GREAT ZIMBABWE UNIVERSITY

SCHOOL OF COMMERCE

DEPARTMENT OF ACCOUNTING AND INFORMATION SYSTEMS

THE EFFECT OF ENVIROMENTAL MANAGEMENT ACCOUNTING PRACTICES ON PERFORMANCE OF MINING COMPANIES. CASE OF BINDURA MINING COMPANIES.

BY

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A DESERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE MCOMM DEGREE IN APPLIED ACCOUNTING

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PROGRAMME:	Master of Commerce in Applied Accounting
YEAR GRANTED:	2023

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DECLARATION

I, Misheck Mutara do hereby declare that this research project is the result of my own investigation, and that it has not been submitted in part or in full to any other university except Great Zimbabwe University. The researcher guarantees that the information within this write-up was obtained ethically. I further declare that I obtained the necessary authorisation and consent to carry out this research study.

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DEDICATION

It is with sincere appreciation that I dedicate this research to my lovely wife Nandy Rudo Mutara and our kids. I salute you for being the best family.

ACKNOWLEDGEMENTS

It is with a humble heart that I acknowledge the faithfulness of the Lord in the fulfilment of his word in my life, that he started a marvellous work in my life, and with grace, has brought it unto completion. I acknowledge the unmerited grace. I extend my deep gratitude to my supervisor Dr L Chimwai for the untiring support and suggestions he gave me throughout the preparation of this project. I could not have produced this dissertation without his constructive guidance. Your efforts will always be appreciated. God bless you.

Special thanks goes to my wife Nandy Rudo Mutara and kids who have never gave up on me and whose support and words of encouragement were always ringing in my mind. I also acknowledge the unwavering support I received sometimes undeservedly from my manager Mr O Nhimura and for allowing me time to research. Thank you General Manager.

ABSTRACT

This research was set up to investigate the effect of environmental management accounting practices on performance of mining companies operating in Bindura. The study objectives were to identify environmental management accounting practices employed by mining firms, establish the roles of environmental management accounting practices, and identify limitations on the adoption of EMAPs and to assess the relationship of environmental management accounting practices on environmental performance (EP) and on return on investment (ROI). Mixed method research strategy which blends characteristics of both quantitative and qualitative research design were used. Data was collected from a sample of 61 participants using questionnaires and interviews as data collection instruments. Descriptive statistics and inferential statistics analysis tools were employed. Data analysis and presentation employed the convenience of MS Excel packages. The research concluded that mining companies mainly use environmental budgeting, environmental capital appraisal and environmental performance tools in their mining processes and activities. Further, the investigation established that EMAPs are mainly used for compliance to regulatory authorities, for external reporting, for environmentalism decision making and less for strategic reasons. It also concluded that EMAPs improves environmental performance (EP) and ultimately financial performance. To the primary beneficiaries the research study suggested that mining firms should embrace EMAPs as part of strategic management process so that they maximise from benefits associated with adoption of EMAPs. The research also recommended that the Central government should consider designing fiscal incentive policies to encourage more investment in environmentalism. Furthermore, educational institutions were recommended to develop an environmental management accounting framework and all stakeholders have been challenged to develop an environmental management accounting curriculum. Lastly, Media has been recommended to stimulate public interest in environmentalism for it is anticipated that public interest pressure groups activism will accelerate the speed on adoption of environmental management accounting practice.

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LIST OF ACRONYMS

ACCA	Association of Certified Chartered Accountants
CSR	Corporate Social Responsibility
EBT	Environmental Budgeting Techniques/Tools
ECAT	Environmental Capital Appraisal Tools
ECT	Environmental Costing Techniques/Tools
EMA	Environmental Management Accounting
EMAPs	Environmental Management Accounting Practices
EMRAZ	Environmental Management and Regulatory Authority of Zimbabwe
EP	Environmental Performance
EPMT	Environmental Performance Measurement Tools
EPPT	Environmental Product Pricing Techniques/Tools
GHG	Greenhouse Gases
GZU	Great Zimbabwe University
ILO	International Labour Organisation
MAPs	Management Accounting Practices
NGO	Non-Governmental Organisation
ROI	Return on Investment
SHE	Safety, Health and Environment
UN	United Nations
UNICEF	United Nations International Children's Emergency Fund
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency for International Development
ZSE	Zimbabwe Stock Exchange

CHAPTER I

INTRODUCTION AND BACKGROUND

1.1 Introduction

Environmental problems require collective action from international organisations such as United Nations (UN), national governments, the donor community, individuals and companies. The reason for collective action is mainly because, environmental related challenges are capable of terminating existence of both fauna and flora (Bennett & James, 2017). The role of the mining firm is going to be the focus of the study particularly in relation to the adoption of environmental management accounting practices. Chapter one will outline the background of the study and explain the problem in the statement of the problem section. It will establish the objectives and the associated research questions and hypothesis pivoting the whole research. The section will also justify the research study, delimit the scope of the study as well as explain the limitations of the research.

1.2 Background of the study

The world is under the threat of extinction due to problems emanating from environmental damages. Environmental problems are mainly triggered and exacerbated by irresponsible human activities (Bodansky & Daniel, 2013). Human activities include inter alia the emissions of refuse in water bodies, emissions of Greenhouse Gases (GHG) into the atmosphere which are emitted deliberately or incidentally during production processes. These GHG and other refuse emissions cause a chain of environmental problems and some of these problems are so disastrous that they may lead into human extinction on mother earth. Some of these environmental challenges are depletion of the ozone layer among many of these problems (Karimi, Dastgir, & Saleh, 2017). Ozone depletion allows the ultra-violet rays which were prevented from reaching humanity by the ozone layer. Ultra-violet rays cause life threatening diseases such as cancers.

On the other hand, GHG are blamed for causing problems associated with climate changes such as increased incidences of cyclones, acid rain, prolonged hot seasons, glaciation which may lead to the submergence of other parts of nations and islands as sea water levels rise (Wei-

Lun & Yan-Kai, 2019). Nations such as Barbados, Mozambique, are under the threat of climatic induced problems which are related to environmental damages. Zimbabwe is also not spared as it had already experienced environmental induced problems in different forms (Plowes, 2002). In the year 2000, Zimbabwe was ravaged by its first major cyclone called Eline, which destroyed homes, farmland and other infrastructure such as dams, roads and bridges (Zimbabwe, 2000). The cyclone also left many people homeless particularly those living in low lying areas. Furthermore, another cyclone related flooding occurred in the South Eastern districts of Zimbabwe which includes Chimanimani and Chipinge killing people, destroying roads, bridges, buildings and homes (Konrad Adenauer Stiftung , 2020). Many people were killed in this unfortunate event leading into a humanitarian problem. Those who survived the cyclone were left without food and shelter.

In all these environmental problems mining companies are also involved partly as perpetrators and also as potential game changers to these environmental problems. In the process of extracting minerals from the earth surface or underground mining companies are inevitably involved in damaging and contaminating the environment (Chukwudi et al, 2016). They open up mining shafts, creating big holes and craters which are dangerous to humans, animals and also disturbs the sustainable natural ecosystems. Furthermore, the processing of minerals requires dangerous chemicals, such as cyanide, mercury, and many of these chemicals which contaminate water bodies including dams, lakes and even underground water through the processes of infiltration and percolation (Chaudhry, Humaira , Muhammad , & Hussian, 2020). The contamination of water bodies will make it very costly to purify the water and ultimately unclean water will end up being consumed by animals and people without adequately being treated. Aquatic life is also threatened due to refuse released in dams and rivers.

Problems associated with environmental damage and profitability can be potentially addressed if companies employ environmental management accounting practices (EMAPs). A study conducted by Hasniza and Malcolm (2013) in Turkey revealed a strong positive impact of EMAPs on company's performance using the balanced scorecard framework from data gathered from 197 manufacturing firms. Hutahayan (2020) indicated that EMAPs promotes innovation and also revealed that innovation does not need substantial changes to processes. Sometimes it may only require little changes to the current arrangements (Chaudhry, Humaira , Muhammad , & Hussian, 2020). For example little adjustments on processing, waste reduction and minimisation of costs. Adopting environmental innovation on strategy may result in

internal processes improvement. Hasniza and Malcolm (2013) reiterated that if entities introduced new environmental management practices in their processes they gain competitive advantages over their rivals (Hutahayan, 2020). Firms with superior competitive advantage are highly innovative and generally it is complex to imitate their competitive advantage. As a result these firms enjoy long run benefits by adopting EMAPs (Gomez-Conde et al., 2019; Reed, 2012; Saeidi et al., 2018).

Even if companies are not comfortable with adopting EMAPs, it is inevitable for they are compelled by international environmental conventions, legislation and pressure groups. Many countries in an effort to reverse and mitigate environmental challenges, have joined and are part of climate and environmental change conventions. The environmental and climate change conventions give guidelines on how nations can intervene by enacting laws, regulations and policies to reverse environmental problems and to promote friendly sustainable environmental measures and practices. Zimbabwe is a member of these environmental conventions since 1992 (United Nations, 2019). As a result, the countries environmental laws are administered through the environmental Act and are enforced by the Environmental Management Authority of Zimbabwe. Thus, companies are supposed to comply with environmental laws when operating their businesses. Failure to comply will result in heavy fines. Naturally, the mining companies due to the nature of their operations, are compelled to comply with many of these environmental laws, rules and policies so that they avoid costs associated with non-compliance.

It is unfortunate that most of the companies only comply with these laws to avoid costs associated with environmental damage, without consideration of the potential benefits which may be derived in pursuing green manufacturing (O'Neill, 2017). Many of these companies including mining firms, do not necessarily integrate environmental management accounting practices (EMAP) in their accounting system in what is generally called green accounting. It is believed that firms which integrate environmental management accounting practices (EMAPs) in its accounting systems stacks competitive advantage over its rivals (Chaudhry, Humaira , Muhammad , & Hussian, 2020). EMAPs are envisaged to be important in exposing environmental costs and revenues. The exposition of environmental costs and revenue will add another dimension of information which will improve decision making particularly in reducing environmental costs and exploitation of opportunities derived from adopting EMAPs.

Opportunities derived from EMAPs may present themselves in the form of investing in technologies which minimises and enhance efficient production. Secondly, firms may leverage on the growing trend on customers who prefer products and services of green compliant firms (Otekunrin, Samu, Sifile, & Matowanyika, 2021). Unfortunately, few firms had taken this approach to dealing with environmental problems. Even the few entities which have adopted environmental accounting they do so only to comply with environmental reporting requirements of governments and not for strategic purposes. Many firms which are reluctant in adopting environmental management accounting practices view environmental costs as a cost which does not have a direct return to the firm and as a result defeats the economic objective of business that of profit maximisation (UNIDO, 2019).

In addition even those who require to adopt environmental management accounting practices, cannot do so because of inadequate information pertaining to environmental management accounting practices. It is behind the background of the potential capability to address the economic objective of business to make profit, and addressing social ill of environmental damage posed by mining firms. Because of that the researcher seeks to establish whether EMAPs in an attempt to solve environmental problems they simultaneously improve financial performance of mining firms.

1.3 Statement of the problem

Profit maximisation is the primary economic objective of any business (USAID; 2019). Addressing environmental related problems is viewed by many firms, and particularly mining companies as an unnecessary cost (Onyinyichi AB et al, 2017). Environmental costs are perceived to cause unnecessary costs and therefore firms strive to avoid them where possible. They only assume environmental costs and obligation only to the extent of complying with international environmental laws, government laws, regulations and policies. In contrast to this cost averse approach, few researches have been dedicated to investigate the potential capability of EMAPs in both addressing environmental ills and financial performance (Kaplan Financial Limited, 2019). Furthermore, there is a growing trend by customers to buy goods from environmentally friendly firms and as such there is a potential of increasing market research for firms adopting EMAPs. It is against this background that the researcher is interested in investigating whether the adoption of EMAPs is capable of concurrently reducing environmental problems and at the same time improving financial performance of mining firms

1.4 Purpose of the study

The main purpose of this study is to determine the influence of environmental management accounting practices on improving financial performance because business in general is driven by economic motive.

1.5 Research objectives

1. To identify environmental management accounting practices employed by mining firms
2. To establish the roles of management accounting practices
3. To determine the reasons for adopting EMAPs
4. To identify the limitations on the adoption of EMAPs
5. To assess the relationship of environmental management accounting practices (EMAPs) with financial performance.

1.6 Research questions

1. What are the environmental management accounting practices employed by mining firms?
2. What are the roles of management accounting practices to mining firms?
3. What are the reasons for adopting EMAPs?
4. Which factors limit the adoption of environmental management accounting practices?
5. What is the relationship between the adoption of management accounting practices and ROI?

1.7 Statement of hypotheses

The hypothesis is based on the research question 4:

H0: The adoption of management accounting practices does not increase ROI

H1: The adoption of environmental management accounting practices increases ROI

1.8 Significance of the study

1.8.1 To Mining Firms

The research study is fundamentally very important in motivating mining firms to adopt EMAPs especially for internal decision making. Nyamwanza (2014) posits that financial resources and policy engineering might not be adequate for successful mining entities unless they are equipped with strategic management and performance evaluation skills. Sound strategic management and performance evaluation skills are a product of management accounting practices (MAPs). Environmental management accounting practices (EMAPs) is an offshoot of MAPs. EMAPs are the tools which provide the information necessary for the development of strategies and for performance evaluation particularly in relation to environmental management.

The research study will also assist to build entities which will play a prominent role in environmental management and economic development and drift mining from the perspective of viewing environmental management issues as costs which must be avoided at all costs (Maduekwe, 2015). Careful adoption and use of EMAPs can potentially play a substantial role in positioning mining firms on a strategic footing which can stack competitive advantages over its rivals.

1.8.2 To Government and Policymakers

Insights to be derived from the application of EMAPs in the current research investigation, are most likely to contribute towards the development of sustainable environmental management policies which will benefit the economic objectives of mining entities and most importantly mitigate and reduce the environmental degradation facing humanity. It will enlarge the body of knowledge benefiting policy makers such as the Government, Ministry responsible for environment and mining as well as other stakeholders.

1.8.3 To the University

The study will also be of particular interest particularly to scholars and students.

1.8.4 To the student

The student will benefit immensely since the research study will help the researcher to achieve a higher qualification in Masters of Commerce in Applied Accounting. Furthermore, it will expand the researcher's knowledge and understanding of EMAPs in relation to mining entities.

1.9 Assumptions

- That EMAPs adopted by all listed mining firms sampled for this study reflect the general features of EMAPs applicable to all mining firms to enhance generalisability.
- That for the purpose of the study, it is assumed that research participants' views on EMAPs and performance evaluation will adequately reflect the actual situation.
- The researcher assumes that the data gathering techniques (questionnaires) are very efficient to extract desired outcomes.

1.10 Scope of the study

The study was delimited to mining firms operating in Bindura. Furthermore, the study focused on only the period stretching from 2012 to 2022. The period is sufficient enough to evaluate environmental management accounting practices adopted by all listed firms operating in Bindura. The participants of the research investigation will be limited to executive management and staff employed in departments involved in accounting and environmental management.

1.11 Limitations of the study

- The major limitation of this study is expected to be related to sensitivity of the data gathered which potentially may expose non-compliance of the mining companies to environmental laws, regulations and policies. To mitigate the potential denial by participants, to provide the required data the researcher will reassure the participants by explaining that the research will only be used for academic purposes. Furthermore, if there is any need to disclose certain information it will be done under express permission of the company.

- The perception of the sampled Bindura mining firms' participants may not necessarily reflect the state of affairs of the mining business and the adoption and application of EMAPs. However, it is generally accepted that, the mining firms' operations are generally

similar and therefore the views of the research can safely be generalised to other mining firms outside Bindura.

1.12 Definition of terms

Budget: is a quantitative expression of a proposed plan of action by management for a specified and an aid to coordinate what need to be done to implement the plan (Horngren, Datar, & Rajan, 2017).

Cost and management accounting techniques (CMATs): are the tools and systems used to gather and analyse information related to costs and revenues about an entity's activities and the information is used by management to make decisions.

