European Journal of Social Sciences Studies
ISSN: 2501-8590
ISSN-L: 2501-8590
Available on-line at: www.oapub.org/soc

DOI: 10.46827/ejsss.v8i1.1897 Volume 8 | Issue 1 | 2022

THE STUDY OF CAUSES AND EFFECTS OF COST CATEGORIZATION ON ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) AT SIERRA MINERAL HOLDINGS LIMITED IN SIERRA LEONE

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Abstract:
This research focused on the study of causes and effects of cost categorisation on Environmental Management Accounting (EMA) at Sierra Mineral Holdings Limited in Sierra Leone. Specifically, this study serves as a continuation of the previous article on environmental management accounting in volume one. It focused on the present environmental cost paid to produce environmental reports, developing a compliance strategy, and also taking a critical look at the use of knowledge management systems in environmental management accounting. The study made use of probabilistic sampling and a research design that caters to both primary and secondary data. The researcher made use of descriptive design surveys, and in addition, conducted interviews to obtain the required data for the research. This piece of work used business models like Ishikawa Model also known as the Fishbone diagram to analyze and interpret data. The findings of this study revealed that there is high compliance from Sierra Mineral Holdings Limited with payment on costs to produce environmental reports. The study developed an imaginary cause, and effects and came up with possible solutions to build a compliance strategy for Sierra Mineral Holdings Limited as they do not have an internal audit department. This study also discusses how a knowledge management system will improve performance in an organization.

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Keywords: compliance strategies, knowledge management systems, Ishikawa model, Fishbone analysis, environmental impact assessment, Environmental Management Accounting (EMA)

1. Introduction

Environmental Management Accounting (EMA) has been described as a support tool for managers to make informed decisions about their environmental impacts beyond its boundaries. It helps management to identify win-win solutions that improve economic and environmental performance (Burritt, Schaltegger & Christ, 2021).

Environmental Management Accounting (EMA) deals with the internal decision-making related to the environmental performance of the organization (Vinayagamoorthi *et al.*, 2012). Hence, different types of management accounting and control tools have been designed and implemented to improve the measurement and management of corporate environmental performance and information (Qian *et al.* 2017). Research indicates that the fundamental role of accounting with a focus on management accounting is an invaluable tool in supporting environmental accounting (Ariffin, 2016; Contrafatto & Burns, 2013). Although the literature on the application of EMA has shown that it is likely to bring cost-saving opportunities; most organisations do have an environmental management accounting system in place. It is therefore advisable for organisations to use other environmental tools in compliance with the environmental legislation in consonance with their environmental aims and objectives (Gale, 2006).

The establishment of conventional accounting systems such as management accounting can be used to establish sustainability accounting in organisations (Schaltegger *et al.*, 2006). EMA is a prime example of recent innovation in management accounting that represents this development. Sustainable development has increasingly become part of the objectives of many organisations, leading to greater adoption and use of EMA systems (Figge *et al.*, 2002). EMA constitutes an important part of sustainability accounting (Schaltegger *et al.*, 2006) and is an important instrument for organisations that aim to minimize the total costs or environmental costs and mitigate the environmental impact of their activities, products, and services (Hyrslova and Hajek, 2006 p. 455). However, the increasing importance of EMA is not only limited to environmental management decisions but to all types of routine management activities, such as product and process design, cost allocation and control, capital budgeting, purchasing, product pricing, and performance evaluation (Staniskis, 2006).

Sustainability development is a topical issue that companies have to reckon with; hence companies that embrace sustainability development are likely to be in the good books of "green customers" and will also maintain a good reputation for their products (Tsui, 2014). Research has indicated that financial accounting does not fully support sustainable development as the specific accounting rules are highly regulated and applied accordingly. This to some extent has made it difficult to present environmental costs accurately; hence, to address the limitations of management accounting,

environmental management accounting (EMA) was developed (Tsui 2014). In addition, there are suggestions in the literature that the inherent limitation of conventional management accounting practice is the main challenge that restrains the adoption of EMA in following environmental strategies (Gunarathne & Lee, 2015; Lee, 2011; IF AC, 2005; Gray *et al.,* 1993; Burritt, 2004; Burnett and Hansen, 2008).

