

**ENVIRONMENTAL ACCOUNTING PRACTICE:
DETERMINANTS AND EFFECTS ON FINANCIAL PERFORMANCE
OF LISTED COMPANIES IN RWANDA STOK EXCHANGE (2018-2022)**

Roll Number: **202110277**

By

By Armel MUGISHO BUZERA

**Thesis Submitted in Partial Fulfillment of the Academic Requirements for the Award of
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DECLARATION

I, **MUGISHO Armel** certify that the work completed entitled “ **Environmental Accounting Practice: Determinants And Effects On Financial Performance Of Listed Companies In Rwanda Stok Exchange (2018-2022)**” is mine alone, that this work has not been submitted previously to quality for an academic award, that the content of this thesis is the result of work which has been carried out since the official commencement date of the approved research program, that any editorial work undertaken by a third party is acknowledged, and relevant ethics procedures and guidelines have been followed.

MUGISHO Armel

Signature.....

Date/...../2023

CERTIFICATION

This is to approval that this thesis entitled “ **Environmental Accounting Practice: Determinants and Effects on Financial Performance of Listed Companies in Rwanda Stok Exchange (2018-2022)**” was carried out by **MUGISHO Armel** under my guidance, mentoring and supervision.

Supervisor’ Name: **Dr. BASHAYIJA Wilson**

Signature:.....

Date: .../...../2023

DEDICATION

To my Family and Friends

Armel MUGISHO BUZERA

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First and foremost, I would like to thank God. He has given me strength and encouragement throughout all the challenging moments of completing this dissertation. I am truly grateful for His unconditional and endless love, mercy, and grace.

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ABBREVIATIONS, ACRONYMS AND SYMBOLS

CA	Content Analysis
EA	Environmental Accounting
EAD	Environmental Accounting Disclosure
EAP	Environmental Accounting practices
EMA	Environmental Management accounting
EPS	Earnings per Share
ER	Environmental Reporting
GA	Green Accounting
NPM	Net profit Margin
REMA	Rwanda Environmental Management Authority
ROA	Return on Asset
ROE	Return on Equity
RSE	Rwanda Stock Exchange

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ABSTRACT

As environmental problems are increasingly large and widespread at the local, regional, national, and global levels, Environmental disclosure plays a very important part to assure competitive advantages for companies in a world where most investors are getting more and more attracted by green investments, customers are more and more interested in Eco-friendly products and nations are more and more concern in setting up environmental regulations. This study examines the relationship between environmental disclosures with the firms' financial performance of the listed companies in Rwanda stock exchange from 2018 to 2022. Based on both causal and exploratory research design, it aimed at determining the effect of environmental accounting in terms of environmental disclosures to firm profitability measured as net profit margin, earning per share and return on equity. From a global perspective, our findings reveal that the nature of environmental disclosure observed among listed companies in RSE, seems to be rather voluntary than compulsory and even though some firms disclose not too much environmental information in their annual reports, they disclose in parallel the same or even more information on their websites, including sustainability and social reports. Furthermore and as expected manufacturing firms followed by financial institutions disclose more environmental information (Bralirwa :0.75, Cimerwa : 0.74 and KBC: 0.70). From regression models, we have found that larger firms operating as manufacturer, listed in RSE for quite a long time and with a significant board of directors members number are more likely to disclose more environmental information. Regarding the relationship between environmental disclosure and financial performance as proxied by Return on equity (ROE), Net profit margin (NPM) and Earnings per share (EPS), the results indicated that environmental accounting disclosure, by itself and as moderated by industry type and board size has positive and significant effect on net profit margin. Furthermore, results reveal that none of the control variables has significant impact on ROE. Environmental accounting disclosure, by itself and as moderated by, firm size, board size, number of years listed in the PSE, Board size and financial leverage, has no significant effect on Return on Equity and finally the variables board size , the variable EAD itself and moderated by board size affect negatively and significantly Earning per share.

Key words: *Environmental Accounting Practices, Green Accounting, Financial performance, Environmental Performance,*

CHAPTER ONE: INTRODUCTION TO THE STUDY

Environmental accounting practices and how it affects firm financial performance has attracted scholars and researchers interest from both developed and developing countries over the past decades. (Festus & Helen, 2020; Cobranding & Ferrer, 2020; etc...). Although exiting literature tend to be clear concerning factors determining its practices, theoretical as well as empirical research findings on how it affects financial performance still seem to be inconclusive,(Horváthová, 2016). While many research claim for a positive relationship (Carandang, & Ferrer, 2020; Ingumba, 2017; Lestari & Restuningdiah, 2021; Magara & Momanyi, 2015), many other on the other hand still believe that the relationship between EAP and financial performance is rather negative, mixed and even undefined, (Kalash 2020 ; Jagongo 2013; Chaturvedi , 2021, etc....).

1.1. Background to the study

The most difficult environmental issues confronting the world today are global warming and climate change, both of which are caused by business operations, (Mbatuegwu et al, 2022, Bassey et al, 2013). Environmental impact in business refers to the effects of business operations and products on the environment, (Impact day, 2023). They include resource depletion, greenhouse gas emissions, waste generation, and the loss of biodiversity, (Carandang & Ferrer, 2020; Şenol & Özçelik, 2012; Shiland, 2007).

Although manufacturing institutions are blamed primarily for environmental change, service organizations, such as banks and other financial institutions, also contribute as they fund the major industry of any country (Hossain et al. 2016).

Historically, it's been admitted that the richer a country is, the more CO₂ it emits due to the uses of more energy. But this relationship no longer holds true at higher incomes. Many countries have managed to achieve economic growth while reducing emissions. According to the EKC theory, developed countries like the UK and many other countries such as France, Germany, Sweden;...Finland. Have achieved this decoupling, (Ritchie, 2021; Bodin,2022).

Despite the above still-contested reality from higher incomes countries, low and middle incomes countries around the world and especially in Africa are still experiencing a completely different reality. According to Persadie et al, (2005), the issue of the environment is a low priority one in developing countries as they have other “problems” to look after among which are poverty, misery, social inequalities, etc. On the one hand there is the need for environmental protection as advocated by the developed world and, on the other hand, there is the fundamental need for development. Sadly, while the impacts of climate change affect every country on every continent, they don’t do it equally. People already burdened by poverty and oppression in Africa, Asia and south-America often suffer the harshest consequences, while having the least ability to cope.(Mercy Corps, 2018).

In the light of the above, the issue of environment preservation in developing countries and sub-Saharan countries specifically require a particular attention from both, business operators, academics and political leaders.

One of the way through which businesses can protect the environment and society is by properly disclosing environmental information in order to achieve long-term growth and development. (Mbatuegwu et al, 2022). The disclosure and reporting of environmental-performance-related information to stakeholders both within, and outside of an organization is known as Environmental accounting also known as green Accounting, (Nandini, 2020). It is a new form of accounting practice that integrates the principles of sustainable development and social responsibility into corporate management systems, (Senhadji & Seghir 2022)

According to many authors, the environmental accounting debate rose to prominence in the 1990s, (Lodhia, 2015; Festus & Helen, 2020). However, though on one side the public concern for environmental issues is the result of a long process of scientific discovery, political and social commitment, corporations, on the other side, have been slow to go green. One of the reasons for this delay is that for a long time environmental accounting has been regarded as an alternative form of accounting thought and the involvement of accountants in

environmental issues has been often subject to skepticism. (Festus & Helen, 2020). Moreover, according to Enahoro (2009), corporate negligence and avoidance of environmental costing was leaving gaps in financial information reporting.

Based on the foregoing today the modern accounting is no longer merely concerned with record keeping and reporting of financial information to the investors but it aims at fulfilling the information needs of a wide range of internal and external stakeholders. That is why, currently, Environmental accounting is becoming an emerging topic of accounting research in both developed countries as well as developing countries, (Festus & Helen,2020; Carandang & Ferrer,2020), but very little is still known of its practice and importance in Africa, in Sub-Saharan Africa and in Rwanda in Particular.

According to Business daily Africa (2021), in recent year's investors and consumers want to deal with more sustainable companies by 2023 and as a result, through detailed analysis, researchers have proved the existence of a strong relationship between Green Accounting and financial performance which in turn increases the value of a company. (Carandang, & Ferrer, 2020; Ingumba, 2017; Lestari & Restuningdiah, 2021; Magara & Momanyi, 2015; Nor et al, 2016). The application of green accounting can increase the companies' internal and external values (Flammer, 2012; Wang et al., 2017, Restuningdiah, 2020).

Prior research has been contradictory on the relationship between financial and environmental performance. This study is one of the existing attempts trying to understand not only the determinants of Environmental accounting but also and most its relationship to financial performance based on Rwanda Context.

1.2.Problem statement

The debate on a potential impact of environmental practices on business performance has emerged from both theoretical and empirical point of view, and the results have been contradictory (Gallego-Álvarez et al., 2015). While some arguments support the view that environmental practices can enhance economic value, others have argued that it instead generates extra cost to the business. In addition to that, if these arguments have been proved empirically in developed countries, very little of it is still known in developing countries, in Africa and more specifically in the Rwandan context.

Rwanda, as a developing country, has many environmental issues, which require a very strict and responsible environmental management. Among the issues are: land scarcity, soil degradation, deforestation, climate change, natural resource depletion, etc...., (RECCA, 2019). Currently, Rwanda is witnessing an increasing emphasis on environmental conservation and sustainable development. However, the extent to which companies listed on the Rwanda Stock Exchange incorporate environmental accounting practices into their financial reporting and the impact of these practices on their financial performance remains unclear. This makes the current study one of the attempts to fill this gap.

By addressing these issues, the study will contribute to the existing literature on environmental accounting practices and its impact on financial performance. The findings will provide valuable insights for Rwandan companies in terms of understanding the potential benefits and challenges associated with integrating environmental accounting practices into their financial reporting.

However, to the best of our knowledge, studies on this subject have not given the attention it deserves in Africa, given the role that it plays. This last point prompts us to ask questions about the genuine situation on environmental accounting practices in Rwanda, and then seek to link explanations of its influence on financial performance to the various modern theories. To make it, the following objectives will guide us.

1.3. Research objectives

The master research seeks to achieve its general objective of evaluating the impact of Environmental Accounting practice on financial performance of listed companies in Rwanda Stock Exchange by focusing on the following specific objectives:

- To examine the extent to which companies listed on the Rwanda Stock Exchange implement environmental accounting practices.
- To ascertain the influence of Firm characteristics, Environment Certification and financial leverage on environmental accounting disclosure index within listed companies on RSE.
- To assess the influence of environmental accounting disclosure on financial performance of the concerned companies.

It is by attempting to meet these objectives that we assigned to the study the following research questions.

1.4. Research Questions

- What is the nature and the extent to which environmental accounting is implemented within listed companies in Rwanda Stock Exchange?
- What are the determinants and explanatory factors of the implementation of environmental accounting practices by listed companies in Rwanda?
- What is the impact of environmental accounting on a firm's financial profitability and value of listed companies in Rwanda stock exchange?

1.5. Scope of the study

The study will focus on financial reporting of all listed companies in Rwanda stock exchange for the period of Five years or from 2018 to 2022. The choice to this period is justified not only because of the availability of data but also it covers a period during which Rwanda has implemented the new environmental law: the LAW N°48/2018 OF 13/08/2018 on environment that determines modalities for protecting, conserving and promoting the environment in Rwanda.

Similarly, to Carandang and Ferrer, (2020), the study is based on three theories, which are the legitimacy theory, the institutional theory and the stockholder theory to construct the study framework.

Based on the information from these three theories, we were able to configure our model made of Environment disclosures as independent variables on one hand and Profitability, measured by net profit margin and return on equity as dependent variables.

1.6. Significance of the study

Given the increasingly importance and the sensitivity of issue addressed, the study of the effect of environmental accounting practices on the financial performance of companies listed in the Rwanda Stock Exchange carries significant importance for various stakeholders, including researchers, companies, investors, policymakers, and society as a whole. The following are some key significance of this study:

First and foremost, the study contributes significantly to fill the gap in literature on environmental accounting practice in Rwanda. From this perspective, the current research is justified by the possibility of investigating the variables that have shown conflicting results in the existing literature, since some authors have identified a relationship with positive influence between such relationships, and some others, a negative relationship. Therefore, it

is expected that the findings of this research contribute to the existing knowledge on the subject in Africa and Rwanda in particular and to provide evidence for further studies.