Costing Techniques/Tools(CT) :are methods or models used for the establishment of budgets, standard costs and actual costs of operations, processes, activities or products and the analysis of variances, profitability or the social use of funds (Drury C. , 2015).

Environmental management accounting (EMA) is a systematic process of collecting data related to the environment, the data gathered is then converted through management accounting tools and processes into information which can be used for environmental decision making by managers (ACCA Global, 2010).

Mining is the process of extracting useful materials from the earth.

Performance Measurement and Control Tools (PMCT): are formal, information-based routines and procedures managers use to maintain or alter patterns in organisational activities (Simons, 2014).

Pricing tool (PT): refers to the method adopted by an entity when setting selling prices for its products or services (Maduekwe, 2015)

1.13 Research Outline

This dissertation is organised into five distinctive chapters.

Chapter 2 reviews the relevant literature on the role of EMAPs on the performance of mining firms. Chapter two also will discuss theoretical developments in the field of environmental management accounting and to expose gaps which are still existent.

Chapter 3 presents the research design and methodology used in this study. The research design was guided by the Honeycomb of methodologies model.

Chapter 4 analyses, presents and interprets the data gathered from the questionnaires which were used as an instrument in data gathering from mining companies.

Chapter 5 discusses the findings of the study in detail, deduce conclusions and suggest some recommendations

1.14 Summary

The chapter commenced by describing the emergence and the importance of environmental management accounting and its importance to addressing problems related to environmental damage. The research gaps were exposed in the statement of the problem and this culminated into the developing of the research objectives, questions and the developing of the research hypothesis. This chapter is continued by outlining the significance of the study, definition of terms, delimitation and limitations of the study. It concludes with the outline of the research study. The next chapter discuss the literature review of previous studies on the application of four EMAPs which are the focus of this study.

CHAPTER II

REVIEW OF LITERATURE

2.0 Introduction

The primary purpose of this study is to investigate the impact of environmental management accounting practices (EMAPs) in influencing financial performance of listed mining firms operating in Bindura. Consequently, this chapter reviews literature related to EMAPs and their influence on financial performance, the nexus between EMAPs and return on investments(ROI) as the selected measurement criteria for financial performance, types, roles and limiting factors in adopting EMAPs. In that attempt the researcher exposed existing gaps between empirical literature gathered by earlier researchers and the impact of EMAPs on financial performance.

2.1 Theoretical framework

To facilitate quick understanding of the influence of EMAPs on financial performance the study reviewed pertinent philosophical perspectives to the subject of environmental management accounting practices in relation to financial performance. Whilst the researcher content that there are plenty of these theories this study is underpinned by the legitimacy theory, the agency and the contingency theories.

2.1.1 The Green Political Theory

The theory came into existence because of the emergence as a result of the global environmental crisis where incessant and indiscriminate destruction of nature has become problematic (Global Greens , 2012). The thrust of the Green Theory is to warn the inhabitants of the earth that destruction of nature is a time bomb which is now imminent and to reiterate that nature is a crucial entity in its own right (Otekunrin, Samu, Sifile, & Matowanyika, 2021). The theory emphasise that the earth as a planet was created to benefit not necessarily humans alone but also other life. Both fauna and flora must co-exist (Barry , 2014). The green political theory advocates for an eco-centric approach and abandonment of the anthropocentric world view in which more value is placed on the survival of humans instead of the whole ecosystem (Vincent, 2018).

At the centre of the green political theory environmental ethics play a crucial role (Deegan., 2019). Its ethical basis branches from philosophies developed by Gandhi and Spinoza who advocated for every person to act in a responsible manner with a futuristic view and to care for life existing now and future generations to come (Debnath, 2019). On account of this, decisions are fundamentally based on moral choices. The ideology behind this theory is based on creation of a world that is ecologically sustainable. A world that is rooted in social justice, environmentalism and non-violence (Otekunrin, Samu, Sifile, & Matowanyika, 2021). Under this theory human beings are a small component in relation to other components of the earth. Henceforth, the theory challenges the view that humans are superior to any other constituencies of the earth. The theory seeks to address socio-ecological problems hence strengthening the capacity to attain sustainability globally. The green political principles drive for sustainable environmental management which saves nature.

2.1.2 The Agency theory

Historical studies have played a remarkable role in management accounting in the recent years which have helped the development of a subordinate area of environmental management accounting. Holden *et al* (1941) performed an empirical study of incorporated entities and discovered that the fundamental responsibility of management is control. Control serves as a monitoring mechanism which ensures that organisations set objectives are accomplished. Any deviations are analysed through variance analysis and appropriate decisions are taken by the responsible management (Legaspi J. R., 2018). The focus of management accounting by then was on product costs. Product costs were an important input element in the drafting of budgets and the financial control of production processes. Management controls were oriented towards manufacturing and internal administration (Abdel-Kader & Luther, 2008).Management accounting was not proactive but rather reactive when significant variances emerge from the business plan (Ashton, Hopper, & Scapens, 1995)

Then, agency theory makes an important contribution to costing and management accounting as well as to environmental management accounting. It includes explicit recognition of the behaviour of the agent whose actions is a determinant of information generated from the environmental costing and environmental management accounting system in line with the main responsibility of influencing control. (Jensen & Meckling, 1976) stated that the principal duty of the agent (manager) is to maximize the wealth of the principal (firm's owners). Generally in

practice the principal agent relationship is established in the employment contract. This contractual relationship works well when the agent works to the best interests of the principal (Legaspi J. L., 2018). In general the interests of business owners are wealth maximisation. Accordingly the agent (manager) must strive to maximise the wealth of the principal and desist from pursuing personal interests such as self-wealth maximisation (Legaspi J. R., 2018). To manage this kind of behaviour the owner may supervise the agents' performance through an accounting information system (Jensen & Meckling, 1976)An accounting information systems generates its information as one of its sources from a sound environmental costing and environmental management information system.

2.1.3 The contingency theory

Furthermore, contingency theory in environmental management accounting describes how appropriate the environmental management accounting information and control system can be designed to match the size of the organization. The contingency theory is based on the premise that the application of any management principle is dependent on the specific situation encountered by management at any given point in time (Smit, Cronje, Brevis, & Vrba, 2013). In other words, there is no one best way in organizing and leading the organization. An entities environmental management accounting system style that is effective in some situations may not be ordinarily successful in others. It therefore, follows that the optimal environmental management accounting system is contingent upon various internal and external constraints (Drury, 2015).

The focus these days is to identify the most developed and efficient EMAPs and other management accounting tools such as: the business process reengineering, environmental activity based costing; environmental budgeting tools, environmental adjusted balanced scorecard; environmental life cycle costing and target costing and environmental strategic management accounting (Björnenak & Olson, 1999). Over the years research in costing and management accounting and environmental management continued unabated and focused on how best environmental management accounting systems can be applied on different situations and environments faced by various entities (Legaspi J. L., 2018). Especially research on environmental management accounting change, most relates to practices in developed countries and recently in developing Asian countries. It therefore follows that, there is no single best way to manage. The contingent theory is therefore of great importance in explaining how

environmental and management accounting practices (EMAPs) influence the performance of mining entities (Maziriri & Chinomona, 2016). (Otley, 1980) measured the efficacy of the contingency when applied to management accounting practices and found out that there is not a single accounting standard practice which can be generalised to all firms. Similarly, there is no single environmental management accounting practice (EMAP) which can be applied to mining operations in all situations.

Furthermore, (Kariuki & Kamau, 2016) content that the contingency theory is a situational philosophy which argues that there is no singles accounting standard which can be applied equally to all entities in varying circumstances. Management had to decide which environmental management accounting technique to apply to different specific situation in an organisation or work scenario. In other words the contingency approach to management tries to direct the available techniques and principles particularly environmental costing and management accounting techniques (EMAPs) towards specific situations in order to realise the goals of the organisation as productively as is feasible (Smit, Cronje, Brevis, & Vrba, Management Principles: A contemporary edition for Africa, 2013).The theory looks at certain influential factors that will assist management to decide on an appropriate environmental management accounting practices (EMAPs).

2.2 Conceptual framework

In light of the literature review and findings on selected key environmentalism theories and approaches the study proposes a conceptual framework. The framework is an illustration of the relationship between EMAPs and financial performance as shown on the conceptual framework diagram Fig 3-1. Meanwhile the concept of financial performance is explained.

2.2.1 Financial Performance-Concept of return.

Return is the expected reward for an investment which is derived from an attempt to measure performance (Drury, 2015). Measuring performance is crucial to any business interested in measuring return on investment because performance measurement are the basis for financial and operational decision making. There are many different ways used in measuring performance but they are basically categorised into two broad groups which are nonfinancial and financial measurement tools (Legaspi, 2018). Return on investment which is going to be

applied in this research is a financial measure. Therefore this research explained the reasons for choosing a financial measure return on investment (ROI).

2.2.2 Financial performance measures

Financial performance measurement tools are the basis for measuring performance practiced by almost every business despite the fact that non-financial measurement tools are also significantly important. The balanced scorecard is a measurement tool which is an attempt to combine financial and non-financial measures. Many organisations use financial measures mainly to evaluate progress on their strategies. Financial measures are also preferred by companies because they provide primary and objective information which is fundamental for strategic decision making.

Non-financial measures are complementary in their application. They complement financial measures which implies that in most circumstance they cannot singularly relied upon as opposed to financial measures. Accordingly, because of the above reasons the research is going to use financial measurement tool ROI to assess the influence of environmental accounting practices on financial performance (Harrison Jr, Horngren, Thomas, & Suwardy, 2014). Financial measurement tools are retrospective in nature. They measure past performance and also their focus is for generally a short period in comparison to nonfinancial measures. Financial measurement tools are particularly crucial in measuring profitability, leverage, efficiency and capital structure (Lubbe, Modack, & Watson, 2017).

2.2.3 Return on Investment (ROI)

ROI sometimes called Return on Assets (ROA) measures the earning return on invested capital or assets (Huang & Hou, 2019) . It depicts the efficiency in utilisation of the assets acquired by the owners of the business for the purpose of generating a return on investment. ROI is calculated by firstly substracting the operating expenses from the revenue the residue is the profit. This profit return is divided by the net investment which are the net assets after substracting liabilities (Qi, Peng, & Xiong, 2020). It therefore follows that to maximise profit returns the underlying assets must be used efficiently. At the same time profits returns may also be increased by increasing revenue volumes and managing operating costs to acceptable levels. The ROI was chosen for this study because it includes all the major elements important

in measuring return. These elements are revenue, operating expenses and the resources controlled by the entity (Wang & Kesan, 2020).

2.2.4 The Conceptual Framework

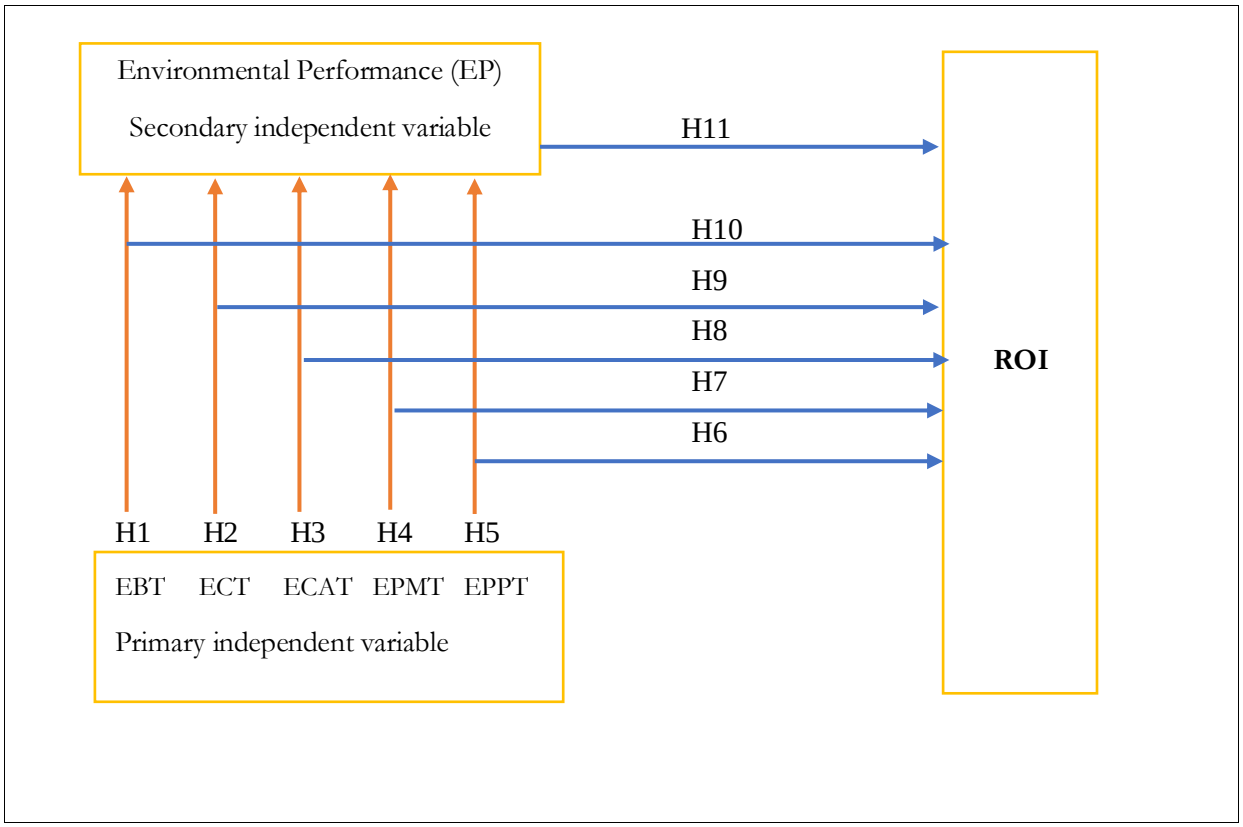

Figure 2-1 Conceptual Framework

Source: (Researcher: 2023)

2.2.5 Independent variables

The independent variables are the environmental management practices (EMAPs). These EMAPs are environmental budgeting techniques (EBT), environmental costing techniques (ECT), environmental capital appraisal techniques (ECAT), environmental performance management techniques (EPMT) and environmental product pricing techniques (EPPT). Their simultaneous influence on both environmental performance and return on investment (ROI) is going to be tested. Environmental performance is a dependent variable to the primary independent variables. At the same time, it also acts as an independent secondary variable.

2.2.6 Dependent variable

There are two dependent variables which are environmental performance (EP) and the return on investment (ROI). EP is a secondary independent variable which is also a result of the primary independent variables. The ultimate dependent variable is the return on investment. The association of the primary independent variables and the secondary independent variable of EP on ROI was also tested.

2.3 Empirical review: Prior literature on EMAPs by mining firms

2.3.1 Environmental budgeting techniques (EBT)

Budgeting is a management accounting tool which is widely used by firms to control performance. It is a proven fact that budgeting improves performance in terms of both financial performance and non-financial performance (USAID;, 2019). Environmental Compliance Budgeting is the process that makes sure that sufficient resources are made available for execution of environmental safeguards and also are responsible for providing transparency to guarantee funds are always available and maintained for these activities (Legaspi J. L., 2018). That is, the process by which project budgets (from the proposal stage through each annual request for funds) transparently capture costs for environmental compliance requirements, which are an integral part of any project and must be duly paid for. Budgeting for environmental compliance is required by USAID's Operational Policies. However little is known as to whether EBT can derive the same results on performance particularly for mining firms. Previous research in this area are mainly in western countries and developed nations of Asia (Ahmad, 2017). Even in those nations, researches in EBT are still sparse.

2.3.2 Environmental costing (ECT)

Environmental costing is a tool used to trace and analyse costs and revenues attributable to the environment (ACCA Global, 2010; Karimi, Dastgir, & Saleh, 2017). This method is believed to enable entities to control costs and revenues and ultimately improve performance particularly financial performance. Nonetheless, though costing techniques has been a management accounting technique which have been in use for quite a long time little is known of its applicability to environmental management accounting especially in improving the firm

performance (Tietenburg & Lynne, 2016). Suggested reasons for sparse use of this technique are attributable to the fact that environmental costs were not analysed separately but bunched in other overheads such as manufacturing and administration overheads.

