burritt, R.L. and Jasch, C., Eds., *Environmental Management Accounting for Cleaner Production, Eco-Efficiency in Industry and Science*, Vol. 24, Springer, Berlin, 233-248.
https://doi.org/10.1007/978-1-4020-8913-8_12
- [2] Medley, P. (1997) Environmental Accounting—What Does It Mean to Professional Accountants? *Accounting, Auditing & Accountability Journal*, **10**, 594-600.
<https://doi.org/10.1108/09513579710180833>
- [3] Schaltegger, S. and Burritt, R. (2006) *Contemporary Environmental Accounting*. Greenleaf Publishing, Sheffield.
- [4] Ismail, M.S., Ramli, A. and Darus, F. (2014) Environmental Management Accounting Practices and Islamic Corporate Social Responsibility Compliance: Evidence from ISO14001 Companies. *Procedia-Social and Behavioral Sciences*, **145**, 343-351.
<https://doi.org/10.1016/j.sbspro.2014.06.043>
- [5] Eltayeb, T.K., Zailani, S. and Jayaraman, K. (2010) The Examination on the Drivers for Green Purchasing Adoption among EMS 14001 Certified Companies in Malaysia. *Journal of Manufacturing Technology Management*, **21**, 206-225.
<https://doi.org/10.1108/17410381011014378>
- [6] Dias-Sardinha, I. and Reijnders, L. (2001) Environmental Performance Evaluation and Sustainability Performance Evaluation of Organizations: An Evolutionary Framework. *Eco-Management and Auditing*, **8**, 71-79.
<https://www.researchgate.net/publication/227763367>
<https://doi.org/10.1002/ema.152>
- [7] International Federation of Accountants (IFAC) (2005) *International Guidance Document: Environmental Management Accounting*. IFAC, New York.
- [8] Doody, H. (2010) *Environmental Sustainability: Tools and Techniques*. The Society of Management Accountants of Canada. The American Institute of Certified Public Accountants, and the Chartered Institute of Management Accountants.
- [9] Schaltegger, S. and Synnestevedt, T. (2002) The Link between 'Green' and Economic Success: Environmental Management as the Crucial Trigger between Environmental and Economic Performance. *Journal of Environmental Management*, **65**, 339-346.
<https://doi.org/10.1006/jema.2002.0555>
- [10] Mokhtar, N., Jusoh, R. and Zulkifli, N. (2016) Corporate Characteristics and Environmental Management Accounting (EMA) Implementation: Evidence from Malaysian Public Listed Companies (PLCs). *Journal of Cleaner Production*, **136**, 111-122.
<http://www.elsevier.com/locate/jclepro>
<https://doi.org/10.1016/j.jclepro.2016.01.085>
- [11] Fuzi, N.M., Habidin, N.F., Janudin, S.E. and Ong, S.Y.Y. (2018) Critical Success factors of Environmental Management Accounting Practices: Findings from Malaysian Manufacturing Industry. *Measuring Business Excellence*, **23**, 1-14.
<https://doi.org/10.1108/MBE-03-2018-0015>
- [12] Gunarathne, N. and Lee, K.-H. (2015) Environmental Management Accounting (EMA) for Environmental Management and Organizational Change. *Journal of Accounting & Organizational Change*, **11**, 362-383.
<https://doi.org/10.1108/JAOC-10-2013-0078>
- [13] Kim, H.J., Park, J. and Wen, J. (2015) General Managers' Environmental Commitment and Environmental Involvement of Lodging Companies: The Mediating Role of Environmental Management Capabilities. *International Journal of Contemporary*

- Hospitality Management*, **27**, 1499-1519.
<https://doi.org/10.1108/IJCHM-01-2014-0011>
- [14] Line, M.B. and Albrechtsen, E. (2016) Examining the Suitability of Industrial Safety Management Approaches for Information Security Incident Management. *Information and Computer Security*, **24**, 20-37. <https://doi.org/10.1108/ICS-01-2015-0003>
- [15] Vasile, E. and Man, M. (2012) Current Dimension of Environmental Management Accounting. *Procedia- Social and Behavioral Sciences*, **62**, 566-570.
<https://www.sciencedirect.com>
<https://doi.org/10.1016/j.sbspro.2012.09.094>
- [16] Asiaei, K., Bontis, N., Alizadeh, R. and Yaghoubi, M. (2021) Green Intellectual Capital and Environmental Management Accounting: Natural Resource Orchestration in Favor of Environmental Performance. *Business Strategy and the Environment*, **31**, 76-93. <https://www.researchgate.net/publication/353926128>
<https://doi.org/10.1002/bse.2875>
- [17] Arjaliès, D.-L. and Mundy, J. (2013) The Use of management Control Systems to manage CSR Strategy: A Levers of Control Perspective. *Management Accounting Research*, **24**, 284-300. <https://doi.org/10.1016/j.mar.2013.06.003>
- [18] Gond, J.P., Grubnic, S., Herzig, C. and Moon, J. (2012) Configuring Management control Systems: Theorizing the Integration of Strategy and Sustainability. *Management Accounting Research*, **23**, 205-223.