Second, the study addresses corporate sustainability by exploring the relationship between environmental accounting practices and financial performance, providing insights into how companies can integrate sustainability into their core operations. Understanding the impact of environmental accounting practices on financial performance can motivate listed companies on RSE to adopt more sustainable practices, reducing their environmental footprint and contributing to long-term environmental sustainability. Then, as investors increasingly consider environmental, social, and governance factors when making investment decisions, this study's findings can guide investors in assessing the financial performance of companies listed on the Rwanda Stock Exchange and their commitment to environmental sustainability. It can help investors identify companies with strong environmental accounting practices, potentially leading to improved investment decisions aligned with sustainable development goals.

From a regulatory perspective, policymakers and regulators can leverage the study's findings to develop effective policies and regulations that promote environmental accounting practices. By understanding the relationship between environmental accounting practices and financial performance, policymakers can encourage companies to adopt sustainable practices through incentives, reporting requirements, or disclosure guidelines. This can drive the integration of environmental considerations into corporate decision-making processes and as result this can facilitate dialogue and collaboration among various stakeholders, including government agencies, industry associations, non-governmental organizations, and the business community. It can serve as a basis for informed discussions on the importance of environmental accounting practices and their role in driving financial performance. The findings can encourage stakeholder engagement, leading to the development of partnerships and initiatives focused on sustainable business practices.

Moreover, as Rwanda strives to achieve its sustainable development goals, understanding the effect of environmental accounting practices on financial performance becomes crucial. The study's findings can provide insights into the potential economic benefits of adopting sustainable practices, such as improved resource efficiency, reduced costs, enhanced reputation, and access to green financing. This knowledge can support Rwanda's efforts in promoting green growth, attracting responsible investments, and advancing its position as a sustainable nation.

Broadly speaking, the significance of studying the effect of environmental accounting practices on the financial performance of companies listed in the Rwanda Stock Exchange lies in its potential to drive corporate sustainability, inform investor decision-making, shape policy formulation, foster stakeholder engagement, and contribute to national development goals.

1.7. Structure of the thesis

The next section after the introduction looks at existing literature, to build a theoretical framework, develop hypotheses and familiarize the reader with concepts, the Rwandan context regarding environmental accounting practice, features, particularities and general assumptions about the relationship between environmental reporting and financial performance. Second, the third chapter describes the research design, the methodological approaches, data collection procedures, variables selections and methods and techniques of data analysis. Third, the study presents research findings describing regressions outcomes and technical interpretation of coefficients respectively. Section four presents the research findings and discussions from an empirical and theoretical point of view while the last section discusses the conclusion, contributions and limitations of the study.

CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

This chapter depicts the theoretical and empirical review supporting the arguments discussed as part of this study. The chapter covers successively the conceptual review, the theoretical review, the review of related literature and the conceptual framework.

2.1. Conceptual Review

2.1.1. Environmental Accounting practice (Environment reporting)

Environmental accounting, it is known also as “green accounting”, could be defined as the information about the damage caused into the environment that is linked to the company’s activities, (Ramos, 2015).

Environmental accounting involves the identification, measurement and allocation of environmental costs, and the integration of these costs into business and encompasses the way of communicating such information to the companies’ stakeholders (Pramanik et al, 2017).

According to Basuki and Irwanda (2018), Environmental accounting is defined as a precaution, mitigation and or avoidance of environmental impact, moving from some chances, starting from repairs of events which caused disasters based on those events. Environmental accounting requires company awareness about potential environmental problems resulting from the company’s operation, such as production of waste and air pollution.

Most of the environmental accounting programs – in both the developed and developing world – however were initiated in the early 1990-ies. The Brundtland report (UN, 1987) that came out in 1987 sparked a lot of interest in sustainable development. The “Earth Summit” held in 1992 in Rio de Janeiro was a major stimulus for environmental accounting as it called in its Agenda 21 (UN, 1992) for “establishing systems for integrated environmental and

economic accounting in all member States at the earliest date, with the main objective to expand existing systems of national economic accounts in order to integrate environment and social dimensions in the accounting framework”..

2.1.2. Necessity of Environmental Accounting

The importance of environmental accounting is increasing because of increasing of environment problems, economic, social and technological developments. Environmental accounting which is for sustainable development is required,(Şenol & Özçelik, 2012).

According to Nandini et al, (2020), Accounting for the environment has become increasingly relevant to enterprises because the issue of the availability of natural resources and pollution of the environment has become the subject of economic, social and political debate throughout the world. Steps are being taken at the national and international level to protect the environment and to reduce, prevent and mitigate the effect of pollution. As a result there is a trend for the enterprise to disclose to the community large data related to environment policies, environment management programs and the impact of environment performance on their financial performance.

Companies and other organizations are required to have accountability to stakeholders, such as consumers, business partners, investors and employees, when utilizing environmental resources, i.e. public goods, for their business activities. Disclosure of environmental accounting information is a key process in performing accountability. Consequently, environmental accounting helps companies and other organizations boost their public trust and confidence and are associated with receiving a fair assessment, (Nandini et al, 2020).

2.1.3. Environment accounting and international financial reporting (IFR)

Currently, there is a growing interest in promoting sustainability reporting, which includes the integration of environmental and social information into financial reports. Organizations are encouraged to disclose non-financial information, such as their environmental impact, corporate social responsibility initiatives, and sustainability efforts, alongside their financial

performance. The Global Reporting Initiative (GRI,) and the Sustainability Accounting Standards Board (SASB) are two notable organizations that have developed sustainability reporting guidelines to assist companies in disclosing environmental and social information effectively, (SASB,2017; GRI,.) Additionally, some countries have also introduced specific regulations or guidelines for environmental reporting, further emphasizing the importance of integrating environmental accounting into financial reporting practices.

2.2.4. Financial performance

Current research indicates that opinions on defining and measuring performance are weakly convergent, with the recommendation of taking a more comprehensive and creative approach, (Golubeva, 2021).

Taking into account the opinions of predecessors, but also the difficulty of defining the concept, it is admitted that performance can be considered an artifact based on which the success of an organization is appreciated (Tudose & Avasilcai, 2020).

According to Tudose et al (2022), the difficulty of defining the concept of performance derives from its multidimensional character integrating aspects related to management, finance, accounting, corporate governance, microeconomics, and more. Approached from a financial accounting perspective, the performance is assessed based on the financial results obtained by a company in a given period. Therefore, to admit that a company is financially successful, its monetary outputs must be higher than the expenses related to its realization.

To measure financial performance, previous studies have adopted a variety of indicators namely Earnings per share (EPS), return on assets (ROA), return on equity (ROE), return on investment (ROI), return on capital employed (ROCE), gross profit to sales (GPS), net profit margin (NPM), dividend per share (DPS), earnings before interest, tax, depreciation and amortization (EBITDA), total assets, sales growth, asset growth, and operating income growth as a measure of profitability. (Makori & Jagongo 2013; Oeyono et al. 2011; Skouloudis et al.2014). As for this research, inspired by various studies (Carandang & Ferrer,2020; Malarvizhi & Matta, 2016) , the return on equity (ROE), earnings per share

(EPS) and Net profit margin (NPM) have been used as proxies for capturing financial performance.

Return on equity (ROE) is a measure of the performance of the firm relative to shareholder investment. Since this is a measure of shareholder returns rather than overall firm profitability, interest expenses are subtracted out of income for this measure.

Net profit margin (NPM) reflects a company's ability to generate profit based on sales (Brigham & Nguyen et al., 2021). This indicator is considered important to follow because a significant decrease may generate the risk of bankruptcy.

The term **Earnings per share (EPS)** represents the portion of a company's earnings, net of taxes and preferred stock dividends, that is allocated to each share of common stock. The figure can be calculated simply by dividing net income earned in a given reporting period (usually quarterly or annually) by the total number of shares outstanding during the same term. Because the number of shares outstanding can fluctuate, a weighted average is typically used (Islam, 2014).

According to JHvH-de-Wet (2013), EPS is considered to be the single most popular, widely used financial performance benchmark of all. Harvey and Rajgopal (2004) as cited in JHvH de Wet (2013), surveyed 400 financial executives in the USA and reported that the majority, by far, were of the opinion that earnings per share were the most important performance measure they report to outsiders. EPS is also the mainstay undergirding strategic decision making like share valuations, management performance incentive schemes and merger and acquisition negotiations. EPS is simple to calculate and easily understood and management is congratulated when there is positive EPS growth. It is no surprise that managers take a special interest in EPS when their compensation is linked to the EPS performance of the company.

2.3. Theoretical review

The theoretical framework which gives the meaning of a word in terms of the theory on environmental and social responsibility disclosure established in this study is Stakeholders Theory (ST). It assumes both knowledge and acceptance of this theory that this research work depends upon.

2.3.1. Stakeholders' Theory

This theory focuses more on meeting stakeholders' demands to achieve strategic firm objectives. It considers the different stakeholder groups within society and how they could best be managed. It looks at the relationships between an organization and others in its internal and external environment. It also takes into consciousness how these relationships affect the way the organization operates. (Mbatuegwu & Ogoh, 2021) as cited in Mbatuegwu et al, 2022).

As there are different groups of stakeholders with a different level of interest an organization should publish all kinds of environmental accounting information to its stakeholder through annual reports, brochures, magazines, policy guidelines, websites, or sustainability reports so that all groups of stakeholder's interests are considered properly (Kilic et al., 2015).

An organization contributing to environmental sustainability is likely to remain profitable eventually, because environmental sustainability activities are expected to portray a good image of the organization, such as to attract customers' patronage and investors' interest, incidentally, leading to favorable financial performance. For example, an organization that promotes environmental sustainability by remedying environmental damages caused by the release of toxic substances, emission, waste or pollution into the environment as a result of its operations will be seen as being environmentally-friendly. Also an organization that promotes social sustainability through the delivery of corporate social responsibilities is likely to earn the goodwill of the society. Firms enhancing economic sustainability by providing goods and services that meet the needs of the society will equally enjoy public patronage. Either a firm

engages in one or all of the three sustainability approaches – environmental, social and economic— such a firm will have a good public image, which will favor it as per patronage by the public, thereby eventually leading to profitability (Miles, 2012)

2.3.2. Legitimacy Theory

Legitimacy theory explains and considers the relationship between organization and society (Killic et al, 2015). Suchman (1995) defines legitimacy as a generalized perception or assumption that the actions of an entity are desirable, proper, or appropriate within the same socially constructed system of norms, values, beliefs and definitions. Legitimacy theory in the research can be divided into strategic and institutional (Comyns, 2015). Strategic legitimacy consists of resources and control which an organization uses to achieve social support over managerial performance (Comyns, 2015). Strategic legitimacy explains organizations' desire and motivation for Environmental Accounting and Reporting (EAR) and Sustainability issues. From the legitimacy perspective EAR reporting is an influential instrument of a company to communicate with society (Lu et al, 2015). Legitimacy is important for every organization to manage its strong and reputed position and status in the society and to know the reactions of respondents from the society. For the legitimacy concern companies are interested in disclosing positive information rather than negative information (Sobhani et al, 2015). Organizations in both developed and developing countries use publications and reports to mitigate pressure on controversial environmental decisions by which legitimacy is threatened (Comyns, 2015).

Nowadays, organizations are very concerned about public perception of their prevailing environmental activities for that they consider EAR reporting is an emerging tool to gain societal support and reputation (Lu et al, 2015; Comyns, 2015). Therefore, legitimacy comprises social systems, norms, rules and meaning that can ensure companies responsibility and accountability on EAR. Moreover, legitimacy can create opportunities and attraction of economic resources to ensure social and political support (Nurunnabi, 2015). Prior research on legitimacy has documented the use of social disclosures in annual reports as tools to

legitimize organizations. Many studies have found that EAR disclosures are commonly positive and self-praising, with a little bad and neutral news disclosed (Comyns, 2015). Therefore, we expect that Rwandan companies will disclose EAR information to cope with the legitimacy pressure from the societal expectations.