2.3.3 Environmental capital appraisal techniques (ECAT)

Environmental capital appraisal techniques (ECATs) involves budgeting for capital outlays to invest in environmental friendly technologies (Drury, 2015). These technologies are responsible for reducing environmental related costs, rehabilitating the environment and for installation of clean production systems. ECATs are to a substantial extend widely used in developed nations and particularly in mining industries, manufacturing industries and other industries which are known of contributing heavily to environmental damage (Drury C. , 2018). In developing nations few entities use ECATs and even the few which use ECATs they use it only because they are forced by regulatory agency, international protocols, and legislature of the respective countries. Outside the regulatory and international protocols ECATs are not embraced by entities and the reasons are not clear as yet.

2.3.4 Environmental performance measurement techniques (EPMT)

Performance need to be measured. Environmental performance measures are regarded as less important because they are viewed to contribute less in terms of the predominant economic firm objective of wealth maximisation (Ahmad, 2017). Furthermore, pursuing environmental performance is blamed for contributing unnecessary and avoidable costs (Debnath, 2019). Consequently, environmental costs should remain concealed for as long as is possible.

2.3.5 Environmental product pricing techniques (EPPT)

There are potential benefits which may be derived by including environmental costs and revenues in pricing decisions. Most of the pricing techniques analyses costs accumulation per unit of a product before adding a mark-up (Alemu, 2020). However, in the absence of environmental costing techniques it follows that it is invariably impossible for EPPT to include environmental costs. This results in lost opportunities of controlling costs and revenues related to the environment.

2.4 Prior literature on roles of (EMAPs)

EMAPs play various roles depending on each and every industry. The following roles apply to mining industry although they can still be applied to other sectors of industry.

2.4.1 Manage stakeholder conflicting interests on the environment.

Environmental management accounting practices plays a wide spectrum of roles to business entities (Czinkotaa, Kaufmannb, Basilec, & Ferric, 2020). One of its fundamental role is to minimise pressure from various environmental stakeholders. It is evident throughout all business sectors that pressure is mounting emanating from various pressure groups over the need for firms to recognise the damages they are causing and perpetuating over the environment. EMAPS, assists firms to create and innovate sustainable approaches and strategies of dealing with environmental degradation whilst at the same time meeting their economic objectives of wealth maximisation (ACCA Global, 2010). EMAPs is the nexus between the wealth maximisation objective of business and green manufacturing. Boston College (2016), posits that the well informed customers prefer products services and products from environmental friendly firms as opposed to just basing their buying decisions on price and other economic factors alone. Neu, Warame and Pedwel (2018), echoed similar sentiments when they posit that EMAPs plays an imminent role in sprucing up the image of the firm to external stakeholders. Thus environmental management accounting derives mutual benefits between the business sector and society (Neu, Warame, & Pedwel. , 2018)

2.4.2 EMAPS is the basis for firms' decision making on environmental and financial performance.

EMA provides both physical flow information and monetary information which can be readily manipulated by organisations' decision makers (O'Neill, 2017). This information will significantly impact on environmental and financial performance of any business. Savage et al (2002), were however quick to note that, EMAPs facilitates internal decision making the adoption of EMAPs is not guarantee to any specific level of financial or environmental performance. However, for organisations that do have the goals of minimising costs in general, environmental costs in particular, or environmental impacts, EMA clearly provides a critical set of information for meeting those goals.

2.4.3 EMAPs exposes opportunities to reduce environmental costs.

One major role of EMAPs is its capacity to identify environmental costs and expose environmental inefficiencies (Homan, 2016). The exposure of environmental costs and inefficiencies by EMA will assist the firm to reduce environment-related capital expenditure or operating costs of the environment. Consequently, there is either increase in profit margins or provide an opportunity for reducing product prices as a cost leadership strategy (Doorasamy & Garbharran, 2015). In addition, reducing potential environmental liabilities will also cause legal compliance expenses to decline and this will invariably improve financing access and customer agreements (Ashton, Hopper, & Scapens, 1995). For instance an industrial company which is precise in calculating the true magnitude of the monetary value wasted raw materials exiting the plant as either waste or pollution is likely to be encouraged to identify measures of containing waste, saving raw materials and funds (Abdel-Kader & Luther, 2008). The reduced volume or changed content of the wastewater stream may allow lower cost wastewater treatment plant upgrades in the future (Baldarelli, Baldo, & Nesheva-Kiosseva, 2017). A local government agency responsible for delivering municipal solid waste management services to the local community can use EMA information determine the combination of services, for instance recycling, landfilling, incineration, that is the most cost-effective and has a minimal environmental impact.

2.4.4 EMAPs are tools for data collection for external reporting purposes.

Beyond the roles of internal management and decision-making EMAPs plays a vital role for data collection for external reporting purposes (Bassey E B et al, 2013). Firms can use EMAPs to gather data required by tailor-made to meet the requirements of legitimate external stakeholders and to be used ofr different purposes. Information may be needed as evidence for compliance with government environmental regulators or simply to serve purpose of corporate social responsibility (CSR) (Birnie, Patricia, Allan, Boyle, & Redgwell, 2009). Most of these external stakeholders which may include inter alia environmental non-governmental organisations (NGOs), Local communities and governmental environment regulators are fundamentally interested physical flow processes of environmental management accounting practices (EMAPs). Other stakeholders, such as investors, are more interested in environmental cost data.

2.4.5 Reduction of environmental costs

The separation of environmental costs and revenues as well as the inclusion of identification and inclusion of environmental costs in decision making may (arguably) provide accurate calculations of costs which subsequently enable effective control and reduction of these costs (Khalid, Lord, & Dixon, 2018). EMA usage may also have a positive effect on both environmental and financial performance (Wei-Lun & Yan-Kai, 2019)

2.4.6 Strategic reasons

Companies no longer adopt the green industry concept not only to minimise or avoid costs associated with non-compliance but also as a strategic choice which leads to wealth maximisation. The greening of industries has become a core determinant of economic competitiveness and sustainable growth for example Dupont (O'Neill, 2017). Input resources represent a crucial production cost for companies in the production of goods or the provision of services (UNIDO, 2019). Consequently, firms which adopts green manufacturing and service provision by improving efficiency stacks a strategic competitive advantage over rivals. The greening of industries also plays a role in poverty alleviation, through promoting energy security, health and safety, jobs, and reducing costs through increased productivity (Iheduru & Chukwuma, 2019) . Furthermore, the current generation of consumers is well informed particularly with the developments of digital technology. They are well informed of the importance for firms to adopt environmental friendly business practices. It is therefore not surprising for consumers and customers' particularly first world customers are more sensitive to buying products for pro-environment entities (Ki-Hoon L et al, 2017; Jeenbaeva, 2015).

For those industries which follow the general economic cycles which are mostly triggered by disruptive innovations and inventions understands that the current generations is under the environmental economic upswing. Beginning late 1700s, economic fluctuations have been happening every 30-50 years and these economic upswings are accounted on technical breakthroughs which include but not limited to breakthroughs in steam engines, discovery of electricity, invention breakthrough in automobiles, radio/television and biotechnology among many such discoveries (Tietenburg & Lynne, 2016). Experts are now projecting that the next industrial disruptive innovations are going to be anchored on green technologies, energy and resource efficiency (Weizacker et al 2009). Based on the background of a limitation of natural

resources and energy supply , there exist a strong economic discourse eco-efficiency and productivity of resources will be at the forefront of the green revolution (Doorasamy & Garbharran, 2015). For the majority of industries improving efficiency of resources in production and manufacturing is not a function related to the environment objectives and concerns. Increasing resource efficiency has been the crucial core determinant to stack strategic of economic competitiveness from rivals and will drive sustainable growth. Since input resources represent a crucial component of the cost of manufacturing for firms, increasing efficiencies can be a substantial leverage for strategic competitiveness (SERI, 2009, Prosperous et al 2019).

2.5 Prior literature on reasons for adopting EMAPs by mining firms

In a research study making Environmental Accounting Work a case of the Zimbabwe Mining Industry Otekunrin et al (2021), found out that EMA contributes positively in the mining sector, by promoting sustainability. Consequently, sustainability could be a possible reason for adopting environmental accounting. The researchers were however quick to note that the adoption of environmental management accounting practices are still at their infancy in Zimbabwe mining companies (Otekunrin, Samu, Sifile, & Matowanyika, 2021). In contrast, Muza (2018) argued that EMAPs have since moved away from being at their introduction stage since in his study he found out that there are strong and convincing indicators that EMAPs have since been in existence in company's traditional accounting systems. It is these unresolved arguments which makes the current study relevant.

Environmental accounting derives a broad spectrum of benefits which is one reason persuading companies to adopting EMAPs. One of the benefits EMAPs is that they reduce inevitable compliance pressures from various stakeholders (Czinkotaa, Kaufmannb, Basilec, & Fer, 2020). There is abundancy of evidence that businesses are undergoing a great deal of pressure from environmental stakeholders over their ethical need to realise and recognise the destruction and harm they perpetuate on the environment (Otekunrin, Samu, Sifile, & Matowanyika, 2021). Environmental management accounting practices assist firms to avoid being compelled and promotes industries to be innovative and come out with novel methods which reverses environmental damage and also to develop environmental strategies to improve sustainability in resource management.

Nonetheless, other critiques argue that the existence and benefits for adopting EMAPs is merely rhetoric on the ground there is nothing to show. This school of thought posits that EMAPs are merely implemented as a "green wash" to spruce up good corporate image whilst burying down their bad deeds from the public eye (Sun, 2018) . Deegan (2019), content that piecemeal EMAPs has led entities to report only on the positives of the company and leaving the bad side of corporate that they perceive to be detrimental to the reporting entity. This is supported by Gray and MIlne (2019), who reiterate that management capture, records and control the environmental issues to be disclosed without the involvement of external stakeholders. This gives the management the opportunity to gather and disclose information which it deems favourable to advance the corporate image agenda and the expense of being inclusive, transparent and accountable to the society its serves.

Smith (2020), emphasised the absence of credibility and reliability in information derived from environmental accounting reports in comparison with information disclosed by financial reports. Environmental sustainability issues are qualitative in nature and lacks specificity leading to complexity in measuring and compare it with other information generated by other firms. This is regardless of the availability environmental guidelines produced by GRI and SEEA, there is still an insufficient framework with proper standards which helps in measuring and comparing of environmental information (Baldarelli, Baldo, & Nesheva-Kiosseva, 2017). In addition there is absence of legal enforcement mechanisms to force the uptake of environmental accounting standards at the global level. Another peculiar challenge which does not go well for companies is attempting to adopt environmental management accounting practices and remain profitable (Ahinful & Tauringana, 2019). It is difficult to increase profits when implementing environmental accounting practices. .

2.6 Prior literature of limiting factors on adoption of EMAPs

Karimi *et al.* (2017) analysed factors affecting the adoption of EMA to provide a conceptual model, from the financial managers and assistants point of view, who are in the oil refining and petrochemical companies. The result indicated that the limiting factors to the adoption EMAPs is the inherent resistance to change, absence of EMAPs standards framework, and clear methods of collecting and allocating environmental costs (Karimi, Dastgir, & Saleh, 2017).

The study also revealed that organisations competitive environment and the culture of the community in interacting with environmental are some of the factors which determines the use of EMAPs (Karimi *et al* 2017). Le et al (2020) accounted the lethargy for the adoption of EMAPs by firms to weak environmental legislation and enforcement structures. The behaviour of firms on the adoption of EMAPs is also delayed if in a particular country there are few and less vocal pressure groups such as environmental pressure groups, shareholders, employees, investors and lenders (Li, Dang, & Le, 2020). In other nations these pressure groups have transformed the organisational culture, the management systems as well as the accounting systems of various organisations (ILO, 2018). The change in the accounting systems in which EMA is a branch was accounted for form the various environmental management pressure groups.

Another, inhibiting factor on EMA uptake is the nature of the firm and managers perspective on environmental costs and benefits (Burritt, 2015). Phan et al (2017), contented that managers who are more informed about EMA are flexible to adopting an EMA information system and appreciate its usefulness. They are willing to consider the costs and benefits associated with environmental accounting. Similarly, Phan et al (2017) noted that management support on EMA information systems has a great positive bearing on the implementation of EMAPs. Buttressing the importance of management support for EMA Roger (2015) reiterated that managers in heavy manufacturing companies are more flexible to change and generally ready to adopt EMA particularly because of strict regulatory, economic, environmental and international pressures (Phan, Baird, & Su, 2017). However, the preparedness of management to embrace environmental management practices is a factor which depend on how fast concerns emanating from inconsistencies in regulations at micro level and a subdued awareness of environmental issues among employees can be resolved (UNICEF , 2019).

Hamzah et al. (2018), identified several inhibiting factors to the adoption of EMAPs in local government authorities. The included inter alia, the strength of social cultural factors, regulatory pressures from environment authorities, environmental expectations of the community, situational needs of particular companies, and complexity of waste operations (Burritt, 2015). The strategies of the different local authorities also have a bearing on the adoption of the EMAPs.

According to Olubukola et al (2021), factors that limit the uptake of EMAPs among firms are the complexity of EMA, absence of shared consensus among international bodies, (Schaltegger & Burritt, 2017) and the absence of a single environmental framework. The absence of a single framework on environmental management accounting had made it difficult for firms to decide on which framework to adopt. In addition, there is no consensus on the basis of evaluating the quality and reliability of environmental issues (Olalekan & Jumoke. , 2017). Equally important is the insufficiency of resources and dedication on operationalisation of environmental accounting practices (United Nations, 2019).

George, Siti-Nabiha, Jalaludin & Abdalla (2016) argued that inadequate funds, absence of appropriate labour force, limited environmental expertise and knowledge are the critical challenges in the implementation of environmental accounting practices. Environmental management accounting is still at its infancy, consequently there is limited expertise in this area. Lack of expertise in this area has proved too problematic particularly on the adoption of EMAPs in developing nations (George, Siti-Nabiha, Jalaludin, & Abdalla., 2016). Misalignments of goals between firms' financial teams and environmental advocates is one of the greatest impediments in the up taking of EMAPs (Osmanagić Bedenik, Prebežac, & Strugar, 2019). There are always differences in priorities between environmental sustainability and financial teams.

In most circumstances the financial implications proposed by the financial management teams carries the day at the expense of the environmental issues. Consequently, environmental may not be incorporated in the both the corporate and business strategies of organisations (Schaltegger & Burritt, 2017). Another impediment to the adoption of EMAPs is the complexity in measuring and quantifying environmental issues (Bennett & James, 2017). The absence of a clear methodology of pricing environmental expenditure particularly pollution climatology changes, it is very complex to include these items as part of the decision making and accounting of any firm. The implication is that even if the firms attempt to adopt environmental accounting practices , they may not be fully acquainted with the precise costs and consequences associated with environmental activities in the long run (Karimi, Dastgir, & Saleh, 2017).

2.7 Other empirical evidence

A study conducted by Hasniza and Malcolm (2013) in Turkey revealed a strong positive impact of EMAPs on company's performance using the balanced scorecard framework from data gathered from 197 manufacturing firms. Hutahayan (2020) indicated that EMAPs promotes innovation and also revealed that innovation does not need substantial changes to processes. Sometimes it may only require little changes to the current arrangements (Chaudhry, Humaira , Muhammad , & Hussian, 2020). For example little adjustments on processing, waste reduction and minimisation of costs. Adopting environmental innovation on strategy may result in internal processes improvement. Hasniza and Malcolm (2013) reiterated that if entities introduced new environmental management practices in their processes they gain competitive advantages over their rivals (Hutahayan, 2020). Firms with superior competitive advantage are highly innovative and generally it is complex to imitate their competitive advantage. As a result these firms enjoy long run benefits by adopting EMAPs (Gomez-Conde et al., 2019; Reed, 2012; Saeidi et al., 2018).