<https://doi.org/10.1016/j.mar.2012.06.003>
- [19] Henri, J.F. and Journeault, M. (2010) Eco-Control: The Influence of Management control Systems on Environmental and Economic Performance. *Accounting, Organizations and Society*, **35**, 63-80. <https://doi.org/10.1016/j.aos.2009.02.001>
- [20] Traxler, A.A., Schrack, D. and Greiling, D. (2020) Sustainability Reporting and Management Control—A Systematic Exploratory Literature Review. *Journal of Cleaner Production*, **276**, Article ID: 122725.
<https://doi.org/10.1016/j.jclepro.2020.122725>
- [21] Wijethilake, C. (2017) Proactive Sustainability Strategy and Corporate Sustainability Performance: The Mediating Effect of Sustainability Control Systems. *Journal of Environmental Management*, **196**, 569-582
<https://doi.org/10.1016/j.jenvman.2017.03.057>
- [22] Kirschke, S. and Newig, J. (2017) Addressing Complexity in Environmental Management and Governance. *Sustainability*, **9**, Article 983.
<https://doi.org/10.3390/su9060983>
- [23] Mokhtar, S.S.M. (2013) The Effects of Customer Focus on New Product Performance. *Business Strategy Series*, **14**, 67-71.
<https://doi.org/10.1108/17515631311325132>
- [24] Velasquez, S., Suomala, P. and Järvenpää, M. (2015) Cost Consciousness: Conceptual Development from a Management Accounting Perspective. *Qualitative Research in Accounting & Management*, **12**, 55-86.
<https://doi.org/10.1108/QRAM-07-2013-0029>
- [25] Petcharat, N.N. and Mula, J.M. (2012) Towards a Conceptual Design for Environmental and Social Cost Identification and Measurement System. *Journal of Financial Reporting and Accounting*, **10**, 34-54.
<https://doi.org/10.1108/19852511211237435>
- [26] Taufek, F.H.M., Zulkifle, Z. and Kadir, S.Z.A. (2016) Safety and Health Practices and Injury Management in Manufacturing Industry. *Procedia Economics and Finance*, **35**, 705-712. [https://doi.org/10.1016/S2212-5671\(16\)00088-5](https://doi.org/10.1016/S2212-5671(16)00088-5)

- [27] Deegan, C. (2003) Environmental Management Accounting: An Introduction and Case Studies for Australia. Institute of Chartered Accountants in Australia, Melbourne.
- [28] Schaltegger, S. and Burritt, R. (2000) Contemporary Environmental Accounting: Issues, Concepts & Practice. Greenleaf Publishing, Sheffield.
- [29] Bailey, P. and Soyka, P. (1996) Environmental Accounting—Making It Work for Your Company. *Environmental Quality Management*, **5**, 13-30.
<https://doi.org/10.1002/tqem.3310050404>
- [30] Epstein, M. (1996) Measuring Corporate Environmental Performance: Best Practices for Costing and Managing an Effective Environmental Strategy. Irwin Professional Publishing, Chicago.
- [31] Schaltegger, S., Muller, K. and Hindrichsen, H. (1996) Corporate Environmental Accounting. Wiley, Chichester.
- [32] Tuppen, C. (1996) Environmental Accounting in Industry: A Practical Review. British Telecommunications, London.
- [33] Nyirenda, G., Ngwakwe, C.C. and Ambe, C.M. (2014) Environmental Management Practices and Firm Performance in a South African Mining Firm. *Managing Global Transitions*, **11**, 243-260.
- [34] Gray, R., Bebbington, J. and Walters, D. (1993) Accounting for the Environment. 1st Edition, Paul Chapman Publishing, London.
- [35] Coltman, M.M. (1994) Hospitality Management Accounting. Van Nostrand Reinhold, New York.
- [36] Bennett, M., Bouma, J.J. and Wolters, T. (2002) Environmental Management Accounting: Informational and Institutional Developments. Kluwer Academic Publishers, Dordrecht.
- [37] Godschalk, S.K.B. (2008) Does Corporate Environmental Accounting Make Business Sense? In: Schaltegger, S., Bennett, M., Burritt, R.L. and Jasch, C., Eds., *Environmental Management Accounting for Cleaner Production, Eco-Efficiency in Industry and Science*, Springer Netherlands, Dordrecht, 249-265.
https://doi.org/10.1007/978-1-4020-8913-8_13
- [38] Lee, K.-H. (2011) Motivations, Barriers, and Incentives for Adopting Environmental Management (Cost) Accounting and Related Guidelines: A Study of the Republic of Korea. *Corporate Social Responsibility and Environmental Management*, **18**, 39-49.