2.3.3. Institutional theory

As mentioned above, environmental accounting refers to the process of identifying, measuring, and reporting the environmental costs, liabilities, and performance of an organization. It includes capturing and reporting data related to environmental impacts, such as greenhouse gas emissions, water usage, waste generation, and other environmental indicators.

Institutional theory helps understand how environmental accounting practices and disclosures are influenced by the institutional environment in which organizations operate. According to institutional theory, changes in the institutional environment of organizations may result in homogeneity, which would stimulate, or hinder, the adoption of new organizational practices, such as EMA.

The institutional theory states that intra-organizational framework and actions depend mostly on exterior issues rather than on diminishing cost purposes (Moll et al., 2006). Organizations implement socially accepted structures and procedures when they face pressure from the institutional environment (Carpenter & Feroz, 2001). The new institutional theory asserts that action is an opposite reaction of the external environment and challenges that shape the social choices, which are the result of the institutional environment (Wooten & Hoffman, 2008).

2.4. Review of Related Literature

The integration of environmental factors into accounting practices has gained increasing attention as organizations recognize the importance of sustainable business practices. Understanding the potential impact of environmental accounting practices on financial performance is crucial for both companies and policymakers in both developed and

developing countries, as they strive for sustainable development. This literature review aims at exploring existing studies on environmental accounting practices around the world and its relationship to financial performance.

2.4.1. Studies on Environmental accounting practices

Current environmental accounting practices focus primarily on environmental reporting. Consideration of internal environmental accounting mechanisms is often neglected. An immense literature is devoted towards the reporting of environmental information in annual reports. On the other hand, fewer studies have concentrated on the actual evolution of environmental accounting systems in organizations, from the establishment of environmental policies to the reporting and evaluation of environmental information, (Lodhia, 2015).

Shoeb et al (2022) carried out study to examine the importance of Environmental Accounting Disclosure Practices (EADP) and provide a systematic review based on the existing literature. Bibliometric analysis technique was used in his research work based on the Scopus database over a 30-year period (1991- 2021), using a sample of 190 articles, authors determined the most relevant journals, influential authors, countries, keywords, academic institutions, most cited papers, and trends. The results of the study showed that this area of research is still at an early stage but is developing at a greater pace. The current analysis revealed that there is a steady rise in publications, and major academic work in this area was from Italy, the USA and the UK. This research also highlighted that environmental accounting disclosure practices have a positive effect on a firm's performance and that these disclosure practices are significantly dependent upon the firm's characteristics such as firm size, profitability, time of listing, financial leverage, board size and firm age. This research work did not consider books and chapters but only includes papers published in academics and international journals.

Mia (2022), in a research on environmental accounting and its practices in Bangladesh, evaluated the status of environmental accounting and its practices as a new idea and tried to

identify what are the challenges faced in Bangladesh. Based on secondary sources of information, the data used was collected from the various published annual reports of the organizations. Its findings revealed that the use of environmental accounting has increased tremendously in Bangladesh and is no exception. This growing use of environmental accounting in all sectors of Bangladesh is raising awareness for the development of public or private environments. Sustainable development of the environment is possible by revolutionizing awareness about environmental protection at the individual and institutional level along with the government initiatives and proper monitoring

Yusoff et al (2013) investigated the state of environmental reporting by Malaysian and Australian companies on 'other' reports, i.e. other than annual reports. The study employed content analysis to study the environmental disclosures made by the selected 100 companies in the two countries. Regression analysis was performed on potential influencing factors for environmental reporting. The findings are also compared to previous studies on environmental reporting in corporate annual reports by Yusoff and Lehman (2008). The paper finds that environmental reporting in 'other' reports (Malaysia and Australia) are largely descriptive and in qualitative form. In addition, the influencing factors for environmental reporting are of similar quality to those made in annual reports, in both countries.

Festus and Helen (2020), examined the environmental accounting and reporting practices, its significance and issues in listed deposit money banks in Nigeria. Based on primary data collected from the total number of 34 accountants, his main findings of the study showed that the respondents have felt the strong significance of EA (Environmental Accounting) and ER (Environmental Reporting) in their Annual Reports and have also been aware of EA and ER practices. Moreover, the respondents have identified some major problems involved in EAR (Environmental Accounting and Reporting) practices and also have suggested some measures.

Ribeiro and Aibar-Guzman (2010) conducted a study whose purpose was to examine the extent to which Portuguese local entities have implemented a set of environmental accounting practices, and to analyze some potential determining factors of their use. Data were collected by sending a postal questionnaire to a sample of medium-sized and large city councils and the municipal companies belonging to those municipalities. Three variables were considered as possible factors that drive the development of environmental accounting practices in the local public sector. The degree of development of environmental accounting practices in Portuguese local entities is low. Organizational size and the degree of development of environmental management practices are positively and statistically related to the level of development of environmental accounting practices. However, the findings suggest that the existence of compulsory environmental accounting standards is not positively associated with the development of environmental accounting practices by Portuguese local entities

Nguyen (2021) investigated the impact of factors affecting the environmental accounting of enterprises in the food and beverage industry in Vietnam, providing more empirical evidence on factors affecting environmental accounting. The research method used a questionnaire survey of managers at all levels, chief accountants, and cost accountants, of 56 enterprises in the food and beverage industry. After applying quantitative research, results showed that 6 factors positively affect environmental accounting practices, which includes Firm size, Stakeholders, Awareness/Knowledge of leaders, financial resources, Qualifications of staff, and Regulations, in which stakeholders and leaders' perceptions are the most influencing factors. Based on the research results, the author has proposed recommendations to improve the ability of enterprises to successfully implement environmental accounting in the food and beverage industry, thereby contributing to improving the operational efficiency of the food and beverage enterprises.

Ikram (2022), conducting a study aiming at presenting the environmental concept and its integration in the economic sphere, particularly within a company from an accounting point

of view via environmental accounting. Then, the second objective was to discuss the determinants and/or the explanatory factors of the establishment of environmental accounting practices from a theoretical point of view, while mobilizing the neo-institutional theory, the theory of stakeholders, contingency theory...in order to propose an explanatory model.

2.4.2. Studies on the Relationship between Environmental Accounting and Financial Performance

Currently, despite recent advances in the fields of Accounting, Finance and Management, previous researches still show that there is contradiction regarding the effect of environmental accounting on financial performance. According to these researches, investors would prefer to invest in companies that care about the environment or have implemented green accounting (Dewi & Oriana, 2014). The adoption of green accounting can affect the companies' stock price and can increase the value of the company (Maya et al 2018; Puspitasari, 2018; Clarkshon et al., 2013 and Tanc, & Gokoglan, 2015). However, this is contrary to the results of research conducted by Zulhaimi (2015) and Suka (2016) that there is no change in stock prices before and after the adoption of green accounting.

Aggarwal,(2013). Through a review paper, analyzed both types of papers in which a positive and negative relationship was concluded between financial performance and environmental accounting. The paper concluded that factors which lead to positive relationship are good stakeholder relations; improved reputation; talent retention of better qualified employees etc

A. Positive relationship

Haixia and Jianping (2023) questioned the relationship between environmental disclosure and financial performance in china. Trying to answer the question, the study focused on the heavy polluting enterprises in China from 2008 to 2019 to investigate the relationship between environmental disclosure and financial performance as well as the mediating effect of provincial level characteristics namely economic development and information penetration using hierarchical linear model (HLM). Findings showed that there is positive relationship

between both mandatory environmental disclosure and voluntary environmental disclosure and financial performance; economic development positively relates to corporate financial performance, and it also strengthens the relationship between environmental disclosure and financial performance; information penetration positively relates to corporate financial performance, but it weakens the relationship between environmental disclosure and financial performance. As time goes on, corporate financial performance will significantly rise in general.

Malik et al, (20123) in their study focused on the impact of environmental disclosure on financial performance, aimed at exploring the mediating impact of green innovation and provide novel evidence regarding this relationship using stakeholder and signaling theory. Using a sample dataset comprising Chinese firms listed on Shanghai and Shenzhen stock exchange for the period of 2005–2016, empirical results showed that environmental disclosure affects firm financial performance directly and positively influences it through green innovation in Chinese firms. The study suggested that Chinese firms have implications for improved performance by increasing environmental disclosure and green practices

Rakiv et al, (2019), based on a case study on listed Manufacturing companies of Bangladesh, they tried to observe the relationship of company profitability and extent of environmental accounting reporting disclosures in the annual reports. An Environmental Accounting Reporting Disclosure Index (EARDI) was developed consisting of 21 major environmental accounting disclosures. Return on Asset (ROA) was used as the proxy variable for company profitability. To obtain the EARDI score, content analysis has been used and statistical techniques such as frequency, mean, standard deviation, ANNOVA, Bi-variate regression model analysis has conducted to acquire research findings. The research paper disclosed that only 41 of 166 companies are providing some sort of environmental disclosures in their annual reports and there is a significant positive relation between company profitability and EARDI. Fatah and Hamad, (2022), examined the theoretical framework for the concept and

aimed to investigate the impact of environmental cost accounting on the financial performance of oil companies in Iraq. The research used only secondary data over a ten-year period (2010-2020). The time-series data were collected from the financial statements of selected oil companies that are operating in Iraq under licenses granted by the Ministry of Oil in Baghdad. Regression analysis findings indicated that the three environmental cost variables have an impact on the financial performance of oil companies which was measured by ROA.

Nandini et al (2020) investigated the Impact of Environmental Accounting on Profitability of Companies listed in Bombay Stock Exchange. The study has considered the Amount spent on Environmental protection as an Independent variable and Return on Capital Employed, Return on Assets, Return on Net worth/equity, Net Profit Margin and Dividend per Share as Dependent variable. The data was collected from 18 companies listed in the Bombay Stock Exchange for 10 years from the Annual report of companies. The data collected were analyzed using Panel data Regression in Views. Results revealed that there is a significant Relationship between Environmental protection Cost and Return on Capital Employed, Return on Assets, and Return on Net worth/equity, Net Profit Margin and Dividend per Share. The study shows that Environmental accounting impacts positively on Firms profitability.

Ingumba (2017) carried out a study aiming at examining the effects of environmental accounting and reporting practices on profitability of manufacturing firms listed on Nairobi security exchange. Applying descriptive design with secondary data from 10 manufacturing firms listed on NSE from 2014 to 2016, the study confirmed a positive relation between environmental accounting practice and firm's profitability measured by ROA. Magara et al (2015) investigated the impact of environmental accounting on financial performance of corporate organizations in Kisii County. The study used descriptive research design. The study was carried out at Kisii County with a target population of 144 accountants and

auditors in the 16 corporate organizations. The study adopted a stratified sampling design where simple random sampling technique was used to identify a sample size of 49 employees drawn from all the 16 corporations. Both qualitative and quantitative data were collected using questionnaires, and secondary data and descriptive statistics were used to analyze the responses. Findings revealed that the perceived financial performance of the corporate organization in general was in good status as perceived by the employees. Analysis of individual perceived financial performance parameters shows that revenue generation has been improving, cash flows are seen to be in a good state and profitability has been on the increase.

Lestari and Restuningdiah (2020), carried out a research aiming at explaining the effect of green accounting on firm value. The research used control variables, such as profitability, sales growth, leverage, and size of natural resource management companies. The population of this research consisted of mining and agriculture sector companies listed on the Indonesia Stock Exchange (BEI) in 2016-2018. The results proved that the implementation of green accounting has a significant positive effect on firm value. The higher implementation of green accounting will be followed by an increase in the value of the company.

Bassey et al, (2013), examined the impact of environmental accounting and reporting an organizational performance with particular reference to oil and gas companies operating in the Niger Delta Region of Nigeria. The study was conducted using the Pearson's product moment correlation co-efficient. The elements were selected by means of random and stratified sampling technique. Data were gathered from primary and secondary sources. Data collected were presented using tables and analyzed using the Pearson's product moment correlational analysis. Findings revealed that environmental cost has satisfied relationship with firm's profitability. It was concluded that environmentally friendly firms will significantly disclose environmental related information in financial statements and reports.