A limited number of studies refutes the presence of a positive association between environmental process innovations to company financial performance. A typical analogy is an investigation conducted by Njanja (2013) which established that environmental process innovation has a substantial negative influence on a firm's performance. In another research, environmental innovation on process was blamed for stifling growth of a firm (Mahfud, 2015). This acute difference could have been caused by factors which were not taken into consideration by the researchers.

Most of the investigations linking environmental management accounting and financial performance were carried out in advanced nations with highly structured and advanced manufacturing sector (Njanja, 2013). Such results cannot be generalised in mining industries of Zimbabwe who are still using old technology in a sector which is still developing. Hence, there is an important need to find out the relationship between EMAPs and firms' performance in emerging economies (Bassey E B et al, 2013). Additionally, there is apparent contradictions between earlier researches where other studies concluded that there is positive relationship between EMAPs and firm performance while other studies regards EMAPs as a negative

predictor on financial performance. The disharmony of these earlier researches on the influence of EMAPs on financial performance requires further empirical research on this relationship.

H1*: EMAPs has a positive significant effect on financial performance*.

Furthermore, Minoja et al. (2010) demonstrated that the development of that demands creative efforts have a positive viable edge. In the literature on the environment, the study by Chang (2011) revealed that there is a positive association between manufacturing of green products and the entity's ecological ethics and a viable edge (Amir et al., 2020). Although, several studies were dedicated to investigation on the influence of innovation on firm performance relatively few researches were devoted to investigate the relationship of innovation on EMA. Hutahayan (2020) noticed that the influence of innovation on EMA and ultimately on financial performance was rarely evaluated by earlier studies. It therefore follows that a research lacuna still regarding the intermediary role played by innovation on EMA and financial performance. As a result the current study seeks to considerably close this gap by placing EMAPs on the mediatory role between environmental innovation and firms' performance.

Ahinful and Tauringana (2019) investigated the relationship between environmental management practices (EMPs) and financial performance (FP).The study was based on a sample of 187 SMEs and used data on six EMPs related to energy, water, waste, material, emissions, and biodiversity. The outcome showed a significant positive association of environmental management practices related energy, water, and material and financial performance. Similarly, there was also a positive association between aggregate EMP measure and financial performance. In this instance, the results were consistent with those of Boakye et al (2021) which revealed a strong positive correlation between EMAPs and financial performance for SMEs operating in the United Kingdom. The predictability of the relationship was strongest among medium and larger firms, return on assets (ROA) have shown a significant relationship with environmental performance (Boakye, Tingbani , & Gabriel, 2021).

However, other EMPs waste, emissions, and biodiversity were not significantly correlated with financial performance (Ahinful & Tauringana, 2019). Overall, these results provide empirical support to the mostly normative suggestion that the conflicting results on the environmental management and financial performance relationship are partly due to the EMP measure used. The study was again based on small and medium enterprises (SMEs) only. It therefore follows that the outcome of this research cannot be generalised to large companies operating in the

mining sector. Obviously, there are differences in the type of management accounting practices employed.

In another study Aslam et al (2020) , investigated the relationship between environmental management practices (EMPs) and financial performance (FP), and consequently ascertain whether environmental performance (EP) can mediate the EMPs–FP nexus. The investigation used a comprehensive dataset of Nikkei 225 listed firms from 2007 to 2018. The findings suggested that environmental management practices have a positive effect on financial performance. Furthermore, the results also revealed that the expected environmental performance (EP) can be achieved through adopting comprehensive EMPs. In a similar study conducted to evaluate the linkages between environmental management practices with financial performance Kumar and Dua (2021)results revealed a significant positive relationship between EMPs and profitability. The study was based on a comprehensive dataset of 459 large listed Indian companies covering major manufacturing and service sectors of the economy over a period of 11 years. Regardless of the consistence of results, these studies were carried in India a medium economy in contrast to the Zimbabwean which is still a developing nation. Henceforth, the results cannot be generalised to the Zimbabwean context.

Nyirenda et al (2013), examined the impact of environmental management practices on the financial performance of a South African mining firm. The major aim of the paper was to investigate whether such practices have a close relationship with the mining firm's financial performance represented by return on equity (ROE). The result revealed that there is no significant relationship between environmental management practices return on equity (roe). To this end the pursuance of environmental management practices are driven primarily to meet compliance requirements of the environmental regulatory bodies rather than in pursuance of the regulatory (Nyirenda , Ngwakwe , & Cosmas, 2013). There are so many inconsistences and conflicting results pertaining to the impact of EMAPs on financial performance.

The inconsistencies were confirmed by another study conducted in South Africa. The study was carried out over more than three decades of research concerning the link between environmental performance and firm financial performance remain (Tattersall , 2021). Using a sample of 12 large capitalization South African metal and mining firms listed on the Johannesburg Stock Exchange, the results revealed inconclusive and conflicting results. Firstly, a significant positive correlation was found to exist between environmental

management practices (EMPs) scores and Return on Assets (ROA). Secondly, a significant negative correlation was found to exist between (EMPs) scores and Tobin's Q. Evidence of such financial gain with respect to environmental performance, provides impetus for firms and managers seeking to implement sustainable practices. These results demonstrate that it does pay to be green. It is these conflicting and inconclusive results which makes this current study relevant.

Inconsistences were not found in a study conducted to analyse the impact of EMPs on Environmental and Financial Performance firms in Malaysia (Ali , Salman , & Parveen, 2022). The analysis was based on a sample of 141 listed firms on Bursa Malaysia extracted between 2009–2020. The findings reflect that EMPs have a significant positive effect on EP. Similarly, EP have a significant positive effect on financial performance (Ali , Salman , & Parveen, 2022). Nonetheless, regardless of the consistencies these results cannot be generalised to Zimbabwe mining companies due to the differences in regulatory and economic environments obtaining in these two countries.

2.8 The research gap

Regardless of a considerable research in the area of environmental accounting and disclosure, few researches have been dedicated to EMAPs and performance of mining companies. Further, there is a clear lack of consistency on the influence of EMAPs on environmental performance and ultimately on financial performance. Some research studies have established that environmental process innovation has a substantial negative influence on a firm's performance. In contrast, some earlier studies have concluded that EMAPs have positive influence on financial performance. It is these contrasting views which justifies the need for further research. In addition, most of the researches were done in developed economies of the western economies and the medium economies of the Asian countries. Few were conducted in Sub-Saharan Africa which share similar economic conditions. Even if the economic systems shares a lot in common environmental issues are mainly determined by the political environment, legal frameworks and international treaties.

From the above knowledge gaps identified in the prior literature the following research questions remain unanswered:

- What are the environmental management accounting practices employed by mining firms?

- What are the roles of management accounting practices to mining firms?
- What are the reasons for adopting EMAPs?
- Which factors limit the adoption of environmental management accounting practices?
- What is the relationship between the adoption of management accounting practices and ROI?

The unanswered questions suggest a need for a Zimbabwean research study to fill the knowledge gap in previous literature reviews. This study is an attempt to fill that gap by seeking answers to the above research questions.

2.9 Chapter summary

This chapter evaluated literature on the impact of EMAPs on environmental performance, the influence of both environmental performance and EMAPs on financial performance. The review also assessed the roles EMAPs, and limitations for the adoption of EMAPs. In doing so the researcher established the research gaps that existed between literature and the impact of EMAPs and financial performance of mining companies operating in and around Bindura especially the fact that there is contradicting evidence pertaining to the nexus between EMAPs and financial performance. This therefore justifies the hunger for further research. Chapter three presents the research methodology.

CHAPTER III

RESEARCH METHODOLOGY

3.0 Introduction

This chapter described the research methodology adopted for the purpose of this study. The methodology employed the Honeycomb which outlined the philosophy, approach, strategy, design, data collection and analysis (Wilson, 2014) figure 3.1. Chapter 3 also explained how the population was determined and the method used to determine the sample size. Furthermore, aspects of validity and reliability in relation to this research study were discussed. Finally, the study outlined how ethical issues were addressed throughout the research process.

3.1 The Honeycomb of research methodology

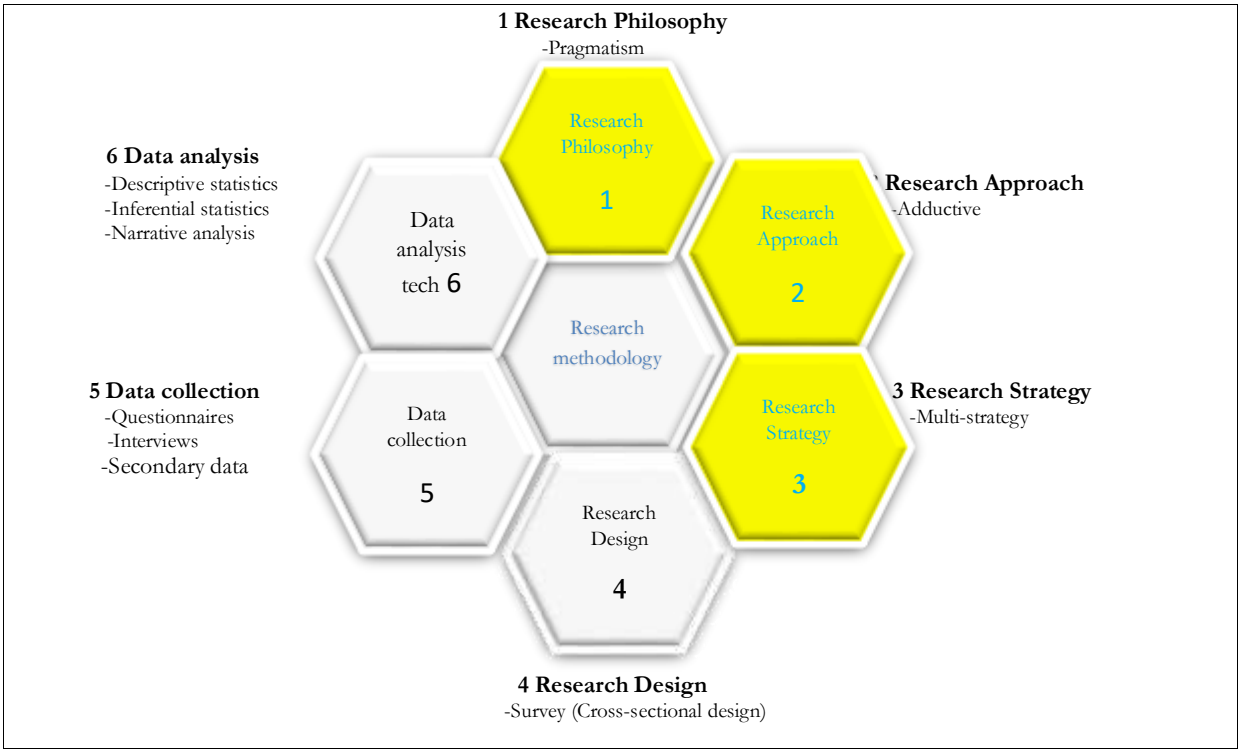

Figure 3-1 Honeycomb of research methodology
(Source: Wilson 2014)

3.2 The research philosophy

Since research is done in different ways, it is vital to select a suitable research philosophy (Hatch & Cunliffe, 2006) which is aligned to the belief system of the researcher. A research philosophy is an action shaped by a value set of beliefs and is strongly linked to development

of knowledge particularly epistemological knowledge (Saunders & Thornhill, 2012). This research will apply the pragmatic research philosophy because the belief system and values in addressing the research problem are epistemologically not aligned to positivism nor interpretivism but is a fusion of both philosophies (Wilson, 2014). The pragmatism research paradigm recognises the importance of both the physical and the social world (Hatch & Cunliffe, 2006). This philosophy identification is justified because within the research problem, there are research questions of the cause and effect nature which needs to be answered scientifically particularly those addressing the association of EMAPs and performance. On the other hand there are other questions which will be best addressed by interviews. Significant insights about effect of EMAPs on performance will be unravelled if those charged with implementation of EMAPs are interviewed.

3.3 The research approach

In most of the circumstances, the researcher's philosophy influences the choice of the research approach to be used. As a result, in light of the pragmatism philosophy chosen the most ideal approach adopted is the abduction approach. The abductive approach combines both qualities of deductive and inductive approaches and synchronises naturally with the pragmatism research philosophy. Marytyna (2017), acknowledges that the simultaneous application of deductive and inductive approaches is made possible by implementing abductive reasoning, where outcomes can culminate into forming models and theories that are capable of being verified by action. In fact, adopting abduction approach makes it simple for researchers to make use of premises which are known to produce testable conclusions and culminates into the development or modification of a theory , or constructing a new theory or to modify an existing theory (Mitchell & Mitchell, 2018).

3.4 Research strategy

In line with the Honeycomb research methodology the choice of the research is linearly a product of the predecessor research approach chosen which in this study the abductive approach. Consequently, the research approach to be applied in this study is the mixed method research strategy (Wilson, 2014). Mixed method strategy can be viewed as 'pragmatic research' in that the research does not attempt to fit into any paradigm but the researcher uses whichever methods considered works best for their particular research(Malhotra 2017;

(Wilson, 2014). The mixed method strategy does not only combine quantitative and qualitative research strategies, but is also capable of answering questions which cannot be addressed by these two extreme approaches (Techno 2016). For example 'why do respondents provide certain answers in a questionnaire survey?' In other words qualitative data can be used to determine quantitative results (Wilson, 2014).

Another compelling reason for adopting the mixed method strategy is that this strategy is more practical and do not restrict the researcher to be glued to well defined research paradigms. This research strategy, follows a realistic approach to research. Consistent with Wilson (2014), Mitchell & Mitchell (2018), argued that the use of mixed strategy methodology implies application of both inductive and deductive assessment in one research study. The major strength of the mixed research strategy is that it allows the design of one study by the researcher, which is capable of addressing questions vis-à-vis the phenomenon nature from the viewpoint of the respondent as well as the associations between measurable variables (Saunders, Lewis, & Thornhil, 2018). It therefore follows that, the researcher is capacitated to explore, describe, forecast, understand and investigate a phenomenon.

3.5 Research Design Type

The research study settled for the descriptive research study. Descriptive research designs are conducted to describe existing phenomena. The data gathered during the process of conducting a research is used for the production of descriptive statistics, independent and dependent variables and for testing and measuring hypothesis using multivariate and bivariate statistical analysis. This study used descriptive measures such as measures of central tendency, frequency distributions and measures of dispersion. Frequency distributions were employed to show the number of responses attributable with each variable or value from the questionnaire instrument. Measures of central tendency located the centre of distribution of the data analysed using mode, median and mean. Similarly, dispersion measures described the extent of variability from the central tendency.

3.6 Time Horizon

The researcher opted for the cross sectional time horizon as opposed to the longitudinal time horizon. The cross sectional time horizon was most appropriate because it reduces the costs of

resources budgeted for the study and the time which is expected for the researcher to write a report. Most student researches are limited in attracting funding. Consequently, the cross sectional time horizon was attractive to the researcher because it simultaneously shortens the time required to produce a dissertation and reduces costs through minimising resources getting into the research project. The longitudinal time horizon takes a long period of time and also resource which does not commensurate with six months the student researcher is supposed to produce a report. The greatest strength of the cross sectional approach is that it is capable of gathering data at once at a particular point in time unlike the longitudinal where data is collected continuously over a particular period (Mabhungu & Poll, 2017) . Collection of data at a particular point in time means that the dissertation is capable of being completed within the six months the report is supposed to be produced. However, to cater for the data which falls outside the horizon of time, the researcher used appropriate secondary data sources.