The misuse of natural resources and the environment has become the biggest problem facing the world such as truncated economic growth and sustainable development (Chichan *et al.*, 2021). However, there is an increasing awareness among all the stakeholders about the importance of the corporate social responsibility of the firms, especially in green concepts. The environment-related information informed decision-making both internally and externally decision-making of the organization. Hence, the collaborative role of government and companies is vital to enhance environmental sustainability; other key stakeholders such as employees and management attitudes with respect to environmental management and performance are paramount in achieving co-efficiency and economic growth (Mokhtar *et al.*, 2016).

This paper aims to provide a brief description of the development of environmental management accounting, provide basic background on the various costs to produce environmental reports, and also develop a compliance strategy for the assessment of the various risks associated with environmental issues.

In addition, this piece of work reviewed the annual cost paid to the government of a leading mining company to make an assessment of the company's performance and to evaluate how its environmental costs to produce environmental are reported. Furthermore, as stated in the previous article or volume one of this article, the researchers noticed that the said company does not have an internal audit department that should have dictated the internal audit functions, a compliance strategy was developed by the researchers to provide possible solutions for each problem identified. The researchers also discussed how knowledge management systems can be used to aid performance in an organization.

2. Aims Objectives and Methodology

2.1 Aim

To establish the increasing role and importance of EMA and its effect on compliance strategy development to minimize risk and the use of knowledge management to improve performance in environmental management accounting.

2.2. Objectives

- To investigate and evaluate the various costs of environmental reports
- To assess the various risks that affect EMA practices by developing a compliance strategy.

- To evaluate how Knowledge Management Systems can be used to improve an organization's performance in areas relating to Environmental Management Accounting.
- To identify the various environmental costs paid to produce an environmental report.

3. Methodology

To achieve the aims and objectives of the research, the study made use of probabilistic sampling and a research design that caters to both primary and secondary data. The researcher made use of descriptive design surveys, and in addition, conducted interviews to obtain the required data for the research.

3.1 Categories of Environmental Accounting

This section discusses the cost of producing environmental reports and the report on cost details paid to the government of Sierra Leone for the period 2013 to 2018. The first article published focused on conventional and contingent costs (Kamara *et al.*, 2016) but this piece of work will discuss the various costs of producing environmental reports.

3.2 Cost of Producing Environmental Reports

The cost of producing environmental reports is referred to as the cost of reporting environmental performance. From the records inspected, we noticed that Sierra Mineral Holdings Ltd is producing various reports to various stakeholders. In other to produce such reports, some monetary obligations must be met. Firstly, Stage seven of the checklist for the issuance of Environmental impact assessment licenses gives guidance on the terms and conditions for such licenses should be issued (Environmental Protection Agency Act. 2010).

Based on the information garnered during the research, the researchers developed a table that gives details about the cost paid to the government and other stakeholders of Sierra Mineral Holdings Limited from 2013 -2018.

Table 1: Report on Cost Paid to the Government of Sierra Leone

Report on Expenses to Governments Fy 01 – 019	**$**	**$**	**$**	**$**	**$**	**$**
Description	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
Sierra Leone Maritime Administration	256,565	517,176	594,762	659,489	759,246	878,063
Nectar Sierra Leone Bulk Terminal	171,044	344,784	177,012	351,776	404,928	468,305
Royalty NRA	502,502	1,151,279	1,289,943	1,532,312	1,808,337	2,022,383
Community Development Fund	168,817	383,760	429,981	510,771	602,779	674,128
The National Minerals Agency, Mining lease	500,000	522,712	550,050	550,000	550,000	550,000

The Environmental Protection Agency (EPA)	178,076	182,111	182,507	186,822	187,536	166,752
National Mineral Agency, Exploration licenses	37,606	155,775	74,056	35,420	124,383	88,884
Surface rent	123,170	128,033	161,820	143,542	183,155	136,277
Crop Compensation	62,090	187,308	235,761	260,305	311,289	376,433
Corporate Tax NRA	-	-	-	747,753	2,183,795	2,368,578
Sub Total	**1,999,869**	**3,572,936**	**3,695,890**	**4,978,189**	**7,115,449**	**7,729,802**

Source: Developed by the Researchers.