Seun et al (2023) examined environmental accounting practices and financial performance of listed aviation firms in Nigeria; using environmental research and development, pollution control, and waste management on return on asset. The study found that environmental accounting practices negatively and significantly affect financial performance. Individually, the result shows that research and development and waste management had a significant negative effect, while positive and significant effects of environmental pollution and control policy manifested in the financial performance of the aviation firms. The study, therefore, concluded that environmental accounting practices have the ability to influence the financial performance of aviation firms in Nigeria.

Fabian et al (2022), investigated the impact of environmental accounting practice and social responsibility disclosures on value of Oil and Gas Firms in Nigeria by using the GRI G4 on content index to measure environmental accounting practice and social responsibility disclosures while firms' value on the other hand was represented by net assets per share (NAPS). The researchers has adopted an Ex Post Facto design with secondary data from annual financial reports of the entire oil and gas firms quoted on Nigerian Exchange Group (NGX) from 2016-2020. After estimation using OLS regression model operated with STATA V.15, the findings of the study indicated that environmental accounting practice & social responsibility disclosures have significant and positive influence on firms' value measured by net assets per share (NAPS) at 1% significant level. Thus, the study concluded that environmental accounting practice & social responsibility disclosure positively improved firms' performance over the years. Adesanmi, (2022) conducted a similar study in Nageria and based on his analysis; the results revealed that environmental accounting practices had a positive effect on stakeholders' value in Nigeria. Yaakoo (2021) examined data from the Nigerian Stock Exchange from 2012 to 2019. Panel data analysis techniques such as the Fixed Effect Model, Random Effect Model, Pooled Ordinary Least Square, Hausman Test, and Wald Test were used to analyze the data. Finding revealed that environmental accountability has a favorable but modest effect on the return on asset, according to the study.

B. Negative, Mixed or Non-definitive relationship

Kalash (2020) investigated the determinants of public disclosure of environmental information by firms and its effect on their financial performance. Using a sample of 66 firms listed on Istanbul Stock Exchange during the period of 2014-2018, he found that highly leveraged and larger firms and firms with higher equity agency costs are more likely to disclose environmental information. However, the results indicated that profitability, industry type, information asymmetry, investment opportunities and business risk do not affect the probability that the firm will disclose environmental information. Finally, he found weak evidence that environmental disclosure affects the financial performance of Turkish firms.

Jagongo (2013) carried out a study to establish whether there is any significant relationship between environmental accounting and profitability of selected firms listed in India. The data for the study were collected from annual reports and accounts of 14 randomly selected quoted companies in Bombay Stock Exchange in India. The data were analyzed using multiple regression models. The key findings of the study showed that there is a significant negative relationship between Environmental Accounting and Return on Capital Employed (ROCE) and Earnings per Share (EPS) and a significant positive relationship between Environmental Accounting and Net Profit Margin and Dividend per Share. Based on this it was recommended that the government should give tax credit to organizations that comply with its environmental laws and that environmental reporting should be made compulsory in India so as to improve the performance of organizations and the nation as a whole. Khandelwal and Chaturvedi , (2021), conducted a research almost in same line with Jagongo (2023). However, for measuring independent variables the study used environmental index for environmental disclosure while ROA, EPS, ROE and Profit Margin were used as the dependent variables for the study to act as the parameter for measurement of financial performance. Findings revealed that no relationship was found between TED, Profit Margin and EPS. The

multivariate test, on the other hand, showed that Environmental Disclosures have a significant effect on ROA and ROE

Ali (2015), study aims to investigate the existence of environmental disclosure and financial performance among top 100 companies of market capitalization in Malaysia for the year 2011. The needed information was examined by content analyzing the companies' annual report. The analysis shows mixed results between the existence of the environmental disclosure practices in Malaysia and financial performance.

Dhar and Chowdhury (2021), conducted a study whose aim was to explore the effect of environmental accounting reporting (EAR) practices on the financial performance of the banking industry of Bangladesh. Panel data consisting of 25 listed banks in Dhaka Stock Exchange (DSE) over the period 2012 to 2016 has been employed in the study. An environmental accounting reporting score (EARS) index has been developed by analyzing the content of banks' annual reports. After Using Pooled OLS, the analysis revealed that EAR reporting had been increased after publishing the Bangladesh bank guideline. The empirical analysis showed that a significant positive correlation between EAR and profit margin (PM). However, EAR has an insignificant relationship with ROAE (return on average equity), EPS (earnings per share), and ROAA (return on average assets). Among control variables, size, capital ratio, overhead expense, and loan ratio have a significant impact on financial performance

Ogbonna, (2019) examined the effect of environmental accounting on the economic development in Nigeria. The study concluded that in Nigeria environmental accounting practices adopted by the companies did not play any pivotal role in progress of the economy. Hence, suggested to the government to augment the functioning of environmental laws in the country to make it more stringent for business organizations to surpass their environmental responsibilities. **(Lolo & Rum 2019)** scrutinize the significance of amalgamating environmental matter in the financial and decisional economic entity. Environmental

accounting can reap ample advantages for an organization, which include cost savings and improved management effectiveness in both large and small organizations, in addition can benefit from getting an environmental audit. Environmental costs have been documented according to the categories of expenses according to their functions and should be reflected in the costs and expenses of the current accounting period. **Isaac et al (2019)** re-examined the issue of Environmental accounting in the context of how it affect sustainable financial performance of firms in Nigeria. Using data from ten petroleum companies operating in the Niger – delta part of Nigeria over a period of 48 years (1970- 2017), authors analyzed through the lenses of ordinary least square regression method. Findings suggested that environmental operating costs and environmental prevention costs have significant and negative effect on the performance of petroleum firms in Nigeria. **Solanke et al (20121)** examined impacts of environmental accounting disclosure and financial performance of Four (4) listed Information and Communications Technology firms in Nigeria. The study used secondary data from the published annual financial reports in Nigerian stock exchange from 2010-2020 and the data were subjected to multi-regression analysis. The financial performance of information and communications technology firms in Nigeria served as proxies for return on asset (ROA) and earnings per share (EPS). It was discovered that there was a mixed relationship characterized on the one hand by positive relationship between the variables while using return on asset but earnings per share displayed negative relationship between the variables with co-efficient of EPS and ROA on the other hand.

Malarvizhi and Matta (2016), conducted a research whose objective was to understand whether there is any significant relationship between Corporate Environmental Disclosure (CED) and firm performance of selected companies listed in Bombay Stock Exchange (BSE), India. Using content analysis methodology by developing an environmental disclosure index (EDI) to measure the level of environmental disclosure through a sample of 85 companies from chemical, energy and metal sector listed in BSE. A regression model with EDI as dependent variable and return on capital employed (ROCE), return on assets (ROA), net

profit margin (NPM) and earnings per share (EPS) as independent variable were used to analyze data for this research. Results showed there is no significant relationship between the level of environmental disclosure and firm performance.

2.4.3. The Rwandan Context:

The Republic of Rwanda has environmental challenges that are evident in terms of land and wetlands degradation, water pollution, soil erosion etc. Apart from the high population pressure on natural resources that cause environmental degradation another area of great concern are large projects like industries, mining and agriculture. The large projects apart from degrading land produce wastes that in many cases pollute the environment. For example wastes from industries that include discharges in gaseous, liquid and solid phases can have harmful impact on resources and human beings (REMA, 20009)

This point provides an overview of the Rwandan business and regulatory environment, emphasizing the growing importance of sustainability and environmental responsibility. It also reviews any existing studies or reports specific to environmental accounting practices and financial performance in Rwanda.

Before listing the still rare existing literature on environmental accounting and its effect on financial performance, it is important to note the findings of Horváthová (2016), who investigated the issue about the impact of environmental regulations/performance on firm performance and whose findings revealed that the positive link between environmental accounting and financial performance is found more frequently in common law countries than in civil law countries. Rwanda as a civil law legal system but now undergoing a transformation from purely civil law to a merger between civil law and common law appears as an interesting case study.

Twesige and Mbabazize (2013), published a research paper reporting results of an explanatory survey of literature on the relationship between environmental accounting,

macroeconomic indicators and sustainable development in Rwanda. A detailed survey of the literature on environmental accounting, national accounting and sustainable development was used by the researchers in order to establish correlation between those variables. The macroeconomic indicators were measured by focusing on the national accounts performance measures like the gross domestic product, gross national income and the net savings. The environmental accounting was measured by looking at the environmental cost in the national accounts and adjusting them to get environmentally adjusted domestic product and domestic income whilst the sustainable development was measured by the use of social capital and natural capital through the genuine progressive income, index of social economic welfare and the genuine saving. The researchers found out that there is a direct relationship between environmentally adjusted indicators and sustainable development indicators and an inverse relationship with conventional macroeconomic indicators and the sustainable development indicators.

Mbabazi and Kihooto, (2022), conducted a study whose objective of was to assess determinants of financial performance of firms listed on the Rwanda Stock Exchange. Specifically the study ascertained the influence of a number of factors on financial performance, among which is the corporate governance encompassing not only Board composition or Audit committee but also corporate social responsibility which is made though responsible sustainability reporting . For this case of the study the survey was carried out in the work of RSE. The target population for this study was employees of the firms listed at Rwanda Stock Exchange as at the year 2020. The study applied the following tools of data collection; documentary and questionnaires. The researcher used the descriptive, bivariate and multivariate analysis. The results proved that there is strong and positive relationship between corporate governance and financial performance of Rwanda Stock Exchange.

2.5. Conceptual framework

This part presents the scheme of concepts which used by the researcher in order to achieve the objectives. It presents the diagram of the Operational Framework describing schematically causal relationships between dependent and independents variables for or two models expressed through the two following questions:

Q2) What are the determinants and explanatory factors of the implementation of environmental accounting practices by listed companies in Rwanda?

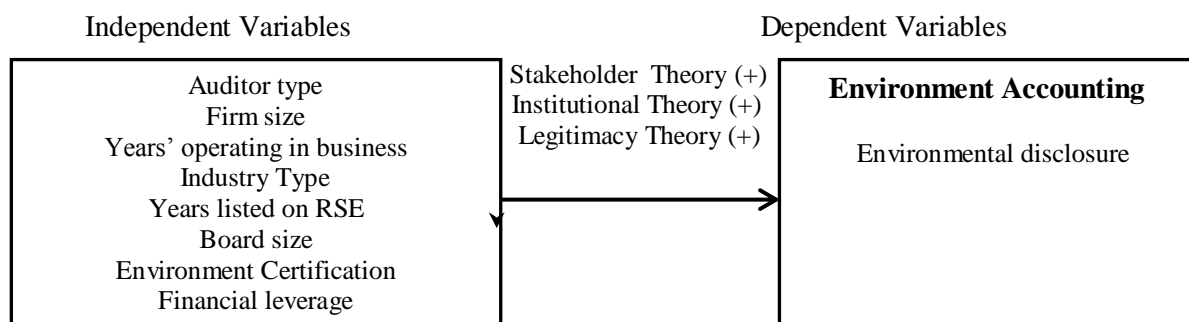


Figure 1. *Diagram of the Operational Framework with Auditor type, Firm size, Years 'operating in business, Industry Type, Years listed on RSE, Board size, Environment, Certification and Financial leverage as the independent variable and Environmental accounting practice proxied by environmental disclosure as the dependent variable.(Objective 2)*

Q3) What is the impact of environmental accounting on a firm's financial profitability (Return on Equity, Net profit margin and Earnings per share) of listed companies in Rwanda stock exchange?