3.7 Population

The researcher had obtained the population of the study from the mining companies operating in Bindura. The population is composed of management staff involved in accounting, management, quality control. Corporate social responsibility, production, and environmental management who are involved in the implementation and monitoring of environmental management accounting techniques. The population is 61 potential participants. The population had been classified into strata based on the section each employee is engaged as shown on table 3-1:

Table 3-1 Stratified population

Strata	Number	Percentage
Accounting	12	20%
Executive management	9	15%
Quality control	12	20%
SHE	13	21%
Production	15	24%
Total	**61**	**100%**

(Source: Research Survey Data, 2023)

3.8 Sample size

A sample size is a sub set of all elements to be included in a research study (Gupta, 2011). The sample size will be determined by using a formula. The researcher applied the Yaro Yamani formula shown below. The use of the Yaro Yamani formula is justified because in its development it took into consideration the size of the population to be represented, accuracy of the outcome, cost variability of the target population and also subjectivity in determining the sample size (Maziriri & Mapuranga, 2017). The Yaro Yamani formula is the most ideal framework because it produces a sample size which more representative of the population from which the study participants have been drawn from.

Yaro Yamani formula.

$$n = \frac{N}{1+N(e)^2}$$

Where n: sample size
N: population from which the sample will be drawn.
e: error margin or sampling of error (level of precision which is usually 5%)

So Sample size

$$n = \frac{61}{1+61(0.05)^2} = 52.928 = 52 \text{ persons}$$

3.8.1 Sample and sampling procedure

The sample method selected was a product of several factors taken into consideration which comprised of the nature of the research problem, the research objectives, cost and time limitations (Bryman & Bell, 2015). To select the sample, a stratified random sampling technique was undertaken within the strata identified which identified in Table 3-1 above. This method was appropriate because the strata were already identified in the population. All the participants were assigned numbers written on tags. The tags were then placed in five boxes in accordance to the strata identified. From each strata box a proportional number of research participants were randomly selected. The stratified random sampling technique was employed because it is a probabilistic sampling approach which gives equal chance to each study participant (Saunders, Lewis, & Thornhil, 2018). Secondly, it allows a sample to be drawn from the part of population that has the characteristics of the researcher's interest (De Vos et al, 2011). Finally, this method is deemed appropriate because each stratum is proportionally represented in the sample (Mabhungu, 2017).

3.9 Sources of Data

There are several sources of data which can be applied in a research. In this research the data sources were primary and secondary data.

3.9.1 Primary data

Primary data refers to the data which is captured at the point where it is generated. Such data is captured for the first time and for a specific purpose in mind. Questionnaires and interviews were the two main data collection instruments used in this research investigation. This research will utilise the convenience of digital technology. The questionnaires will be distributed through email with a few posted through mail or hand delivered. Similarly, interviews will be administered through online video platforms for convenience.

3.9 .2 Secondary data

Secondary data is data which is generated and processed by others for a purpose other than the problem at hand (Otekunrin, Samu, Sifile, & Matowanyika, 2021). Such data is already in existence. This research also took advantage of secondary data obtained from the Mining companies internal reporting systems. The secondary data comprised financial statements, quality reports, and environmental policy documents among many of the management reports. The researcher also utilised secondary data from the Ministry of Environment and Tourism which also included environmental related statutes, regulatory policy among others. Secondary data was also obtained from the respondents for the purposes of document analysis.

3.10 Research Instruments.

Research instruments are the data collection tools. The current research used the questionnaire and interviews.

3.10.1 Design of the questionnaire

Sileyew (2019) stated that a questionnaire is the main tool that can be used for gaining primary information in practical research. Questionnaires are very suitable tools for conducting quantitative research as well as mixed researches where profiling of sample in terms of numbers is desired (Rowley 2014). Questionnaires have their great strength in that they allow

generation of accurate data, they are cost effective and they are a reliable means of collecting feedback which can be both qualitative and quantitative (Wilson, 2014).

In view of the above compelling facts, a self-administered, structured questionnaire was used as the research instrument. The questionnaire was structured into five sections. The first section was dedicated to personal and business profile of the participants. The other four sections was classified around the four objectives of the research study (Oliver, 2010). The questioning technique used in this research were mainly the closed ended questions of yes/no answers which requires short answers. A five point Likert scales was used to solicit responses from the objective sections of the questionnaire (Robinson, 2014). The participants simply ticked their preferred responses. This type of questioning was preferred because it does not take much of the respondents' time. On average only 15 to 20 minutes was required to complete the questionnaire.

To enhance convenience and effectiveness, the questionnaire took advantage of digital technology to distribute the questionnaire (Bryman & Bell, 2015). Most of the questionnaire were sent and returned vial email since most of the respondents were company employees with email addresses. Only a few questionnaires were distributed using WhatsApp platforms. The questionnaires were distributed with a letter of consent attached to address ethical requirements of the research process. The consent letter was used to highlight the purpose of the study and to reassure the respondents that any information they divulge would be used solely for the purpose of this study and the confidence it deserves is to be maintained.

3.10.2 Design of the Interviews Schedule

Interviews are mainly associated with qualitative research strategies but they are also equally important in mixed strategy researches (Wilson, 2014). Interviews can be in the form of face to face, Email, telephone or zoom interviews interview (Opdenakker, 2006, (Davies & Hughes, 2014)). Interviews allows the researcher to gain strong insights into a person's beliefs, and attitudes towards a particular subject (Kaushik & Walsh 2019). These types of beliefs and attitudes may produce rich data in terms of environmental management accounting (EMA). Furthermore, in some types of interviews, they have strong complimentary advantage in that they permit the interviewer to examine verbal and non-verbal communication (Arisha, 2018). For this study, the researcher used face to face semi-structured interviews to gather information

from senior management of listed firms. The semi-structured interview schedule was designed around the EMAPs and also have questions to solicit information pertaining to organisational strategy in terms of environmental accounting.

3.10.3 Data analysis and presentation

The quantitative data to be collected will be captured and analysed using the SPSS and Ms Excel. This software was selected for various reasons: firstly, it is readily available to the researcher and there are no additional costs related to buying and installing the software. Secondly it avails a faster and easier access to frequency, descriptive and inferential statistical functions given that it has these functions in pull-down menus.

3.10.4 Quantitative Data analysis

The research employed the quantitative data analysis tools. Quantitative descriptive and inferential statistical analysis tools were used to identify patterns in the data gathered by the questionnaire (Sileyew, 2019). Mohamed et al., (2016) stated that the employment of descriptive and inferential statistical approach to analyse quantitative data is ubiquitous in social and business research. In view of the above, the data gathered by way of questionnaires was coded and edited before analysing it. The software packages such as Statistical Package for Social Sciences (SPSS), and MS-Excel were employed to establish trends in environmental management accounting techniques in relation to environmental performance and organisational performance. Presentation of data and findings will utilise tables and graphs generated by SPSS and Ms Excel.

3.10.5 Qualitative Data analysis

The analysis of data gathered by interviews will use narrative analysis, discourse analysis, and visual analysis. Data collected through interviews and observations naturally follows a qualitative research analysis approach (Chan, 2017). This would entail inductively identifying the data patterns before proceeding to interpret (Chan, 2017). Narrative analysis will be employed for data gathered from interviews after grouping the data into themes. Discourse analysis examines both spoken and written knowledge and for that reason it will be most appropriate to analyse data gathered from secondary sources and semi-structured interviews

(Sileyew, 2019). Lastly, data generated from observations is going to be analysed using visual analysis tools. Visual data analysis involves analysing images that may come from secondary and primary findings.

3.11 Reliability and Validity

Reliability and validity are important issues in conducting a research study to an extent that they can render the credibility of the research study useless if they are not taken seriously. Reliability is consistency of the research instrument in producing the same results if administered in the same circumstances and similar project (Saunders, Lewis, & Thornhil, 2018). Validity is concerned with whether the findings are really about what they appear to be about. It refers to the appropriateness of the measures used, accuracy of the analysis of the results and generalisability of the findings.

In order to address reliability and validity expert opinion was sought. Both the questionnaire and the interview schedule were send to experts for evaluation and consideration. The correction and advise given were incorporated in the amended questionnaire and interview schedule To complement the expert opinion, the researcher also carry out a pilot test using the Cronbach's Alpha Coefficient to test internal reliability (Saunders, Lewis & Thornhill, 2007; Bruwer, 2010). The calculated coefficient for the items constituting the questionnaire was 0.812295 against 0.70 which is the minimum standard. Consequently, the Cronbach's Alpha Coefficient was considered consistent and reliable since it is more than 0.7 the minimum standard consistency and reliability (Bruwer, 2010)

3.12 Ethical consideration

Research ethics was taken into consideration throughout the research process. The likely ethical challenges were mainly attended to using the Belmont ethical principles (Mabhungu I. , 2017). These are respect of persons, beneficence and justice. In using the Belmont ethical principles, the following ethical issues were addressed in the ways stated:

- Participants of the research study were made aware that participation is voluntary. Furthermore, the participants were conscientised of the purpose of the research study and emphasising that the information generated or accessed incidentally will be kept in

confidence (Saunders, Lewis, & Thornhil, 2018). Divulging this information where necessary is only after authority is expressly granted by the research participant or if there are legal requirements compelling the researcher to divulge this information. This knowledge was given to the researcher in the letter seeking consent of the research candidates to participate in the study.

- The consent letter also expressly stated that the information gained in this study will be used for academic purposes only.
- The researcher also sought permission from companies that provided the research participants. The same gesture was also extended to the employees who are part of the sample participants.
- Furthermore, gathered information was analysed and presented in a manner that protects the identity and maintain confidentiality of the respondents.

3.13 Summary

Chapter three laid out the research methodology which were generally underpinned by the research philosophy of pragmatism. The population of the study was described and the sampling techniques used were justified. This chapter also spelt out the data collection and data analysis instruments employed. Matters of validity, and ethical issues were discussed. Chapter four is dedicated to data analysis, presentation and discussion of findings.

CHAPTER IV

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

The main purpose of this study was to evaluate the impact of environmental management practices on return on investment. The objectives of the research included the identification of EMAPs, roles of EMAPs, factors that limits adoption of EMAPs among mining companies and determining the extent of the influence of EMAPs on performance. The preceding chapter outlined the research methodology used in this study. This chapter presents and analyses data in accordance with the research methodology presented in chapter three. The interpretation was based on inductive and deductive analysis techniques. Discussion of findings was then aligned to the empirical evidence provided in chapter two.

4.1 Response Rate

The table below shows the response rate for the respondents who participated in the research study.

Table 4-1 Response rate

Strata	Target Respondents	Actual Respondents	Percentage %
Accounting	12	9	75
Executive management	9	5	55.6
Quality control	12	12	100
SHE	13	12	92.3
Production	15	11	73.3
Total	**61**	**49**	**80.3**

(Source: Research Survey Data, 2023)

As shown above (Table 4-1) 61 questionnaires were distributed and only 49 were returned representing a response rate of 80.3%. This response rate is inclusive of the interviews carried out only for top executive management who have a response rate of 55.6% (Table 4-1). The reduced response rate is attributable to timing and tight work schedules reminiscent of mining companies. However, the views were entirely represented for each and every stratum have a response rate above 50%. Furthermore, the response rate was statistically significant to make generalisation. According to Ahmad (2017), a response rate above 16% was statistically significant to represent the population from which it was drawn.

4.2 Demographic characteristics of the respondents

In this research study respondents' gender, age and level of education as well as their length of service with their current employer considerations were valued. The following sections presents the research findings in this regard.

4.2.1 Gender, age and level of education

Table 4-2 presents the research findings on respondents' gender, age and level of education.

Table 4-2 Demographic data

	Variable	Frequency	Percent	Valid Percent	Cumulative Percent
	Males	29	59.2	59.2	59.2
	Females	20	40.8	40.8	**100**
	Total	**49**	**100**	**100**	
	18-25	10	20.4	20.4	20.4
	26-33	15	30.6	30.6	51
	34-41	12	24.5	24.5	75.5
	42-49	7	14.3	14.3	89.8
	50^{+}	5	10.2	10.2	**100**
	Total	**49**	**100**	**100**	
	Primary	3	6.2	6.2	6.2
	Secondary	10	20.4	20.4	26.6
	Tertiary	34	69.2	69.2	95.8
	Other	2	4.2	4.2	**100**
	Total	**49**	**100**	**100**	
	PHD	1	2.0	2.0	2.0
	Masters	3	6.1	6.1	8.1
	Bachelor	10	20.4	20.4	28.5
	Diploma	13	26.5	26.5	55
	Certificate	9	18.5	18.5	73.5
	O & A Level	10	20.4	20.4	93.9
	Other	3	6.1	6.1	**100**
	Total	**49**	**100**	**100**	

(Source: Research Survey Data 2023)

As illustrated on Table 4-2, 29 out of 49 respondents were males and 20 were females. This represents 59.2% and 40.8% for males and females respectively. Thus the majority of mining employees are males. This perhaps reflect the physical nature for most of the mining activities which makes them less preferable for women. In terms of age distribution 20.4% of the respondents were between 18 to 25years of age. Of the remaining participants, 26years to 33years (30.6%), 34years to 41years (24.5%), 42years to 49years (14.3%) and above 50years constituted 10.2% respectively. The age distribution is consistent with the employment laws of

Zimbabwe where the minimum age of majority is 18years which is the age an individual can be employed. Highest concentrations of employment is in between 26 years to 33 years and age group 34 to 41 years contributing a total of 55.1%. The statistics are consistent with the education system where most of the graduates of colleges and universities are ready for employment after completing their studies at ages around the mid-twenties to thirties. Consequently, the demographics reflects exactly that.

In terms of the highest level of education attained by respondents, the research study results indicated that the level of education significantly varied. Three respondents (6.2%) have primary education and 20.4% did secondary education. Data findings also showed that more than 73.4% of the respondents had acquired a professional qualification at tertiary level. The implication is that the majority of the respondents were literate enough to answer the questionnaires and were in a position to fully understand and explain environmental issues as related to financial performance.

4.2.2 Respondents' occupational employment section in mining.

This section presents the participants employment profile in terms of the section which they are employed in the mining companies. The analysis was done to determine the contribution of each and every section of the mining companies to environmentalism.

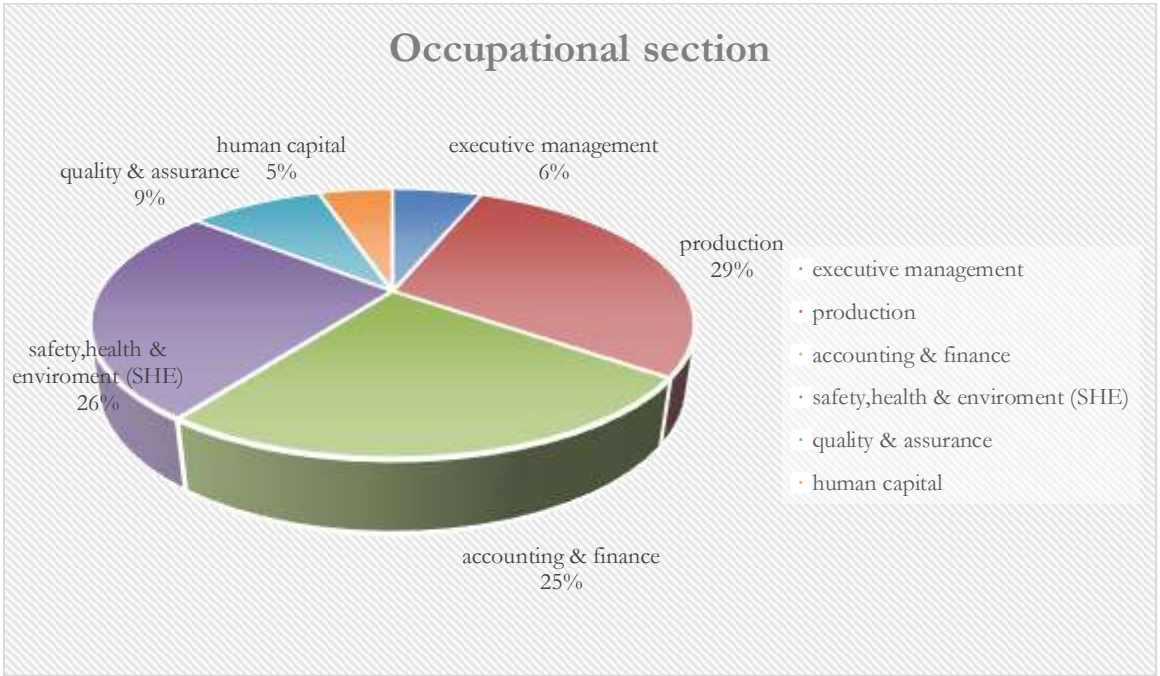

Figure 4-1 Respondents' section 1

(Source: Research Survey Data 2023)

Responses obtained show that the largest percentage of participants are employed in the production (29%), safety, health and environment (26%), accounting & finance (25%), quality & assurance (9%), executive management (6%), and finally human capital (5%). The results show that all the sections which are crucial in the implementation of environmental management accounting practices and environmentalism were fairly represented by the different sections of the mining sector in Bindura. The findings are in alignment with previous empirical review outcomes which established that environmentalism encompasses every department and any activity of any business entity (ACCA Global, 2010; Debnath, 2019; O'Neill, 2017).