Organizations that practice EMA principles are extremely aware of the significance of the environmental impact of an entity's operations when assessing risk. On the contrary, conventional/ traditional costing methods fail to disclose these environmental-related costs. The main reason underlying these incomplete disclosures is the fact that these costs are hidden as Overheads, Operational costs, and administrative costs. This will prevent managers and other stakeholders from making informed decisions in terms of budgeting and forecasting. With the introduction of EMA practices, managers can use such information easily and accurately to make accurate decisions relating to environmental costs.

4. Compliance Strategies

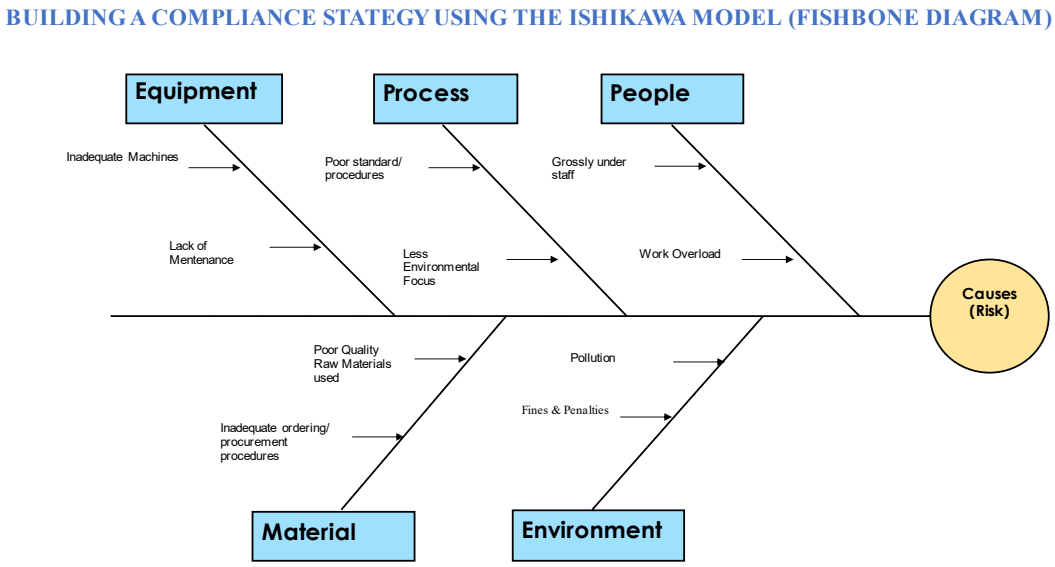
This section will discuss a business model that will be used to develop a compliance strategy on EMA and give assurance on the internal control processes. The researcher will use the Ishikawa diagram to build a compliance strategy.

4.1. Using Ishikawa Diagram to Aid Compliance within Sierra Mineral Holdings Limited

Ishikawa Diagram is also called the fishbone diagram or causes and effect diagram (Hayes, 2021). A compliance strategy was developed by the researchers to assist Sierra Mineral Holdings Limited in looking at the root causes and effects of each category of the fishbone analysis and to come up with a possible solution. The causes and effects section are made up of six categories namely equipment, process, people, material, environment, and management.

Although we have highlighted the problems (causes) with environmental management accounting using a fishbone analysis in the fishbone diagram as in Figure 1, it will be prudent we discuss the effects and suggest possible solutions for each problem.

Figure 1: Fishbone Diagram for Vimetco Sl Limited



Source: Developed by Researchers, June 2021.

Table 2 provides the various categorizations, problems identified, and the effects of these problems; hence, we were able to proffer suggested solutions to the environmental management accounting risks identified.