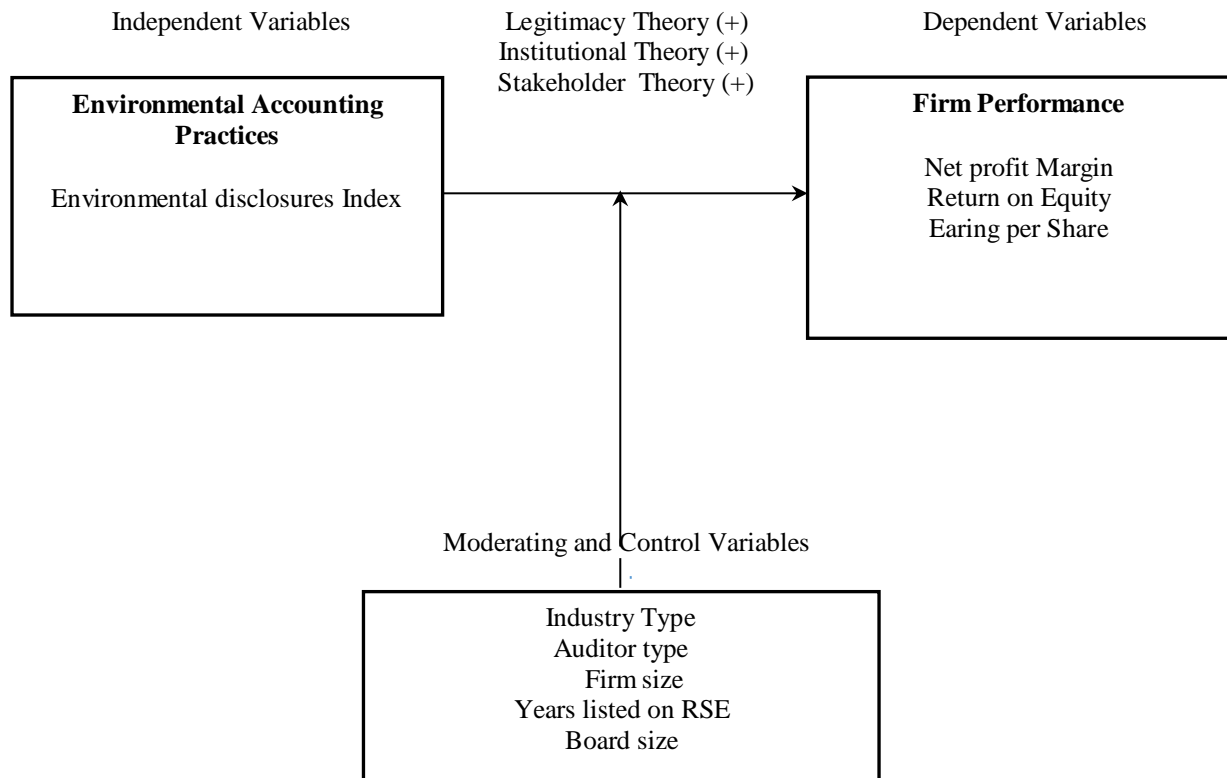


Figure 2. *Diagram of the Operational Framework with environmental accounting in terms of environmental disclosures as the independent variable and firm profitability in terms of net profit margin return on equity and Earning per share as the dependent variables, the association of which is moderated by Firm size, Industry type, Board size, Audit type or financial leverage .(Objective 3)*

CHAPTER THREE: RESEARCH METHODOLOGY

This chapter highlights the methods and approaches used in carrying out the study. It covers the following parts: the research designs, the target population, the data collection techniques and tools as well as the data analysis methods.

3.1 Research Design

This study used both causal and exploratory research design. It aimed to know the effect of environmental accounting in terms of environmental disclosures to firm profitability measured as Net profit margin, Earning per share and Return on equity.

3.2 The population of the study

The population of this study comprises the Rwandan Private and Public Listed Companies listed on Rwanda Stock Exchange. Among the 10 listed companies, this study retains all of them for the year 2018 to 2022. The use of all 10 listed companies during this particular study period is due to several reasons. First, in Rwanda, most of large companies with significant impact on environment are listed on RSE and also the use of all 10 companies could be justified based on the fact that there is no known study to the best of our knowledge which had centered on all listed companies in Rwanda in examining the relationship which exists between environmental accounting practice and firm financial performance.

According to several authors, large companies undertake more activities and have a larger impact on society since they are more visible (Hackston & Milne, 1996). Furthermore, large companies are believed to have more information which allows them to comply and engage more with corporate governance, social and environmental responsibility (Aerts; Cormier, Gordon; Magnan, 2006). Other than that, large listed companies have published more information and also provide higher quality disclosure (Buniamin, 2010).

Second, among the study objectives, this research aims at identifying the determinant factors of environmental accounting practices, in other words, by using all 10 companies as study

population, the research should inform on why some companies have a high level practice while others have just a minor practice level of Environmental accounting.

Finally, the choice to this period is justified not only because of the availability of data but also it cover a period during which Rwanda has implemented the new environmental law: the LAW N°48/2018 OF 13/08/2018 ON ENVIRONMENT that determine modalities for protecting, conserving and promoting the environment in Rwanda.

There was no need of sampling or determining the sample sizes since the population under investigation is 10 companies 'information extracted from five years of each financial statement which makes 50 observations.

With this number of observations, we met statistics and econometrics requirements regarding time series even though recommendations on the minimum necessary number of time points for time-series analysis vary, however, there is considerable consensus that this minimum requirement is in the middle two-digit range, for instance, 40 observations is often mentioned as the minimum number of observations for a time-series analysis" (Poole et al., 2002), "... many models require at least 50 observations for accurate estimation (McCleary et al., 1980)." (Jebb et al., 2015), "Most time-series experts suggest that the use of time-series analysis requires at least 50 observations in the time series."(Warner,2018).

3.3. Data Collection Techniques and Tools

The data collected is secondary, mainly quantitative and some qualitative data by reviewing the annual report to gather the information regarding the environmental disclosures of the 10 Companies listed on RSE for the period between 2018 and 2022.

According to Kumara (2022), there are advantages of using secondary data for researching. First, any researcher using secondary data can enjoy much information that has been collected in the past, and relevant policy variables can easily be generated by using them. Second, the researcher does not have to wait for a longer time for collecting data, and

thereby, the research can be conducted in a timely manner. Accordingly, the researcher may be able to skip the stage of 'data collection' which allows him/her to proceed directly to the stage of 'data analysis. Third, generally, the secondary data are available for a larger sample size, and the weights or inflation factors are also provided along with datasets. Thus, the researcher may apply statistical techniques to generate weighted-estimates which represent an entire country or an entire sector.

Annual reports were used in this study because annual reports are an acceptable and commonly used medium for social disclosure as well as to communicate information to stakeholders. The purpose of annual reporting is according to ICPAR (2020) is to provide information about the financial position of an entity. General purpose financial statements are those intended to serve users who do not have the authority to demand financial reports tailored for their own needs. Besides, annual reports are the most accessible source of information in most countries. The annual reports are obtained from RSE and African financials where companies had published.

For all three objectives, papers, articles and journals available in various websites were consulted. Environmental disclosure index, Environmental protection cost and financial performance along with other dependent variables indicators were collected from Annual reports. The information such as Return on Asset (ROA), Earnings per Share (EPS), Return on Equity (ROE) and also profit margin need to exploit in order to measure the financial performance as the data are obtained from Bursa Malaysia as it's already being calculated by emailing knowledge center of Bursa Malaysia for the request of the data.

3.5. Validity and reliability tests (depending on the study)

For all secondary data, a detailed assessment of reliability and validity involve an appraisal of methods used to collect data (Saunders et al., 2009).

As mentioned earlier, secondary data may be advantageous especially in terms of cost management as a result of the large database it can provide for management research innovation, productivity, and drawing conclusions in academics' research. However, when utilizing secondary data to help draw important conclusions in academic research, failing to check the reliability of that data could lead to inaccurate analyses and inappropriate research findings and conclusions. This may be due to some of the following. First, with today's accessibility to data via the internet, anyone can publish anything from anywhere. Secondly, some organizations fraudulently manipulate information to give investors and clients an impression that may not reflect their true state, some organizations don't post or give out detailed information/data needed for comprehensive business and management research (especially details of their working capital and other financial variables. that can aid a comprehensive research, (Olabode et al, (2019).

Flintermann (2014) as cited in the work of Olabode et al, (2019), is of the opinion that available literatures have not been able to identify a suitable tool/method for the assessment of the reliability and validity of secondary data.

Given the aforementioned statements, to confirm the validity and reliability of the data collected, we considered that the auditor report is been judged to be credible, valid and reliable for confirming the authenticity of financial report presented by listed companies in RSE.

3.6 Data processing

Information extracted from financial reporting was edited, organized and coded using Excel spreadsheet. Descriptive Statistics were computed with SPSS 25 while econometrics analysis was made using Stata 18/SE.

3.7 Methods of data analysis

To analyze the effect of environmental accounting on the 10 listed companies' performance over time, the descriptive statistics were presented by frequent, percentage, average, standard deviation values, minimum and maximum values. Panel regression analysis was used due to the dataset being cross-sectional and time-series in nature. Using the data extracted from the annual reports, the following variables were used as part of our study.

3.7.1. Measurement of Variables and Model Specifications and Hypothesis formulation

Same variables were first used as dependent variables to build our first model in order to meet our second research objective concerning determinant factors of environmental accounting practices, and then they were used as independent variables moderated by a list of other variables in the second model.

3.7.1.1. First Model: Determinant factors of environmental accounting practice

A. Dependent Variable

Previous studies that investigated the determinants of environmental disclosure firms have measured the degree of environmental disclosure by using "content analysis" (Boakye et al, 2021; Akbaş, 2014; Malarvizhi & Matta, 2016; Yildiz et al., 2016). However, Kılıç and Kuzey (2019) ; Akbaş and Canikli (2019) have used other methods which mainly depend on firms' response to questionnaires.

As part of our study, to measure environmental accounting practices, content analysis has been adopted to generate the variable environmental disclosures index. This is in-line with previous empirical studies such as Ribeiro and Aibar-Guzman (2010); Suileek,(2022); Nguyen (2021), etc...

To calculate environmental disclosures index, we used Villiers and Standen's Proposed Environmental Checklist (2006) as used and adapted by Jamil et Ferrer (2020). (see **Index 2**)

B. Independent Variables

Environmental accounting practices are related to a combination of both internal and external determinants and/or explanatory factors, which constitute the independent variables.

The variables Sector of Business, Years' operating in business, Auditor type, Firm size, Years listed on, RSE, Board size and Location of operating have been used as independent variables.

- **Sector of Business (Type of industry)**

Studies on environmental disclosure show that industry type is an important variable in multiple-industry analyses, (Meng, 2014).

Firms belonging to environmentally sensitive Industries (e.g. manufacturing firms) disclose more environmental information. The operations of these firms have high negative effects on environment and are subject to more stakeholder pressure related to environmental issues. By paying more attention to environmental transparency, firms operating in environmentally sensitive industries legitimize their operations and improve their image. Several studies have found that firms in environmentally sensitive industries disseminate more environmental information, (Kalash, 2020). However, some studies reported an insignificant relation between industry type and environmental disclosure (Braam et al., 2016;; Kolsi & Attayah, 2018; Odoemelam & Okafor, 2018; Kılıç & Kuzey, 2019; Akbaş & Canikli, 2019; Kouloukoui et al., 2019).

Firms located in public-oriented industries will demonstrate their commitment to environmental responsibility more than other firms by disseminating their societal information and implementing environmental practices. For example, previous research has demonstrated a positive association between the sector of activity of companies reflecting the level of exposure to environmental and social risks and the level of dissemination of

environmental and societal information. Based on this hypothesis and the results of these studies, authors have predicted that companies in sectors with greater societal impact are more exposed to societal risks and will have a greater need to manage these risks in order to increase user confidence in the credibility of societal information disseminated (Simnett et al., 2009).

Based on previous results and literature, the first hypothesis is stated as follows:

H1a: Environmentally sensitive firms (industrial firms) disclose more environmental information than environmentally non-sensitive firms.

- **Firm's Size**

There are several theoretical arguments in the literature that there is a link between company size and the implementation of environmental practices such as environmental accounting. Size being a source of visibility, the larger a company is, the more it will be observed and subjected to public pressure, (Boakye et al, 2021).

According to the legitimacy theory and stakeholder theory, larger firms are more visible and tend to disclose more information to legitimize their operations and activities, and to meet the expectations of society and stakeholders. Compared to small firms, larger firms are subject to increased pressure from society, (Kalash 2020).

Bases on previous discussion, firm size (as proxied by the size of total assets) could have positive effect on environmental disclosure. In other words, it is expected that large firms will tend to disclose more environmental information than small firms. Hence, the first hypothesis is as follows:

H2a: Environmental disclosure is positively related to firm size

- **Years Listed on Rwanda stock exchange**

According to Carandang and Ferrer, (2020), the companies that are listed in the stock exchange for a long time tend to disclose less information as they do not find the value of disclosing more information if they are already profiting in their operations. Lesser costs allocated to environmental reporting results in higher income explains the significant negative relationship to profitability.