4.2.3 Respondents' length of service with the current employer.

This section presents the research participants length of service with the current employer. This was done to determine the association of work experience with the knowledge of environmental issues particularly with mining firms.

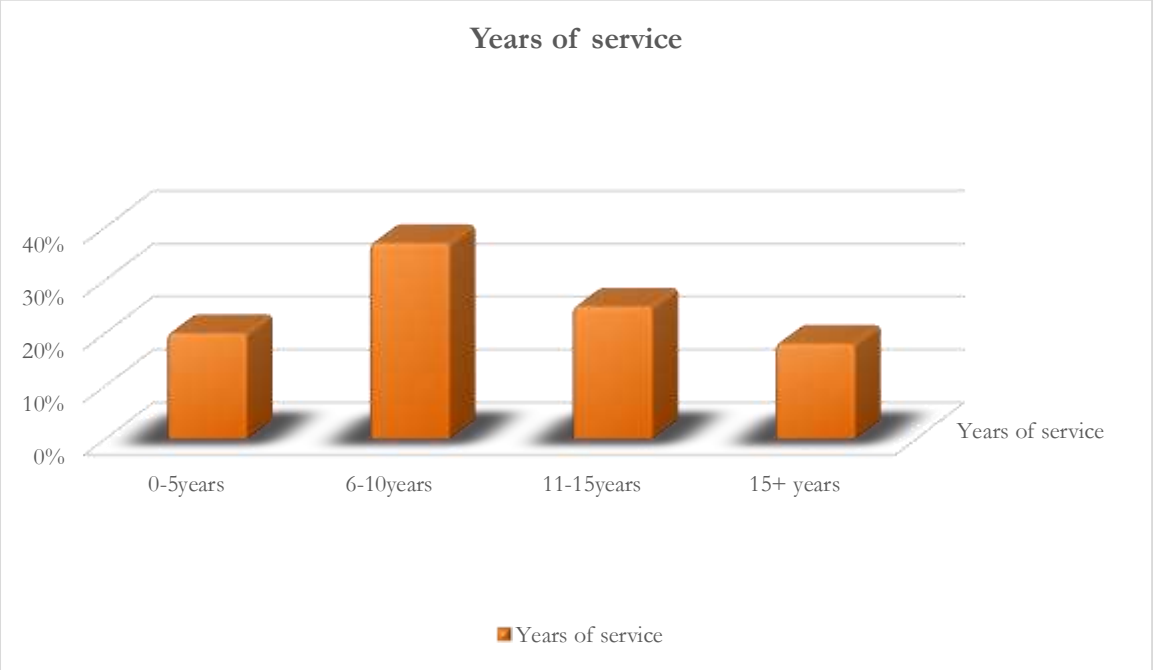

Figure 4-2 Respondents' service

(Source: Research Survey Data 2022)

The results of mining workers experience (Figure 4-2), show that the 0-5years period group has 20%, 6-10years (37%), 11-15years (25%) and 15^{+}years (18%) that only 13% of the workers

are above 10 years' experience (Figure 4.3). The majority of the employees are in the experience level of more than 6years (80%). The implication is that in mining companies there is high labour retention in general. Furthermore, this high level of experience commensurate with the expected level of understanding of environmental issues as they relate to mining entities (Otekunrin, Samu, Sifile, & Matowanyika, 2021)

4.3 Types of EMAPs Frequency of use

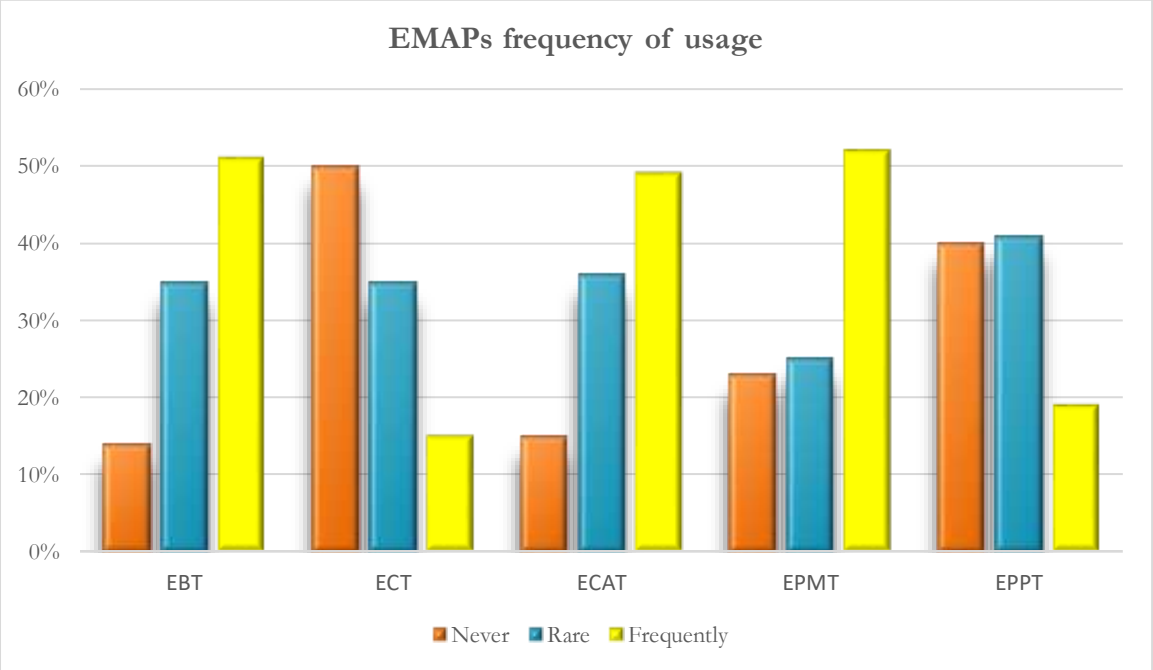

Figure 4-3 EMAPs frequency

(Source: Research Survey Data 2023)

Figure 4-3 shows the frequency of usage of environmental management accounting practices (EMAPs). The EMAPs used identified are:

(i) Environmental budgeting techniques Environmental costing techniques (ECT),
(ii) Environmental capital appraisal techniques (ECATs),
(iii) Environmental performance measurement techniques (EPMTs) and
(iv) Environmental product pricing techniques (EPPTs).

The most frequently used EMAPs are environmental performance measurement tools (52%), environmental budgeting tools (51%) and environmental capital appraisal tools (49%). The results show that three mostly used EMAPs are mainly related to capital expenditure

acquisition and maintenance. To a considerable extend it shows that mining firms are acquiring resources which enables them to be compliant with environmental laws. These results are consistent with the findings of Olubukola et al (2021), who reiterated that entities particularly mining companies invest in environmental equipment inorder to comply with environmental laws and pressures from environmental stakeholders. Environmental laws are strong particularly when it comes to their application to mining companies. Henceforth, the frequency of use of EPMT, EBT and EPAT could be attributable to compliance to environmental regulations.

In contrast the infrequent usage of environmental costing techniques (85%), environmental product pricing techniques (81%) may be accounted to lack of direct relation with costs reduction or enhancing financial performance. The results are consistent with the findings of Savage et al (2002), who argued that adoption of EMAPs is not guarantee to any specific level of financial or environmental performance. However, Hutahayan (2020), strongly objected when he argued that EMAPs promotes innovation and improves financial performance significantly. Furthermore, Hutahayan (2020), revealed that innovation does not need substantial changes to processes. Slight changes to processes that lead to significant costs savings and improved financial performance.

4.4 Roles of EMAPs.

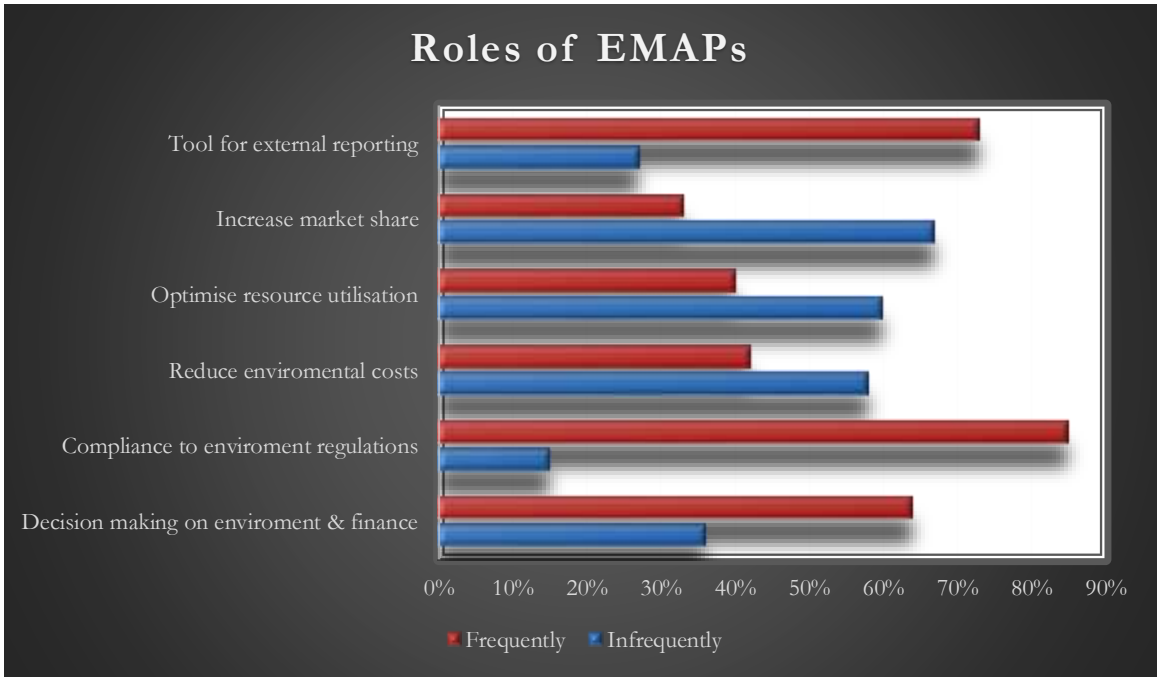

Figure 4-4 Roles of EMAPs 1

(Source: Research survey data 2023)

From the data obtained (Figure 4-4) results indicate that mining companies infrequently use EMAPs to increase market share (67%). Only 33% indicated that they use EMAPs to improve the image of their mining companies and ultimately the market share. Thus, data findings showed significantly lower levels of the usage of EMAPs for reputational purposes and this denotes that mining companies are perhaps oblivious of the potential indirect benefits to be reaped when EMAPs is embedded in strategic making process. Correspondingly, EMAPs are infrequently used for optimisation of resource utilisation (60%), and for cost reduction (58%). Only a few respondents indicated that mining companies use EMAPs to optimise resource utilisation (40%) and for cost reduction purposes (42%). The majority of the respondents were of the view that EMAPs were not primarily adopted for the purposes of increasing market share, cost reduction or optimisation of resource utilisation. If ever these roles were met, this could be accounted to incidental achievement.

The findings agree with the results from key informants interviewed who also indicated that most of the mining companies engage in environmental management only to comply with environmental laws particularly as enforced by EMA. Achievement of any other results inconsistent with this primary purpose is only incidental and not a planned result. This is however inconsistent with the results of Lea et al (2020), who established that adoption of EMAPs particularly environmental costing techniques leads to the exposure of environmental costs and inefficiencies will assist the firm to reduce environment-related capital investments or environmental operating costs. Ultimately, profit margins will be increased or allow the lowering of product prices (Lea et al, 2020).

Contrastingly, most respondents significantly indicated that EMAPs are frequently used for the purposes of external reporting (73%), compliance to environmental regulations (85%), and for decision making related to environmentalism and finance (64%). Thus, data findings substantially show high levels of respondents agreeing that the fundamental roles of engaging in environmentalism is for compliance purposes with environmental laws. The results are consistent with key informants interviewed who indicated that in Zimbabwe environmental and safety laws are very strict to mining companies perhaps because of the nature of mining business which is relatively dangerous in comparison to other business sectors. Key informants also reiterated that even the roles of environmental decision making and the role of external reporting are only supporting roles which are ancillary to meeting the compliance requirements.

The results were also consistent with the findings of Chaudhry et al (2020), who concluded that most of the adopters of environmental management accounting practices implements them only as a tool to comply with the environmental regulatory requirements of the countries in which they operate. Similarly, EMAPs are also undertaken as a direct capitulation to environmental pressures from environmentalism pressure groups.

4.5 Reasons promoting adoption of EMAPs

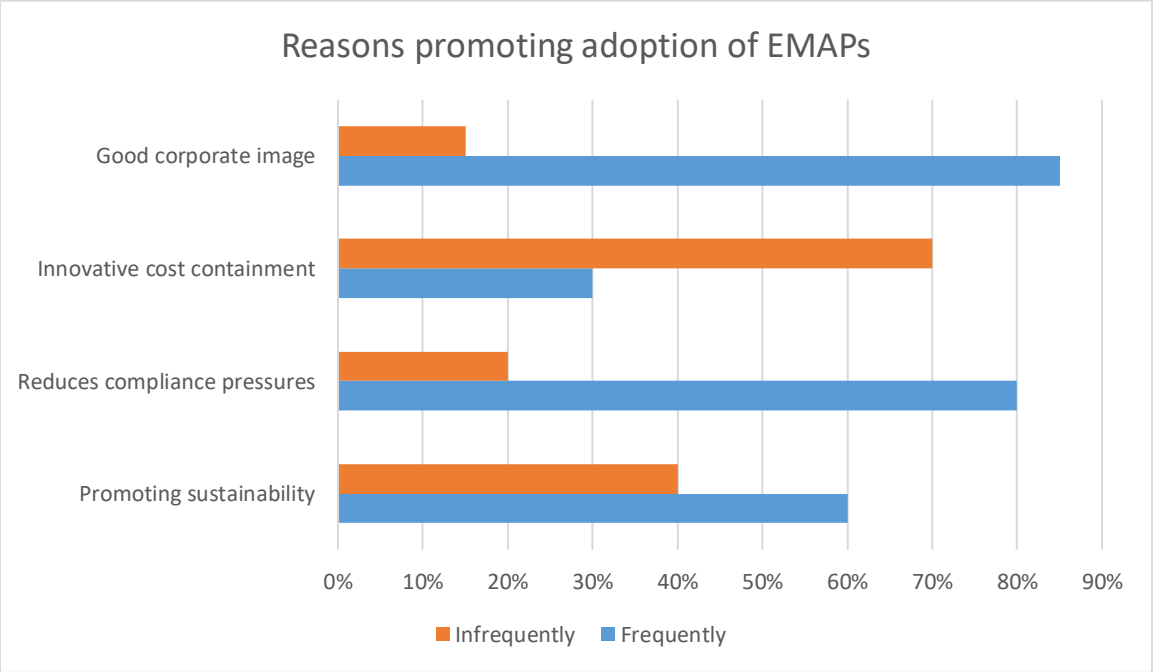

Figure 4-5 Reasons promoting adoption of EMAPs

(Source: Research survey data 2023)

From the data obtained (Figure 4-5) results reveal that major factors promoting the adoption of EMAPs are mainly related to building a good corporate image (85%), reducing compliance pressures (80%) and for sustainability reasons (60%). The results surprisingly, show that the main drivers promoting EMAPs are not related to financial performance although financial performance will eventually be attained incidentally. Nonetheless, the results are consistent with those of Otekunrin et al (2021), who found out that EMA contributes positively in the mining sector, by promoting sustainability. The results also confirm the outcomes of earlier empirical studies which stated that the major promoting factors for adoption EMAPs are to reduce compliance pressures, and sprucing corporate image as opposed to encourage innovative ways of cost containment (Otekunrin, Samu, Sifile, & Matowanyika, 2021). In contrast, innovative cost containment is not a factor attracting mining companies to adopt

EMAPs with 80% of the respondents stating reducing costs is not the reason for up taking EMAPs. This settles the long dispute that companies adopt EMAPs as a cost cutting measure (Czinkotaa, Kaufmannb, Basilec, & Fer, 2020).