<https://doi.org/10.1002/csr.239>
- [39] Ann, G., Zailani, S. and Wahid, N. (2006) A Study on the Impact of Environmental Management System (EMS) Certification towards Firms' Performance in Malaysia. *Management of Environmental Quality*, **17**, 73-93.
<https://doi.org/10.1108/14777830610639459>
- [40] Bansal, P. and Bogner, W.C. (2002) Deciding on ISO 14001: Economics, Institutions, and Context. *Long Range Planning*, **35**, 269-290.
[https://doi.org/10.1016/S0024-6301\(02\)00046-8](https://doi.org/10.1016/S0024-6301(02)00046-8)
- [41] Cassells, S., Lewis, K. and Findlater, A. (2011) SMEs and ISO 14001 Adoption: A New Zealand Perspective. *Small Enterprise Research*, **18**, 19-32.
<https://doi.org/10.5172/ser.18.1.19>
- [42] López-Gamero, M., Zaragoza-Sáez, P., Claver-Cortés, E. and Molina-Azorín, J. (2011) Sustainable Development and Intangibles: Building Sustainable Intellectual Capital. *Business Strategy and the Environment*, **20**, 18-37.
<https://doi.org/10.1002/bse.666>

- [43] Massaro, M., Dumay, J., Garlatti, A. and Mas, F. (2018) Practitioners' Views on Intellectual Capital and Sustainability: From a Performance Based to a Worth-Based Perspective. *Journal of Intellectual Capital*, **19**, 367-386. <https://doi.org/10.1108/JIC-02-2017-0033>
- [44] TEDA: Environmental Consultants (2012) Sierra Mineral Holdings Limited in Sierra Leone Internal. Sierra Leone Bauxite Project. TEDA Environmental Consultant.
- [45] Freeman, E. (1984) Strategic Management: A Stakeholder Approach. Cambridge University Press. <https://doi.org/10.1017/CBO9781139192675>
- [46] Roome, N. and Wijen, F. (2005) Stakeholder Power and Organizational Learning in Corporate Environmental Management. *Organization Studies*, **27**, 235-263. <https://doi.org/10.1177/0170840605057669>
- [47] Clarke, S. and Roome, N. (1999) Sustainable Business: Learning-Action Networks as Organizational Assets. *Business Strategy and the Environment*, **8**, 296-310. [https://doi.org/10.1002/\(SICI\)1099-0836\(199909/10\)8:5<296::AID-BSE212>3.0.CO;2-N](https://doi.org/10.1002/(SICI)1099-0836(199909/10)8:5<296::AID-BSE212>3.0.CO;2-N)
- [48] Wachira, M.M. and Wang'ombe, D. (2019) The Application of Environmental Management Accounting Techniques by Manufacturing Firms in Kenya. In: Tauringana, V., Ed., *Environmental Reporting and Management in Africa*, Vol. 8, *Advances in Environmental Accounting & Management*, Emerald Publishing Limited, Bingley, 69-89. <https://www.researchgate.net/publication/324087385> <https://doi.org/10.1108/S1479-359820190000008004>
- [49] Schaltegger, S., Hahn, T. and Burritt, R. (2000) Environmental Management Accounting: Overview & Main Approaches. Center for Sustainability Management, Lueneburg. http://fox.leuphana.de/portal/files/1199114/Schaltegger_Hahn_Burritt.pdf
- [50] Elsa, P. and Carlos, F. (2020) The Effectiveness of Management Accounting Systems in SMEs: A Multidimensional Measurement Approach. *Journal of Applied Accounting Research*, **21**, 497-515. <https://doi.org/10.1108/JAAR-05-2018-0059>
- [51] Ahmad, K. and Zabri, S.M. (2015) Factors Explaining the Use of Management Accounting Practices in Malaysian Medium-Sized Firms. *Journal of Small Business and Enterprise Development*, **22**, 762-781. <https://doi.org/10.1108/JSBED-04-2012-0057>
- [52] Thabit, T.H. and Ibraheem, L.K. (2019) Implementation of Environmental Management Accounting for Enhancing the Sustainable Development in Iraqi Oil Refining Companies. *Proceedings of 3rd Scientific Conference of Administration and Economic College*, University of Anbar, Anbar, March 2019, 12. <https://www.researchgate.net/publication/337486442>
- [53] Muhammad, A. and Iqbal, C.N. (2019) Linking Environmental Strategy to Firm Performance: A Sequential Mediation Model via Environmental Management Accounting and Top Management Commitment. *Pakistan Journal of Commerce and Social Sciences (PJCSS)*, **13**, 849-867.
- [54] Tzempelikos, N. (2015) Top Management Commitment and Involvement and Their Link to Key Account Management Effectiveness. *Journal of Business & Industrial Marketing*, **30**, 32-44. <https://doi.org/10.1108/BJIM-12-2012-0238>