H3a: The numbers of years listed in Stock exchanges market affect negatively the environmental disclosure

- **Firm Age**

Previous research revealed that the older the company gets, the lesser the environmental accounting disclosures they make; thus, a negative inverse relationship between environmental accounting disclosures and a firm's age,(Carandang & Ferrer, 2020).

According to Abdo and Al-Drugi (2012) as cited in,(Carandang & Ferrer, 2020). There is a significant negative relationship between a firm's age and level of environmental accounting. This means that the older a company is, the lesser quality of environmental accounting can be expected. This is proven during data gathering when content analysis of annual reports is performed over audited financial statements. Most companies disclose repeated environmental reports yearly and only change the amounts of environmental protection and rehabilitation costs incurred for a given year.

H4a: There is a negative relation between environmental disclosure and firm age

- **Board size**

Board size is also a significant moderating variable. A large number of board of directors give the possibility to appoint one of them to environmental protection and rehabilitation and create an environmental committee, as suggested by Villiers and Staden (2006). Ionel-Alin

(2012) also mentioned that the size of the board is a corporate governance variable that could explain environmental reporting, allowing the presence of a committee for environmental safety and responsibility and ensuring the sufficient unbiased and independent votes in solving the potential conflict, (Carandang & Ferrer, 2020).

H5a: There is a positive relation between environmental disclosure and board size

- **Certification**

The various international organizations seeking to promote good environmental practices and communication have developed voluntary standards in the framework of public voluntary programs, which can be freely implemented by companies that wish to do so. ISO 14001 Certification in Rwanda provides a structured framework for organizations to develop and implement effective environmental management systems. This globally recognized standard enables companies to identify and manage environmental risks, comply with regulations, and improve their environmental performance¹. The application of these standards is voluntary. However, private principals can impose the implementation of these standards on their subcontractors or suppliers.

Studies have shown that companies that use environmental certification have more developed external constraints (Boiral & Dostaeler, 2004). Consequently, these companies certainly make more use of environmental accounting and/or environmental management control systems, especially if stakeholders are oriented towards this type of performance.

H6a: Environmental certification affects positively environmental disclosure quality

- **Financial Leverage**

Firms can alleviate the conflicts of interests between debtholders and shareholders by disclosing more information. Highly leveraged firms tend to disclose more environmental

information in order to satisfy debtholders and gain their confidence and to provide evidence that firm's projects are not so risky (Rover et al., 2015: 10; Kouloukoui et al., 2019). Furthermore, environmental disclosure contributes to low cost of capital by reducing the agency costs of debt and information asymmetry. Hence, high financial leverage will encourage firms to disclose more environmental information. The results of several studies provide support for this expectation (Kalash, 2020; Ismail et al., 2018; Kolsi & Attayah, 2018). Accordingly, we state the following hypothesis:

H7a: There is a positive relationship between financial leverage and environmental disclosure

C. Variable descriptions

Table 1 : Variables description for Determinant factors of environmental accounting practice

Variables	Acronyms	Variable type	Coding	Expected Impact
Environmental Accounting disclosures	EADI	Quantitative	An index is used to measure the level of disclosure (scoring system). A content checklist is used to establish the index.	Dependent Variable
Firm Size	SIZE	Quantitative	A measure of the total assets of the companies	Positive
Firm Age	AGE	Quantitative	Number of year operation in business	Negative
Type of industry	INDTYP	Qualitative	A dummy variable set to 1 if the firm belongs to environmentally sensitive industry (manufacturing firm), and 0 otherwise	Positive
Audit Type	AUDTYP	Qualitative	A dummy variable; where a value of 1 to be assigned if the firm's auditor is a Big-4 audit firm, otherwise a value of zero is assigned	Positive
Years listed on RSE	YLRSE	Quantitative	Number of years since the company is listed on Rwanda stock exchange	Negative
Board Size	BOSIZ	Quantitative	Board members number	Positive
Certification	CERTF	Qualitative	A dummy variable; where a value of 1 to be assigned if the firm is certified for ISO 14001 or other international certification regarding environment management, otherwise a value of zero is assigned	Positive
Financial leverage	FINLEV	Quantitative	Computed as the ratio of Total Liabilities/Equity	Positive

Source : Authors' compilation

D. Model specification (Determinant factors of environmental accounting practice)

Considering the quantitative continuous and the longitudinal character of the dependent variable and the longitudinal character of the data, we use a Panel with fixed effects regression model to test the hypotheses related to the first model. According to O.Torres-Reyna, (2007), fixed effect model is used when entities investigated have individual characteristics that may or may not influence the outcome and/or predictor variables.

The model predicts whether the firm characteristics will affect the extent to which companies disclose environmental information. The model is estimated as follows:

$$Y_{it} = \alpha_i + \beta X_{it} + u_i + e_{it}$$

$$i = 1 \dots n ; t = 1 \dots T$$

Y_{it} : Outcome variable (for entity i at time t).

α_i : Is the unknown intercept for each entity (n entity-specific intercepts).

X_{it} is a vector of predictors (for entity i at time t).

u_i within-entity error term ; e_{it} overall error term

Interpretation of the β coefficient: for a given entity, when a predictor changes one unit over time, the outcome will increase/decrease by β units (assuming no transformation is applied). Here, β represents a common effect across entities controlling for individual heterogeneity.

Using our research information, the model is presented as followed:

$$(1) \quad EAP_{it} = \beta_0 + \beta_1(SIZE_{it}) + \beta_2(INDTYP_{it}) + \beta_3(YLRSE_{it}) \\ + \beta_4(BOSIZ_{it}) + \beta_5(CERTF_{it}) + \beta_6(FINLEV_{it}) + \varepsilon_{it}$$

3.7.1.2. Second Model: Impact of environmental accounting on a firm's financial performance

A. Dependent Variables

To measure financial performance, previous studies have adopted a variety of indicators namely Earnings per share (EPS), return on assets (ROA), return on equity (ROE), return on investment (ROI), return on capital employed (ROCE), gross profit to sales (GPS), net profit margin (NPM), dividend per share (DPS), earnings before interest, tax, depreciation and amortization (EBITDA), total assets, sales growth, asset growth, and operating income growth as a measure of profitability. (Makori & Jagongo 2013; Oeyono et al. 2011; Skouloudis et al. 2014). As for this research, inspired by various studies (Carandang & Ferrer, 2020; Malarvizhi & R. Matta, 2016), return on equity (ROE), earnings per share (EPS) and Net profit margin have been used as proxies for capturing financial performance.

According to Orlitzky et al., (2003), these accounting-based indicators capture a firm's internal efficiency in some way (Cochran et al., 1984). ROA can be divided into four indicators: sales profit rate, value-added rate, sales efficiency, and production efficiency, which includes information on profitability, value-added ability, sales ability, and production capacity (Wen & Zhou, 2017). ROE can be decomposed into three indicators: sales profit rate, asset turnover ratio and equity multiplier, which includes profitability, operational capability, capital structure (Wen & Zhou, 2017). EPS is the most important financial index to measure the profitability of listed companies, reflecting the profit level of common stocks. Stakeholder also uses EPS to evaluate companies' profitability potential and future stock prospects (Wang, 2004).

B. Independent variables

The independent variable for our second model is Environmental accounting practice measured as for the first model through environmental disclosures. The previous literature suggested that environmental disclosure reduces the asymmetric information costs, agency

costs and the cost of capital. Firms legitimize their activities to stakeholders by disclosing environmental information (Kalash, 2020). This legitimization may increase sales and decrease cost of capital because consumers and investors prefer firms with good environmental reputation. Plumlee et al. (2015) indicated that voluntary environmental disclosure is related to firm value through cash flows and cost of equity.

Currently, despite recent advances in the fields of Accounting, Finance and Management, previous researches still show that there is contradiction regarding the effect of environmental accounting on financial performance. According to these researches, investors would prefer to invest in companies that care about the environment or have implemented green accounting (Dewi & Oriana, 2014). The adoption of green accounting can affect the companies' stock price and can increase the value of the company (Maya et al 2018; Puspitasari, 2018; Clarkshon et al., 2013 and Tanc, & Gokoglan, 2015). However, this is contrary to the results of research conducted by Zulhaimi (2015) and Suka (2016) that there is no change in stock prices before and after the adoption of green accounting

According to the theoretic arguments and the results of previous studies taking into account the context of east Africa and Rwanda particularly, we propose the following hypothesis:

Hb1: There is no significant relation between environmental disclosure and financial performance

C. Control and Moderating Variables

A control variable in simple terms is a variable that is not of particular interest to our study but could arguably affect what we are interested in studying. In other words, it could influence the outcome of our study.

Moderating on the other hand, are variables that can be confused with control variables because they are often the same variable. Age, Firm size, etc..., etc. can be either control

variables or moderating variables. You decide which is which by asking yourself whether the effect of the variable in question will be directly on another variable in your model or on a relationship in your model. If it is the former, then it is a control variable. If the latter, it is a moderator. Once you make the decision, you then model the variable appropriately and test it just like any other relationship in your model. Remember, every arrow in your model is a hypothesis. Moderation occurs when the effect of an independent variable on a dependent variable varies according to the level of a third variable, termed a moderator variable, which interacts with the independent variable (Edwards and Lambert, 2007). A variable 'z' is a moderator if the relationship between two (or more) other variables, say 'x' and 'y', is a function of the level of 'z'.

The most widely used moderating variables in business research are market turbulence, technological turbulence, competitive intensity, strategy type, strategic orientation, firm age, firm size, industry type, entrepreneurial mindset, organizational culture, organizational structure, environmental dynamism.(Farooq & Vij,2017)

As for our study, Moderation will facilitate studying whether the strength or degree of relationship between environmental accounting practice and financial performance depends on firm characteristics such as Firm size, Industry type, Board size, Audit type or financial leverage and led to formulate the following hypothesis:

- **Hypothesis for Control variables**

H1c: Firm size impact positively and significantly financial performance

H2c: Industry type affects positively and significantly financial performance

H3c: There is a positive relationship between Years listed in RSE and Financial performance

H4c: There is a positive relationship between Board size and financial performance

H5c: There is a positive relationship between financial leverage and financial performance

- **Hypothesis for Moderating variables**

H6b: Environmental accounting disclosure moderated by Firm size, Industry type, Board size, Audit type or financial leverage has no significant effect on net profit margin (NPM).

H7b: Environmental accounting disclosure moderated by Firm size, Industry type, Board size, Audit type or financial leverage has a significant effect on Return on Equity (ROE).