4.6 Limiting factors

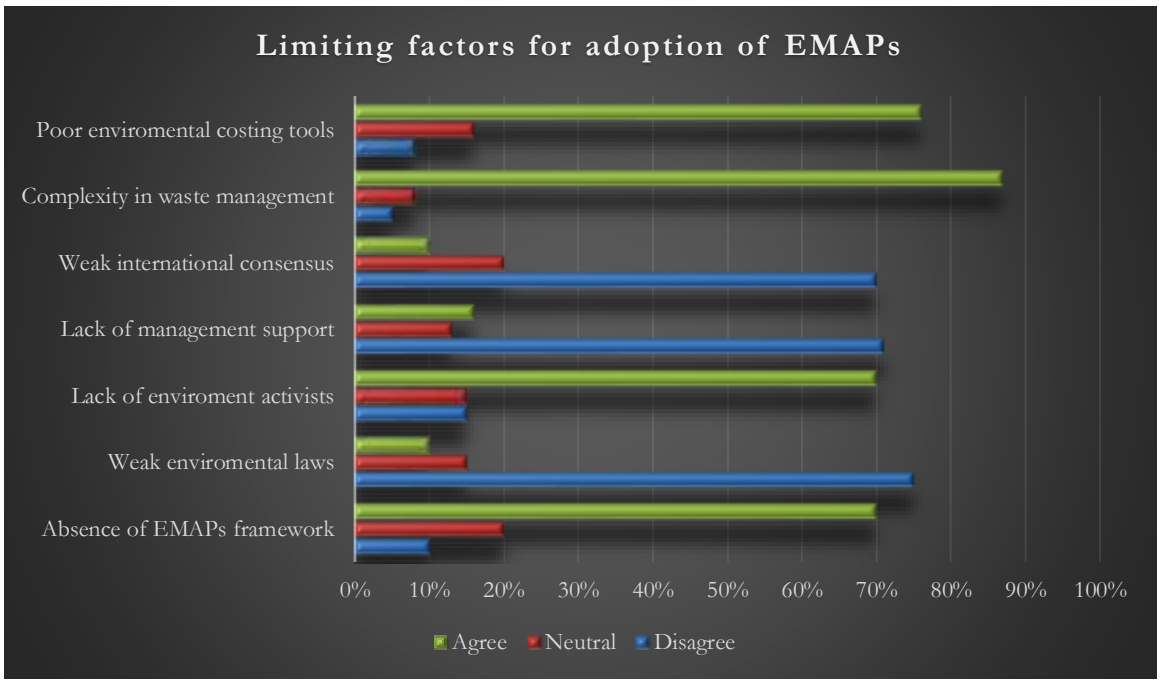

Figure 4-6 EMAPs limiting factors 1

(Source: Research survey data 2023)

Figure 4-6 are the results of the responses to question soliciting the limiting factors on the adoption of environmental management accounting practices. The respondents accounted the significant low adoption of EMAPs as stemming from poor environmental costing tools (76%), complexity in waste management (87%), lack or absence of environmental activists (70%) and absence of EMAPs standards framework (70%). In the words of one key informant interviewed, stated that "the relatively low uptake of environmental management accounting practices is fundamentally accounted for in terms of poor environmental costing techniques, the absence of a universal environmental management accounting standards framework which will guide organisation who are keen to adopt EMAPs. A framework similar to the international financial reporting standards would suffice." Echoing the same sentiments another key informant has this to say, "Low adoption is a result of absence of environmental accounting costing techniques. This is further compounded by lack of knowledge particularly from the

cost and management workers of mining firms since most of their training did not cover the area of environmental accounting."

In line with the current research findings and comments of the key informants, prior studies have also found out that the poor adoption of EMAPs is a result of a skills gap in issues related to environmental cost and management accounting techniques (Karim et al 2017, Lea et al 2020). Furthermore, Lea et al (2020), postulates that the uptake of EMAPs is delayed by the absence of vocal environmental pressure groups such as shareholders, employees, investors and lenders. Similarly, Olubokula et al (2021), concluded that the limiting factors on the adoption of EMAPs among mining firms is attributable to the complexity of EMA and the absence of shared consensus on strategic course of action to address environmental problems. These elements to a larger extend are the reasons which best explains the relatively low uptake of EMAPs among mining entities operating in Bindura.

Surprisingly the findings of this current study refuted the deep held beliefs that weak adoption of EMAPs as indicated by the disagreement percentage, are caused by lack of international consensus on environmentalism strategy (70%), lack of management support (71%) and weak environmental laws (75%). The findings are inconsistent with the results obtained by Lea et al (2020), who accounted the lethargy on the adoption of EMAPs by firms to weak environmental legislation and enforcement. Correspondingly, Olubokula et al (2021), posit that the absence of shared strategic consensus on how to address the environmental problems and lack of top executive support are the fundamental reasons for failure to adopt environmental management accounting practices (EMAPs).

However, these findings were consistent with the comments of two key informants who illustrated that "the belief that the rate of environmentalism uptake is influenced by weak environmental regulations and lack of international consensus does not hold in Zimbabwe. The reasons for that are that Zimbabwe has strong environmental laws and strict enforcement structures when it relates to mining entities. Secondly, the country leadership including the presidium and parliamentarians embrace environmentalism and every effort is put in place to promote environmentalism at workplaces." Thus, to a larger extend factors which limits the adoption of EMAPs are peculiar to the conditions obtaining in a particular country.

4.7 Perceptions on the influence of EMAPs on Environmental Performance

Question 8 was asked to solicit the perception of the EMAPs on environmental performance. A follow up question 9 was asked to evaluate the perception of respondents on the direct influence of EMAPs including environmental performance on return on investment (ROI). The EMAPs tested are developed into sub-hypothesis derived from the alternate main hypothesis:

H_1: The adoption of environmental management accounting practices increases ROI

Consequently, the following sub hypothesis were formulated assessing association on Environmental Performance (EP) and assessing association to return on investment (ROI) as follows:

Association to EP:

- ***H_1:*** *EBT positively influence EP*
- ***H_2:*** *ECT positively influence EP*
- ***H_3:*** *ECAT positively influence EP*
- ***H_4:*** *EPMT positively influence EP*
- ***H_5:*** *EPPT positively influence EP*

Association to ROI

- ***H_6:*** *EPPT positively influence ROI*
- ***H_7:*** *EPMT positively influence ROI*
- ***H_8:*** *ECAT positively influence ROI*
- ***H_9:*** *ECT positively influence ROI*
- ***H_{10}:*** *EBT positively influence ROI*
- ***H_{11}:*** *EP positively influence ROI*

In requesting for the responses, a five-point Likert scale was utilised with weight of 1 = Decreased significantly and 5 = Increased significantly. The researcher employed the Spearman Rank Order Correlation coefficient. The Spearman coefficient works perfectly well with two sets of related ordinal data. Accordingly, the outcomes of the frequency of perceptions were changed to ranking which is aligned to the Likert scale ranking. The reading of the Spearman coefficient ranges from -1 to 1 which implies that a measure between -1 and 0 shows a negative association and a coefficient measure between 0 and 1 also shows a positive

association. It therefore follows that if there is an absence of association the outcome must refute the hypothesis or accept the hypothesis if there is a significant positive association of the variables.

4.7.1 Hypothesis testing using Spearman Rank Correlation coefficient.

Formula: $\mathbf{R_s} = 1 - \frac{6\sum d^2}{n(n^2-1)}$

Rs = Spearman rank correlation coefficient
n = number of paired ranks
d = difference in ranks

Table 4-3 Spearman coefficient-EP

Environmental management accounting tool (EMAP)	$\sum \mathbf{d^2}$	$\frac{\mathbf{6\sum d^2}}{\boldsymbol{n(n^2-1}}$	$\mathbf{R_s}$ $\mathbf{1-\frac{6\sum d^2}{n(n^2-1)}}$
H_1: Environmental budgeting tools (EBT)	9.8	0.49	0.51
H_2: Environmental costing tools (ECT)	7.0	0.35	0.65
H_3: Environmental capital appraisal tools (ECAT)	4.0	0.20	0.80
H_4: Environmental performance measurement tools (EPMT)	9.60	0.48	0.52
H_5: Environmental product pricing tools (EPPT)	18.6	0.93	0.07
$n(n^2-1) = 5(5^2-1) = 120$			

(Source: Research Survey Data 2023)

The results Table 4-3 reveal a significant positive correlation of all the EMAPs on environmental performance. The implication is that the application of EMAPs positively influences environmental performance of mining companies. The results indicate that ECATs (0.80). ECTs (0.65), EPMT (0.52), EBT (0.51) and EPPT (0.07). The results shows that the participants perceive that all the management accounting practices implemented improves environmental performance. However, a weak correlation of was recorded on EPPT (0.07). The results were similar to the findings of K-Hoon et al (2017), who in their studies found out that the uptake of environmental accounting practices determine the level of environmental performance. This is also supported by, Gomez-Conde et al (2019) and Saeidi et al., (2018) carried out research to determine the influence of environmental management accounting on environmental performance and found out that environmental management accounting improves environmental performance. They also emphasised that the greening of industries has become a core determinant of economic competitiveness and sustainable growth. Firms with superior competitive advantage are highly innovative and generally it is complex to imitate their competitive advantage (Ricome, Louhichi,, & Gomez-y-Paloma, 2020).

4.7.2 Perceptions on the influence of EMAPs on Return on Investment (ROI)

Formula: $\mathbf{R_s} = 1 - \frac{6\sum d^2}{n(n^2-1)}$

Rs = Spearman rank correlation coefficient
n = number of paired ranks
d = difference in ranks

Table 4-4 Spearman Coefficient-ROI

Environmental management accounting tool (EMAP)	$\sum \mathbf{d^2}$	$\frac{\mathbf{6\sum d^2}}{\boldsymbol{n(n^2-1}}$	$\mathbf{R_s}$ $\mathbf{1-\frac{6\sum d^2}{n(n^2-1)}}$
H_6: Environmental product pricing tools (EPPT)	11.2	0.32	0.68
H_7: Environmental performance measurement tools (EPMT)	18.9	0.54	0.46
H_8: Environmental capital appraisal tools (ECAT)	23.1	0.66	0.34
H_9: Environmental costing tools (ECT)	9.10	0.26	0.74
H_{10}: Environmental budgeting tools (EBT)	12.95	0.37	0.63
H_{11}: Environmental performance (EP)	16.80	0.48	0.52
$n(n^2-1) = 6(6^2-1) = 210$			

(Source: Research Survey Data 2023)

The results of Table 4-4 shows that all the six EMAPs are positively correlated to return on investment (ROI) with the strength ranging from lowest of 0.34 for ECATs to a maximum 0.74 for ECTs environmental management accounting practices. The implication is that for all the EMAPs under study there is a positive influence on financial performance. Thus, environmental management practices influence financial performance significantly. Consequently, hypothesis:

H_0: The adoption of management accounting practices does not increase ROI is refuted and the alternative hypothesis:

H_1: The adoption of environmental management accounting practices increases ROI is accepted. Hypothesis H1 to H11 represents H1 and are all positively correlated to returns on investment (tax incentives influence profitability significantly.

The hypothesis test results show both consistencies and inconsistencies with previous studies. In the literature on the environment, the study by Chang (2011) revealed that there is a positive association between manufacturing of green products and the entity's ecological ethics and a viable edge (Amir et al., 2020). Similarly, Hutahayan (2020) and Olubokula (2021) in their

researches established that EMAPs adoption promotes innovation and wealth maximisation emphasising particularly firms which adopts environmental life cycle costing. Olubokula et al (2021, posit that environmental management accounting practices are the nexus between the wealth maximisation objective of business and green manufacturing. The current research outcome also corroborates earlier researches. However, in one of the studies conducted by Mahfud, (2015), concluded that environmental innovation on process was blamed for stifling growth of a firm. Nonetheless, this acute difference could have been caused by factors which were not taken into consideration by the researcher.

4.8 Summary

The primary focus of this chapter was to assess the influence of environmental management accounting practices on financial performance as measured by return on investment (ROI) for mining companies operating in Bindura. The secondary objective was to evaluate the influence of environmental management accounting practice (EMAPs) on environmental performance (EP). The analysis employed MS Excel and statistical tools such as the Pearson Rank Order Correlation coefficient to measure association of EMAPs to environmental performance as well as association of EMAPs to financial performance as measured by return on investment (ROI). The results in general showed a positive correlation of EMAPs with environmental performance. Similarly, there was a strong positive association of EMAPs with return on investment. Findings were presented on tables and charts. The charts included inter alia pie charts, bar graphs and histograms. The uptake of EMAPs among mining companies is limited due to limiting factors such as absence of EMAPs standard framework and subdued environmental activism among other factors. The next chapter, Chapter five will present the summary, conclusions and the suggested recommendations of the study.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.

5.0 Introduction

The previous chapter focused on analysis, presentation and discussion of research findings on the impact of environmental management accounting practices (EMAPs) on financial performance of mining companies operating around Bindura. In this chapter, the researcher reviews the main research findings and draws major conclusions that can be deduced from them. The researcher also provides some recommendations that are aimed at stimulating mining companies to adopt environmental management accounting practices (EMAPs) and also to trigger more interest into further research in environmental management accounting.

5.1 Summary

The goal of this research was to examine the impact of environmental management accounting practices on mining entities' financial performance of Bindura mining companies. The research established the following research objectives which were to be addressed by this study; to identify environmental management accounting practices employed by mining firms, establish the roles of management accounting practices, establish the reasons promoting the adoption of EMAPs, identify the limitations on the adoption of EMAPs and to assess the relationship of environmental management accounting practices (EMAPs) with return on investment (ROI).

A mixed method research strategy was employed where a blend of quantitative and qualitative research methods was used. The research findings were triangulated as applying a single method in data analysis would not produce comprehensive outcomes for this research. A sample of 49 employees comprising of top executives and key sections involved in environmental management of mining firms represented. A combination of thematic and hypothesis analysis using the Pearson rank order coefficient approaches were employed to determine the influence of environmental management accounting practices (EMAPs) on financial performance of mining companies in Bindura. Questionnaires were administered to all the 49 participants in addition to the interviews administered to top executive management (key informants). The data was analysed using MS Excel. Following data analysis, the data

was analysed using tables and figures. The main research findings and major conclusions were drawn from them.

The major findings classified according to the research questions were as follows:

Which environmental management accounting practices (EMAPs) frequently used by mining firms in Bindura?

The most frequently used environmental management accounting practices used by mining firms in Bindura are Environmental budgeting techniques, environmental performance measurement techniques, and environmental capital appraisal techniques.

What are the roles of EMAPs to mining firms in Bindura?

The research found out that environmental management accounting practices (EMAPs) are mainly used by mining firms for compliance purposes with environmental regulations and for external reporting requirements. The other important role of EMAPs found is that EMAPs are used to support decision making on environmentalism and its associated financial decisions. Surprisingly, contrary to the deeply held views environmentalism is not pursued for purposes of increasing market share, for optimisation of resource utilisation or reducing environmental costs.

What are the reasons promoting the adoption of EMAPs?