Table 2: Solution to the Environmental Management Accounting Risk

Categories	Problems	Effect	Solutions
People	Grossly under staff	Ineffectiveness	Redeployment /Employment of required skilled personnel
	Work overload	Reduced productivity/Fatigue	Redeployment of required skilled personnel
Process	Poor standards or procedures	Inconsistencies within the system	Improvements to manual (SOP)
	Less environmental focus	causing a lot of damage to the environment	Environmental focus
Equipment	Inadequate machines for environmental works	under production	Provision of required plant and equipment
	Lack of maintenance	frequent breakdown	Improved maintenance culture
Material	Poor quality raw materials used	Unreliable results from field operation	A tolerable level set for quality control of material usage
	Inaccurate ordering/procurement procedures	Substandard material used	Enforcement of Procurement instructions/manuals
Environment	Pollution	Negative publicity /Health hazards	Set tolerable emotion level

	Fines and penalties	Increased operational costs	Improves compliance with environmental requirements
Management	No internal audit department	Lack of monitoring of adherence to internal controls and regulatory requirements	Setup an internal audit department
	High possibility of not complying with environmental laws	Penal actions	The Board of Directors should ensure that an internal audit department is established

Source: Developed by Researchers, July 2021.

4.2 Knowledge Management Systems (KMS) in EMA

Knowledge Management Systems will aid management in recording challenges on environmental-related and environmental-driven costs. It is believed by many professionals and academics that knowledge is the key source for a company that wants to gain a competitive advantage in this modern world. (Zouari and Dakhli, 2018). Even though there are various definitions, in a nutshell, a Knowledge Management System generally refers to how organizations create, retain, and share knowledge. (Zouari and Dakhli, 2018).

This article focused on the use of a Knowledge Management System in Environmental Management Accounting and how KMS can help aid performance in Environmental Management Accounting within an organization. Firstly, on its use, it can be a springboard to channel all previous incidents for future use. It will help to reduce reputational costs as it will always provide a repository that can be easily referenced to avoid previous occurrences or mistakes. This will aid performance in reducing customers' complaints or even losing intellectual capital. If customers are satisfied, revenue will increase.

Another important area will be environmental failure cost as these are costs that are incurred after discharging waste into the environment. Knowledge Management systems can be useful to guide management on how to prevent such and also provide guidelines on how to discharge waste into the environment. This will reduce regulatory fines from the government and reduce the risk of losing contracts from greener organizations and that will also lead to boycotts and also loss of important suppliers.

In essence, even if significant employees leave an organization, the risk of losing information will be completely avoided as there will always be a repository to be referenced. This will also guide employees to follow best practices as each process is documented and the system can also propose various alternatives.

5. Conclusion

The various costs of producing environmental reports were analyzed to ensure eligibility for an Environmental impact assessment license. This environmental impact assessment

license can only be issued by the Environmental Protection Agency in Sierra Leone if an entity has paid or made satisfactory arrangements with all the listed stakeholders.

To aid compliance, a fishbone analysis was developed by the researcher that focused on the cause, and effect, and possible solutions were suggested. The piece of work also discussed how knowledge management systems will be used to improve performance in environmental management accounting practices.

These policies will lead to a successful reporting structure in environmental management accounting within Sierra Mineral Holdings Limited in Sierra Leone.

The limitation of this work is that it was focused on Sierra Mineral Holdings Limited in Sierra Leone a mining company, it should have been prudent if a comparative study was done on different mining companies from various African countries to gain an understanding of the effectiveness of environmental management accounting.

This research did not investigate the collaborative role of government and companies in enhancing environmental sustainability and the role of other key stakeholders such as employees and management attitudes with respect to environmental management and performance which are paramount in achieving co-efficiency and economic growth. We recommend future research on the role of key stakeholders in enhancing environmental sustainability in the context of Sierra Leone. A comparative study on the effectiveness of Environmental Management Accounting (EMA) on different mining companies from various African countries to gain an understanding of the effectiveness of environmental management accounting is also recommended for future research.

All the tools used in this study were randomly selected to answer the research objectives and aim. However, a similar tool can be used to answer different research questions in another research on environmental management accounting.

Conflict of Interest Statement

This research is free from conflict of interest and has no anticipated ethical issues.

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