H8b: Environmental costs reporting, moderated by Firm size, Industry type, Board size, Audit type or financial leverage has no significant effect on Earnings per Share (EPS)

D. Variables description

Table 2 : Variables description for Impact of environmental accounting on a firm's financial performance

Variables	Acronyms	Variable type	Coding	Expected Sign
Financial Performance measured by : <ul style="list-style-type: none"> • Net profit Margin • Return on equity • Earnings per share 	<ul style="list-style-type: none"> • NPM • ROE • EPS 	Quantitative	<ul style="list-style-type: none"> • NPM : Measured as the ratio of net income to net sales • ROE : measured as the ratio of net profits to equity • EPS : Measure as a ratio of Profit for the period attributable to equity shareholders to Weighted average number of shares 	Dependent Variable
Environmental Accounting disclosures	EAD	Quantitative	An index is used to measure the level of disclosure (scoring system). A content checklist is used to establish the index.	Positive or Negative
Firm Size	SIZE	Quantitative		Positive
Type of industry	INDTYP	Qualitative	0 : Service 1: Trade 2: Industrial	Positive
Years listed on RSE	YLRSE	Quantitative	Number of years since the company is listed on Rwanda stock exchange	Positive
Board Size	BOSIZ	Quantitative	Board members number	Positive
Financial leverage	FINLEV	Quantitative	Computed as the ratio of total debt to total assets	Positive

Source: Authors' compilation

E. Model specification (Impact of environmental accounting on a firm's financial performance)

We estimate the following ordinary least squares (OLS) with fixed effect regressions model to determine the effect of environmental disclosures and cost reporting on financial performance:

$$(2) NPM_{it} = \beta_0 + \beta_1(EAD_{it}) + \beta_2(EAD_{it} * SIZE_{it}) + \beta_3(EAD_{it} * INDTP_{it}) \\ + \beta_4(EAD_{it} * YLRSE_{it}) + \beta_5(EAD_{it} * BOSIZ_{it}) + \beta_6(EAD_{it} * FINLEV_{it}) \\ + \varepsilon_{it}$$

$$(3) ROE_{it} = \beta_0 + \beta_1(EAD_{it}) + \beta_2(EAD_{it} * SIZE_{it}) + \beta_3(EAD_{it} * INDTP_{it}) \\ + \beta_4(EAD_{it} * YLRSE_{it}) + \beta_5(EAD_{it} * BOSIZ_{it}) + \beta_6(EAD_{it} * FINLEV_{it}) \\ + \varepsilon_{it}$$

$$(4) EPS_{it} = \beta_0 + \beta_1(EAD_{it}) + \beta_2(EAD_{it} * SIZE_{it}) + \beta_3(EAD_{it} * INDTP_{it}) \\ + \beta_4(EAD_{it} * YLRSE_{it}) + \beta_5(EAD_{it} * BOSIZ_{it}) + \beta_6(EAD_{it} * FINLEV_{it}) \\ + \varepsilon_{it}$$

3.7.1.3. Classical linear regression model assumptions and specification Tests for basic regression

- **Multicollinearity Test**

As mentioned previously, this test ensures that the correlation between independent variables is not high. Therefore it is not possible to estimate a linear combination out of predictors. Therefore, the multicollinearity run after regression (see Index 1) reveals that the 'VIF' factor for all independent variables is less than 10. Therefore there is no multicollinearity.

- **Heteroscedasticity test**

Heteroscedasticity is usually defined as some variation of the phrase “non-constant error variance”, or the idea that, once the predictors have been included in the regression model, the remaining residual variability changes as a function of something that is not in the model, (Astivia & zumbo, 2019).

- **Normality test**

Normality test is run to ensure that residuals of variables have minimum variance.

3.8. Limitations

Empirical research on environmental disclosure and its impact on financial performance is available largely for developed nations and very few is available for Asian countries. This research is probably one of the very few initial research works with respect to environmental accounting by listed companies on Rwanda Stock Exchange. Hence, the extent of prior research literature available on environmental accounting reporting in companies is limited on RSE. The sample size considered for this research is too small to generalize and conclude for diverse sectors Rwandan companies. There is scope for doing further theoretical and action research in this field by enlarging the Number of observations including both listed and non-listed companies from different sectors and of different size.

Furthermore, the method used for econometrics analysis is not appropriate as per statistics requirement respecting the nature of the data used for our researcher. As an alternative, it got inspired by researchers that have experienced the same challenge while conducting the same studies previously.

3.9 Ethical considerations

Based on the nature of our studies, the following ethical guidelines were put into place for the research period to ensure that the study was conducted in an appropriate manner:

- Integrity in reporting our research results, findings, methodology, and data as honestly as possible by avoiding making up data, exaggerating findings, and misleading readers with unclear or contradictory explanations.
- Plagiarism and unethical copying from existing documentation has been handled by strict paraphrasing and acknowledgement and recognition of the people who have contributed to your research work.

- To avoid publishing anything that is fabricated, manipulated, falsified, or duplication of someone's work, scientific rigor along with serious methodological procedures under this study.

As outlined in the previous chapter, we hope that this study will add value in filling the gaps in literature on the link between environmental accounting practice and financial performance in Rwanda, eastern Africa and international literature. It is also hoped that the findings, although they cannot be generalized, will add value to society in general by providing insights on the environmental challenges faced the world as a result of companies of economic activities worldwide and in Africa as a whole.

CHAPTER FOUR: RESEARCH FINDINGS

4.0. Introduction

After defining and implementing the appropriate methodology for testing our hypotheses, this chapter focuses on presenting and interpreting findings before drawing conclusions. The chapter is structured into three sections: the first deals with the descriptive statistics and correlations analysis followed by the content analysis findings for our first objective. Thirdly, we will present two regression models run in line with our two last objectives.

4.1. Frequencies, descriptive Statistics and Correlations

4.1.1. Frequencies for Nominal variables (Time-invariant variables)

Table 3 : Frequency report for time-Invariant Variables

Type of industry		Frequency	Percent
Valid	Non-Manufacturing	35	77.8%
	Industrial (Manufacturing)	10	22.2%
	Total	45	100.0%

Audit Type		Frequency	Percent
Valid	Other	0	0.00%
	Big 4 Auditors	45	100.0%
	Total	45	100.0%

Environment certification		Frequency	Percent
Valid	None or other certification	25	55.6%
	ISO 14001 Certification	20	44.4%
	Total	45	100.0%

Source: Author compilation (Based on findings extracted from SPSS 25)

From the output depicted above, we learnt that only 22.2% or 2 companies out of the 9 listed operate as manufacturing and the remaining 77.8% work in different sectors mainly financial and Service. Regarding the auditors type, the findings reveal that all companies have one of the big four as Audit companies working in Rwanda, namely Deloitte which is the last of the Big Four firms to open an office in Rwanda, EY, KPMG and PwC. For environmental certification, 44,4% or 20 companies out of 45 are certified under ISO 14001:2015 which

specifies the requirements for an environmental management system that an organization can use to enhance its environmental performance.

4.1.1. Descriptive statistics for scale variables

Table 4 : Descriptive Statistics

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Environment accounting	45	0.05	0.85	61.89	22.64
Firm Size	45	4713216.48	62184850915.43	5413983460.52	15217373808.42
Firm Age	45	7.00	63.00	37.67	19.91
Years listed on RSE	45	0.00	13.00	5.49	4.29
Board Size	45	5.00	16,00	9.80	3.24
Financial leverage	45	0.10	0.78	0.61	0.75
Return on Equity	45	0.03	0.48	0.17	0.100
Earnings per share	45	0.20	65.00	11.87	14.71
net profit margin	45	0.01	0.69	0.22	0.17
Valid N (listwise)	45				

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

Source: Analysis extracted from SPSS 25

As shown in Table 4, the net profit margin has a wide range of values from thoroughly 0.01 to 0.69 but averaging only 0.22. Return on equity shows only positive values, from 0.03 to 0.48, with an average of 0.17. These values reflect the presence of net income in all listed companies over five years. It is also noticed that Earning per share's maximum value is 65.00 with a minimum 0.20 while firms have moderate financial leverage which means on average 60.5% of total assets are financed by debt

Environmental accounting disclosures is the percentage of scores obtained by the companies using the environmental index checklist suggested in the study of Villiers and Standen (2006)

and used in the study of Aquino (2009). Its mean value is at 61.89 %, which means that, on average, a company discloses almost twelve out of the 20 information in the disclosure checklist. Based on the checklist used, the inference made out of the findings is that environmental disclosures of listed firms in Rwanda are at average level, and most of which are descriptive and qualitative in nature.

Firm size is a measure of the total assets of the companies, ranging from Frw (000) 4713216.48 to Frw (000) 62184850915.43, as presented in their audited financial statements. The mean value of firm age is 37.67 indicating that an average number of firms in our sample are mature in terms of the life cycle of a firm. Board size, representing the number of directors, ranges from 5 to 16 directors with an odd number of boards of directors, which can be explained by the convenience of reaching a decision without the votes being split equally (Carandang & Ferrer, 2020). The number of years listed is counted from the listing date of the listed firm in the RSE to the year-end of 2018. This averaged 5.49 years beca

adopted whose test will be completed by the VIF analysis in next sections.

Table 5 :Correlations Panel A: Correlations between the firm characteristics and environmental disclosure

		EAP	FSIZE	FAGE	INDTYP	ADTYP	YLRSE	BSIZE	CERTF	FINLEV
EAP	Pearson Correlation	1								
	Sig. (2-tailed)									
FSIZE	Pearson Correlation	.247**	1							
	Sig. (2-tailed)	.002								
FAGE	Pearson Correlation	.265	.338*	1						
	Sig. (2-tailed)	.079	.023							
INDTYP	Pearson Correlation	.432**	-.188	.240	1					
	Sig. (2-tailed)	.003	.216	.113						
ADTYP	Pearson Correlation	.693**	.120	.209	.189	1				
	Sig. (2-tailed)	.000	.432	.167	.214					
YLRSE	Pearson Correlation	.284	-.317*	-.070	-.087	.407**	1			
	Sig. (2-tailed)	.058	.034	.649	.572	.006				
BSIZE	CERTF	.075	.391**	.168*	-.633**	.088	.116	1		
	Sig. (2-tailed)	.625	.008	.049	.000	.565	.447			
CERTF	Pearson Correlation	.324*	-.298*	-.246	.598**	.316*	.402**	-.613**	1	
	Sig. (2-tailed)	.030	.047	.103	.000	.034	.006	.000		
FINLEV	Pearson Correlation	-.105	-.212	-.261	-.254	.188	-.025	-.044	-.198	1
	Sig. (2-tailed)	.492	.161	.084	.092	.217	.872	.774	.193	

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Source : Analysis Extracted from SPSS 25

Table 6 : Correlations : Panel B: Correlations between environmental disclosure and financial performance

		EAP	Return on Equity(ROE)	Earnings per share(EPS)	Net profit margin(NPM)
EAP	Pearson Correlation	1			
	Sig. (2-tailed)				
Return on Equity (ROE)	Pearson Correlation	-.347*	1		
	Sig. (2-tailed)	.020			
Earnings per share (EPS)	Pearson Correlation	-.201	.306*	1	
	Sig. (2-tailed)	.185	.041		
Pet profit margin (NPM)	Pearson Correlation	.211	-.103	-.304*	1
	Sig. (2-tailed)	.165	.502	.042	

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Analysis Extracted from SPSS 25

Table 5 and 6 report the Pearson rank correlation coefficients between variables. We find in panel A that four variables are significantly and positively related to environmental disclosure (ED), namely firm size, industry type, Auditor type and financial leverage. However, there is a positive and significant correlation between board and firm size and age. This is consistent with existing literature on determinant factors of a board size where firm size and firm age are almost mentioned to be positively correlated while financial leverage is negatively correlated (O. J. Ilaboya, 2016). Other relevant information from Panel A is the positive and significant relationship between industry type and the number of years since the company is listed in the RSE. Environmental certification is negatively and significantly related to firm age, board size and financial leverage. Although this negative relationship seems to not be built on relevant and existing theories, the positive and significant relationship between environmental certification and industry type proves sufficiently that manufacturing companies care more about being environmentally certified.

In Table, panel B provides mixed results about the relation between environmental disclosure and financial performance. While return on Equity (ROE, -.347) and Earnings per share (EPS -.201) are negatively associated with (ED), net profit margin is positively but insignificantly associated.