The research found out that the reasons promoting the adoption of EMAPs are related to environmental sustainability, to reduce compliance pressures and for building a good corporate image. The study also found that innovating cost containment measures is not the reason for promoting adoption of EMAPs.

What factors limits the adoption of EMAPs by mining firms in Bindura?

Furthermore, the research survey found out that the major limitations to the adoption of environmental management accounting practices (EMAPs) according to their strength of inhibition are:

- **The complexity in waste management for mining firms**.

  Waste management in mining firms is very complex because there are many different types of waste involved in mining companies which affects primarily the safety of the employees and indirectly the environment. Another complexity is in the form of managing different types of waste which include emissions of emitting greenhouse gases, disposal liquid refuse and solid refuse. Furthermore, they are required to rehabilitate the land on abandoned mines so that they avoid endangering biodiversity. Waste management require a lot of resources and consequently management may be forced to hide some of these need areas.

- The second compelling reason for non-adoption of environmental management accounting practices is **the absence of comprehensive environmental costing techniques.** This is critical because environmental management accounting is an emerging area of study. As a result, there are no costing techniques dedicated to environmental management accounting. Henceforth, environmental management accounting borrows techniques from a sister area of costing and management accounting systems which at times becomes difficult to adopt such tools without some adjustments.

- The third significant finding of the research study inhibiting the adoption of EMAPs among mining firms in Bindura is the absence of an environmental management accounting (EMA) standard framework which is supposed to work as a guideline to assist those who intend to implement environmental management accounting practices. For instance, the framework can come in the form of accounting standards as issued by the International Financial Reporting Standards Board (IFRSB).

- The fourth limiting factor on the adoption of EMAPs in Zimbabwe and in particular mining is the subdued environmental activism. The lack of pressure groups which are very vocal is the reason for the lethargic implementation of environmentalism protocols in Zimbabwe. This is regardless of the fact that we are already experiencing the dangers of the endangered environment such as cyclonic climate changes, the cholera outbreaks of 2009, contamination of water bodies, and unrehabilitated mining pits and dump to mention just a few.

- Another surprising finding is that weak environmental laws, lack of management support and week international consensus on environmental strategy are not in any way an impediment when it comes to Bindura mining firms.

To what extend are EMAPs positively correlated to financial performance?

It was found that environmental management accounting is strongly positively correlated to environmental performance (EP) except for environmental product pricing technique (EPPT) which have a weaker correlation coefficient(r) of 0.07. Similarly, EMAPs are strongly positively associated to financial performance (ROI). The strength of the correlations was measured by the Spearman Rank correlation coefficient.

5.3 Conclusions

From the findings discussed above the following conclusions were made:

a) The level of education of those charged with decision making for mining firms in Bindura is commensurate with the requirements of the implementation of environmentalism. The conclusion was drawn from the finding that, all sections involved in environmentalism were represented and their level of education commensurate with the minimum requirements expected in environmentalism issues.

b) Environmental management accounting practices (EMAPs) are widely and frequently used by mining firms in Bindura. The conclusion was drawn after finding that EBT, EPMT, and ECAT were commonly and significantly used by mining firms in Bindura. The implication is that mining firms in Bindura have embraced environmental management accounting practices. However, the low use of environmental costing techniques and environmental product pricing techniques need to be addressed because they are important in improving financial performance.

c) **Environmental management accounting practices are pursued to meet regulatory requirements, for external reporting and for decision making related to**

environmentalism. The conclusion was drawn from the fact that most respondents (85%) agreed that they practice environmentalism to meet the requirements of the national laws on safety and environment which are very strict in terms of their enforcement in mining firms. Additionally, the enforcing authorities such as Environmental Management Regulatory Authority of Zimbabwe (EMRAZ) has very strict monitoring and reporting requirements which are expected to be met regularly. Failure to meet the regulatory requirements of EMRAZ is often met with punitive action such as withdrawal of mining licence.

- Secondly, meeting external reporting is another compelling reason for adoption especially for mining companies because most of the mining firms are listed firms. They are expected to meet the listing requirements of the Zimbabwe Stock Exchange (ZSE) which expects mining firms to include a sustainability report in addition to the traditional financial reports published.

- Lastly and complementary to meeting regulatory requirements, the research study concluded that EMAPs were adopted by mining firms to facilitating decisions related to environmentalism and financing to support environmental investments. This conclusion was drawn after most of the respondents (64%) attributed the adoption of EMAPs to facilitating environment decision making.

d) This research also concluded that environmental laws are strong in Zimbabwe and particularly for mining firms. The conclusion was derived from the fact that respondents indicated that regulatory requirements were not an inhibiting factor. Furthermore, even when there is weak international consensus on the environmental strategy, lack of management support and weak environmental laws. Those factors do not deter mining firms to implement environmental management accounting practices perhaps because the government of Zimbabwe is positive and supports environmentalism.

e) Environmentalism is not pursued for purposes of improving financial performance of mining firms. It is surprising that factors which are very crucial to enhance financial performance polled very lowly in terms of influencing financial performance. For example, environmental costing techniques (42%), resource optimisation (40%) and increasing

market share (33%) and yet these are factors which are significantly influential in meeting financial performance. It therefore follows that if ever financial performance measures are met, they are achieved incidentally not out of planned activity to reduce costs, increase market share or optimisation of resource utilisation.

f) Influence of EMAPs on environmental performance and financial performance
   - The research study concluded that the adoption of EMAPs determine the magnitude of environmental performance (EP). The outcome was confirmed by the finding that all EMAPs were strongly positively correlated to EP except for EPPT which have a weaker correlation coefficient of 0.07.
   - The researcher also concluded that EMAPs have a great bearing on financial performance as measured by return on investment. The adoption of EMAPs is expected to increase return on investment (ROI). All the EMAPs hypothetically tested were strongly positively correlated to return on investment according to the perceptions of the respondents.

5.4 Recommendations

Recommendations were made to the various stakeholders to the environment and environmental management accounting as follows.

5.4.1 Mining Companies

a) Mining firms should seriously consider including environmental management accounting practices in formulation of their organisational strategy. The mining sector should not only concentrate on practicing EMAPs for the purpose of compliance to regulatory requirements only. They should also seriously consider EMAPs as part of the company strategy formulation activity to improve organisational performance in all its perspectives which include inter alia financial performance and non-financial perspectives. That way they will realise the importance of the often-ignored environmental costing techniques and environmental product pricing techniques. These EMAPs are closely linked to financial performance.

b) Training of environmental management accounting practices (EMAPs).

Knowledge of environmental management accounting practices is crucial for mining companies to be in a position to implement EMAPs successfully and in particular environmental costing techniques and environmental product pricing techniques. Currently, the training was mainly towards training costing and management accounting practices. The environmental management accounting can be spearheaded by universities and colleges who should include environmental management accounting in their training programmes. Also accounting training institutions in Zimbabwe can also initiate training environmental management accounting in their curriculum. However, this to be effective public-private partnership (PPP) are crucial to speed the training and adoption of such policies. The private sector particularly the mining companies would provide the much-needed financial resources and the government will participate by developing policies which are environmentally friendly through legislature.

5.4.2 Government and its Agencies

c) Design fiscal incentive policies to buttress the strong mining environmental laws and safety laws and regulations.

The environmental laws as they relate to mining firms are fairly strong and even the enforcing mechanisms mainly through EMRAZ is considerably efficient. However, the government can expand the number of companies who will voluntarily adopt environmental management accounting practices by incentivising environmentalism. Government through the fiscal policy budget statement and statutory instruments may consider granting generous tax incentives for investing in environmentally friendly technology and capital expenditure. The tax incentives can come in the form duty free for environmental capital expenditure, tax holidays as well as availing affordable credit facilities through the financial institutions specifically for financing investment in environmentalism projects. That the government will go a long way in expanding the adoption of environmental management accounting practices.

d) **Consientising the public on the benefits of practicing environmentalism**.

Humanity is always the victim of environmental degradation which to a greater extend are perpetuated by firms particularly those firms which emits greenhouse gases (GHG) and of course mining firms included. As a result, the public should be on the forefront in ensuring that

firms engage in sustainable environmental management accounting practices by engaging in environmental activism. Environmentalism can be promoted among the public through media organisations. Deliberate and well researched environmental information can be published through media houses. The government can also assist through media reforms to incentivising environmental media information broadcasting. When the public is well acquainted with information pertaining to environmentalism that is when they perceive the dangers posed by firms who contaminate the environment. That way environmental activism groups will ultimately image. Non-governmental organisation can also fill the void left for vociferous activism.

5.4.3 Accounting Boards

a) **Developing an environmental management accounting standards framework specific for Zimbabwe.**

Related to training of EMAPs is the development of a comprehensive environmental management accounting framework which will act as a guideline for those who are compelled to adopt environmental management practices. The development should be inclusive of all sectors affected by environmentalism such as mining sector, services sectors, manufacturing sectors, chemical production sectors and leather tannery sectors among others. However, the development of the framework can be initiated by the Public Accounting and Auditing Board of Zimbabwe (PAAB) through its affiliate member organisations by triggering debate on environmental management accounting practices. In developing the environmental management accounting framework international protocols on environmentalism and the expectations of international laws and local laws should be taken into consideration.

5.5 Recommendations for further studies

Notwithstanding the limitations of this study, the research present possible opportunities for further research which are listed below:

- Firstly, the current study assumes that only a few sections of the mining companies, such as accounting, quality and SHE among others are the only departments or sections of the organisation which are important for the successful implementation of environmental

management accounting practices. Future research may expand the number of decision-makers sections and departments involved in environmentalism to spruce up the scope.

- This study also focused on only six EMAPs. Other future researches can also investigate other types of EMAPs such as environmental target costing, environmental life cycle costing and environmental activity-based costing.

Furthermore, this study focused on only mining companies operating in Bindura. The scope can be extended to include other sectors such as tourism, leather processing firms and textile industries among others. Similarly, the mining sector could be possibly expanded to include Artisanal miners.

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APPENDIX A: CONSENT LETTER

The Effect of Environmental Management Accounting Practices on Performance of Mining Companies. Case of Bindura Mining Companies.

Dear Participant,

You are invited to participate in a research study titled "**The Effect of Environmental Management Accounting Practices on Performance of Mining Companies. Case of Bindura Mining Companies.**" This study is being conducted by **MISHECK MUTARA,** a Master of Commerce in Applied Accounting at Great Zimbabwe University (GZU). This study aims to determine the extent to which Environmental management accounting practices (EMAPs) influence performance of Mining companies operating around Bindura town. Environmental issues are very crucial to the operations of any entity because if not handled well may lead to environmental damage and ultimately to legal implications.

Because you are a decision-maker and participate in environmentalism, your opinions are very valuable for this study. Your participation in this study is voluntary and you are free to withdraw your participation at any time without obligation. The information provided will be kept in strict professional confidence. You are not required as the respondent to reveal your identification information as all responses will be recorded anonymously. While you will not receive any compensation for participating, the information collected in this study will hopefully contribute to environmental sustainability and improved financial performance to your organisation and other mining corporations in Zimbabwe.

For further inquiries, you may contact me via;

Email:

Cell:

Thank you for your time.

Signature ----------

APPENDIX B: QUESTIONAIRE

QUESTIONNAIRE

SECTION A: DEMOGRAPHIC INFORMATION

1. Gender: Male ☐ Female ☐

2. Age:

18-25years ☐

26-33years ☐

34-41years ☐

42-49years ☐

50+years ☐

3. Level of Education:

Primary ☐

Secondary ☐

Tertiary ☐

Other ☐

4. Highest Educational Qualification:

PHD ☐ Masters ☐

Bachelor ☐ Diploma ☐

Certificate ☐ O & O Level ☐

5. What is your position in business?	
a. Manager	
b. Production	
c. Finance	
d. Environment	
e. quality assurance	
f. human capital	

6. How many years of service do you have with your current mining company employer?

0-5years [ ] 6-10yrs [ ] 11-15yrs [ ] 15+years [ ]

SECTION B: ENVIROMENTAL MANAGEMENT ACCOUNTING PRACTICES

Respond to Environmental management accounting practices (EMAPs) which correspond to your responses in question 7

Please use the following scale to answer question 7

1 = Never 2 = Rarely 3 = Frequently 4 = Very Frequently

7. How often does your business use the following environmental management practice?

Environmental budgeting techniques (EBT)	1	2	3	4
Environmental costing techniques (ECT)	1	2	3	4
Environmental capital appraisal techniques (ECAT)	1	2	3	4
Environmental performance measurement techniques (EPMT)	1	2	3	4
Environmental product pricing techniques (EPPT)	1	2	3	4

SECTION C: ROLES OF ENVIROMENTAL MANAGEMENT ACCOUNTING PRACTICES

Please use the following scale to answer question 8. (Encircle in the appropriate box).

1 = Never 2 = Rarely 3 = Frequently 4 = Very Frequently.

8. How often does your business use management accounting reports for the following purposes?

For decision making on environment & finance	1	2	3	4
Compliance to environment stakeholders	1	2	3	4
Expose opportunities to reduce costs	1	2	3	4
For optimising resources utilisation	1	2	3	4
Increase market share	1	2	3	4
Data collection tools for external reporting	1	2	3	4

SECTION D: REASONS FOR ADOPTING EMAPs

Please use the following scale to answer question 9

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

9. To what extent do you agree with the following reasons that promote the adoption Environmental Management Accounting Practices by mining firms?

Wealth maximisation	1	2	3	4	5
Manage costs	1	2	3	4	5
Safety and health purposes	1	2	3	4	5
Increase customer base	1	2	3	4	5
Sustainable growth	1	2	3	4	5
Corporate social responsibility (CSR)	1	2	3	4	5
To scale competitive advantages over rivals	1	2	3	4	5

SECTION D: LIMITING FACTORS ON ADOPTION OF EMAPs

Please use the following scale to answer question 10

1 = Strongly disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly agree

10. To what extent do you agree with the following statements about factors that limit your company from adopting Environmental Management Accounting Practices?

Absence of EMAPs standards framework	1	2	3	4	5
Weak environmental laws	1	2	3	4	5
Lack of environmental pressure groups	1	2	3	4	5
Lack of executive management support	1	2	3	4	5
Lack of international shared consensus	1	2	3	4	5
Complexity of waste management	1	2	3	4	5
Lack of clear environmental costing technique	1	2	3	4	5

PART E : PERCEIVED IMPACT OF EMAPs ON ENVIROMENTAL PERFORMANCE

Use the following scales to answer question 11 (Please encircle the appropriate box).
1= Decreased significantly 2 = Decreased 3= No change 4= Increased 5= increased significantly

11. What are your perceptions regarding the influence of EMAPS on environmental performance (EP)?

Environmental budgeting techniques (EBT)	1	2	3	4	5
Environmental costing techniques (ECT)	1	2	3	4	5
Environmental capital appraisal techniques(ECAT)	1	2	3	4	5
Environmental performance measurement tools(EPMT)	1	2	3	4	5
Environmental product pricing techniques (EPPT)	1	2	3	4	5

PART F : PERCEIVED IMPACT OF EMAPs ON ROI

Use the following scales to answer question 12 (Please encircle the appropriate box).
1= Decreased significantly 2 = Decreased 3= No change 4= Increased 5= increased significantly

12. What are your perceptions regarding the influence of EMAPS on Return on Investment (ROI)

Environmental performance (EP)	1	2	3	4	5
Environmental budgeting techniques (EBT)	1	2	3	4	5
Environmental costing techniques (ECT)	1	2	3	4	5
Environmental capital appraisal techniques(ECAT)	1	2	3	4	5
Environmental performance measurement tools(EPMT)	1	2	3	4	5
Environmental product pricing techniques (EPPT)	1	2	3	4	5

APENDIX C: INTERVIEW GUIDE

ENVIROMENTALISM INTERVIEW GUIDE
1. Which environmental management practices have been implemented by your Company? 2. What are the benefits of adopting environmental management practices? 3. In your opinion what do you think are the reasons for not adopting environmental accounting practices? 4. In your own view, what do you think the Government of Zimbabwe should do in an attempt to improve environmentalism?