4.2. Content Analysis Result (Environment Accounting Practice (Disclosure))

Table 7 : Environmental accounting disclosure index

Villiers and Standen's Proposed Environmental Checklist (2006)	Environmental disclosure Index (Five years average value (2018-2022))									Total	
	BKG	BRALIRWA	CIMERWA	EQUITY	I&MB	KBC	MTN	NMG	RHB		
General Information											
1	Environmental information in annual report	1	1	1	1	1	1	1	1	1	9
2	Corporate mission statement have a policy on environment		1	1	1					1	4
3	Separate environment policy	0.6	1		1	0.6	1	0.2	1	1	6.4
4	Executive director entrusted with ER					1					1
5	One of senior management entrusted with ER			1							1
6	Environmental audit mentioned		1	1						1	3
7	External awards for environmental activities	0.6	1		0.6	1	1	0.2	1	1	6.4
8	Mention of sustainability or sustainable development	0.8		1	1	0.8	1	0.2	1		5.8
9	Accounting policy notes on environmental accounting	0.6	1	1	1	0.6	1	0.2	1	1	7.4
10	Compliance with environmental regulation mentioned	0.6	1	1	1	0.6	1	0.2	1	0.6	7
Specific Information											
11	Quantitative information on environnement activities	0.8	1	1	1	0.8	1	0.2	1	1	7.8
12	Measurable standards for environmental objectives		1	0.8	1		1	0.2	1	1	5
13	Disclose achievement of objectives	0.8	1	0.8	1	0.6	1	0.2	1	1	7.4
14	Mention of environmental risks and impacts	1	1	0.8	1	1	1	1	1	1	8.8
15	Impacts and risks site-by-site basis										
16	Mention of negative aspects of environmental activities			0.8							0.8
17	Environmental audit attested independently (external)		1	1						1	3
18	Quantitative non-Financial information disclosed	1	1	1	1		1	1	1	1	8
19	Financial environmental information	0.8	1	1	1	0.6	1	0.2	1	1	7.6
20	Other environmental issues		1	0.6			1	1	1	1	5.6
TOTAL RAW SCORE		9	15	14,8	12.6	9.6	14	5.8	13	13.6	
Percentage		45.0%	75.0%	74.0%	63.0%	48.0%	70.0%	29.0%	65.0%	68.0%	

Source: Author compilation

As mentioned in previous sections, this study is mainly based on content analysis of listed firm's annual reports in Rwanda. Content analysis (CA), according to Steenkamp and Northcottis (2008) , is widely used in accounting research to reveal useful insights into accounting practices. As for this study, content analysis made it possible to index information related to social and environmental reports or sustainability reports in the company's financial report.

The Villiers and Standen's Proposed Environmental Checklist (2006) used, was adapted (especially at the item 10 and 20) and updated with current trends about EAD and particularity to stay in line with empirical research in Africa.

A total of 10 listed companies from RSE were studied via their sustainability reports and annual reports wholly. Hence, given availability constraints, only information from 9 companies was gathered as shown in table: 7 above. It was therefore found that in all 9 firms there is presence of environmental information in annual reports and most of them mention environmental risks and impacts, objectives and financial environmental information.

As expected, the analysis reveals that BRALIRWA and CIMERWA, the only two manufacturing companies, are ranked the highest in reporting with respectively, 75% and 74%, followed by KBC group and RHB, with respectively 70% and 68%. Moreover, from the table, 66.7% of the sample company reports above 50% environmental accounting practices in the annual reports which prove a positive indication towards environmental accounting reporting according to Islam et al., (2012).

One more important fact is that, the nature of environmental disclosure observed among listed companies in RSE, seems to be rather voluntary than compulsory and even though some firms disclose not too much environmental information in their annual reports, they disclose in parallel the same or even more information on their websites, including sustainability and social reports.

However, despite the usefulness of website disclosure that allow investors and other stakeholders to potentially acquire additional information or different perspectives on environmental issues by consulting websites, we remain consistent to the fact that annual reports are, through their association with regulation and audit, more credible than websites, as well as the fact that annual reports and websites serve different purposes with different audiences.

4.3. Regression Results

The correlation analyses tested the linear relationship between two variables captured separately and provided no information on the degree or level of causal relationship. To compensate for this limitation, regression models have been run for two models to determine first, the determinants factors of environmental accounting practice, then to analyze the impact of EAD on financial performance.

4.3.1. Classical linear regression model assumptions and specification Tests for basic regression

4.3.1.1. Multicollinearity Test

As mentioned previously, this test ensures that the correlation between independent variables is not high. Therefore it is not possible to estimate a linear combination out of predictors.

Therefore, the multicollinearity run after regression (see Index 1) reveals that the 'VIF' factor for all independent variables is less than 10. Therefore there is no multicollinearity. These findings remain consistent with the correlation analysis run in previous section

4.3.1.2. Heteroscedasticity test

As per the results (see Index 2), the null hypothesis suggests the presence of constant variance which means data is homoscedastic. However, the p-value is 0.000 which is significant enough to reject the null hypothesis. Therefore, the dataset has heteroscedastic variances. This is may result from the presence of Time-invariant variables in the date set

4.3.1.3. Normality test

Normality test was run to ensure that residuals of variables have minimum variance. Since the p-value is less than 0.05, we can reject the null hypothesis of the test. We have sufficient evidence to say that the variable displacement is not normally distributed.

From the above result; it clearly observed that all regression diagnostic tests for the panel dataset are not met. Apart from the absence of multicollinearity, the data is not normal and even contains heterogeneous variances. However, these violations are not worrisome in the case of panel data regression (Brüderl & Ludwig, 2019).

4.3.2. Regression analysis on Determinant factors of environmental accounting practice

To understand the impact of different factors on the environmental disclosure level of listed companies on RSE, our empirical analysis will determine the extent to which firms disclose environmental information based on selected specific factors.

Table 8 : Model 1 Regression Results for OLS Estimation (Determinant factors of environmental accounting practice)

	Variables	Coefficients	Std. Error	t-ratio	p-value
1	(Constant)	.045	.129	.344	.732
	SIZE	4.967	.000	2.717	.010**
	AGE	-.002	.001	-1.431	.161
	INDTYP	.408	.090	4.522	.000***
	AUDTYP	.323	.095	3.409	.002***
	YLRSE	.015	.008	1.990	.054*
	BSIZE	.020	.011	1.745	.089*
	CERT	-.070	.094	-.748	.459
	FINLEV	.001	.005	.107	.916
	R Square		.726		
	F-stastics		6.863	Sig	000.0 ^b

* p –value < 0.10, ** p –value < 0.05, *** p –value < 0.01

a. Dependent Variable: EAP

b. Predictors: (Constant), *FINLEV*, *YLRSE*, *BSIZE*, *EAP*, *AGE*, *SIZE*, *INDTYP*

Source: Analysis Extracted from Stata 18

Table 8, describe the results of panel regression for first model. Findings reveal that firm size, industry type, auditor type, years listed on RSE and Board size positively and significantly affect the extent to which a firm discloses environmental information. These results indicate that larger firms and manufacturing firms are more likely to disclose more

environmental information.

The result regarding firm size is consistent with the legitimacy, stakeholder; where larger firms are more visible and tend to legitimize their activities to society and stakeholders by disclosing more information. Moreover, disclosures are less costly for larger firms, as these firms incur less costs and have more capacity and resources to accumulate, produce and publish environmental information. Also according to Carandang and Ferrer, (2020), the firm's age and environmental costs reported showed a positive relationship. This means that as companies grow older, higher amounts of environmental costs are incurred.

Generally speaking, the positive impact of a firm size, as a source of visibility, encourages firms to set up strategies and practices aimed at demonstrating their environmental and social involvement. This is consistent with the numerous studies on societal reporting that find that because of their increased visibility, large companies are encouraged to implement environmental practices such as environmental accounting (Nguyen, 2021; Hashem & Suileek, 2023, Kalash, 2020; Ribeiro & Aibar-Guzman, 2010; Boess & Kumar, 2007, etc...)

The result related to industry type is consistent with the idea that firms operating as manufacturing are facing more pressure from society due to the direct impact of industrial activity on environmental degradation. Thus, whether voluntary or compulsory, the extent to which manufacturing companies disclose environmental information proves their consciousness but also their compliance with environmental regulations.

Industry type is also an important factor affecting EAD as the pollution and emission propensity vary from industry to industry, (Meng et al, 2014). Classified as an environmentally sensitive sector, manufacturing sector firms are expected to disclose more environmental information than the rest of the sector. In other words, due to the fact that large firms are more visible and exposed, they would then be inclined to report more financial information relating to environmental reporting. However, this can trigger public scrutiny and investigation. The

government may even closely monitor large firms than small ones for the greater scope of damages they may cause and higher amounts of penalties that may be imposed. As such are normally publicized, the market is easily affected; thus, the negative relationship to firm value. As for our case study, BRALIRWA and CIMERWA, the two manufacturing companies recorded the highest disclosure level followed by Banking and assurance sector. This proves what Nguyen, (2021) found that Commercial banks and insurance companies made the most disclosure of social and environmental information.

Moreover companies operating in an environmentally sensitive sector will be subject to special government attention and will attempt to respond to government pressure by providing societal information. It may also be a matter of visibility not at the government level but at the public level for consumer-oriented firms. This result is consistent with a number of existing empirical evidence on the subject, (Senhadji. & Seghir, 2022; Meng et al, 2015, Kalash, 2020).

Supporting the stakeholder-shareholder perspective, The auditor type and the board size captured respectively as dummy variable of whether companies are audited by the Big 4 or not and the number of members composing the board of directors, are listed among significant factors affecting environmental disclosure level (Cof .323, P-value, 0.002). The audit quality always goes with the quality of reported information and as a result, companies audited with the big 4, tend to reassure stakeholders on the assurance and validity of financial reporting produced. As for board size, In relation to environmental accounting, the assignment of a director to environmental reporting can be helpful for a company in risk mitigation and operation's control to reduce environmental impact; thus, reduce costs incurred. This is consistent with Carandang and Ferrer, (2020) findings.

Lastly and contrary to our expectations, Number of years listed in RSE positively and significantly affects EAD. According to this result, the more experience a firm has with RSE, the more concerned it feels toward social and environmental issues.

4.3.3. Regression analysis for the Impact of environmental accounting on a firm's financial performance

Unlike the previous model, by computing this regression analysis we seek to understand the impact of environmental disclosure on financial performance figures coupled with a number of control variables and moderating variables.

4.3.3.1. Impact of disclosure on Net Profit Margin

Table 9: Model 2 Regression Results for OLS Estimation (NPM)

Variables	Coefficients	Std. Error	t-ratio	p-value
(Constant)	.122	.063	1.942	.060*
EAD	.219	.090	2.428	.020**
SIZE	7.751	.000	6.648	.000***
INDTYP	.179	.059	3.017	.005***
YLRSE	-.004	.004	-.928	.359
BSIZE	-.005	.006	-.762	.451
FINLEV	.007	.003	2.766	.009***
EAD*SIZE	5.771	.000	1.412	.167
EAD*FINLEV	-.034	.024	-1.392	.173
EAD*INDTYP	1.237	.507	2.438	.020**
EAD*YLRSE	-.035	.038	-.933	.358
EAD*BSIZE	.534	.190	2.814	.008***
Adjusted R Square		.817		
F-stastics		18.911	Sig	000.0 ^b

* p –value < 0.10, ** p –value < 0.05, *** p –value < 0.01

a. Dependent Variable: NPM

b. Predictors: (Constant), *FINLEV*, *YLRSE*, *BSIZE*, *EAP*, *SIZE*, *INDTYP*, *EAP_By_CYLRSE*, *EAP_By_CFINLEV*, *EAP_By_CINDTYP*, *EAP_By_CSIZE*, *EAP_By_CBSIZE*

Source: Analysis Extracted from Stata 18

As shown in **Table 12**, environmental accounting disclosure, by itself and as moderated by industry type and board size has positive and significant effect on net profit margin; thus, reject the null hypothesis of non-existence of impact of these variables. But when moderated by financial leverage and year listed in RSE, EAD has no significant impact on net profit margin. These findings are partially consistent and contradictory with previous empirical evidence by various researchers from both emerging and developing countries (Norhasimah et al, 2015; Khandelwal, & Chaturvedi, 2021)....).

Our findings imply that listed companies in Rwanda with a higher quality of environmental accounting disclosures will have a higher net profit margin. With respect to the stakeholder and legitimacy theories, the result can be explained by the assumption that the legitimization achieved by disclosing environmental information can enhance firm reputation and consumer confidence, leading to increases in sales and as result profits (Kalash, 2020). Furthermore, regarding the board size, In relation to environmental accounting, the assignment of a director to environmental reporting can be helpful for a company in risk mitigation and operation's control to reduce environmental impact; thus, reduce costs incurred.

Industry type, firm size and financial leverage positive relationship to net profit margin suggests that firms operating as manufacturing, growing older and recording a positive leverage ratio positively affect net profit margin. These findings imply that as firm grows its ability of making profit increases also. This means that firms listed in RSE have higher profitability as their size expands (measured by total assets,). This may be explained by the fact that big firms are more effective than small firms since they make use of the scale economy (Doğan,2013). As for Financial leverage, it positively and significantly decreases the net profit margin (Coef, .007, P-value, 0.009). This is partly due to the leverage effect that describes the effect of debt on the return on equity: Additional debt can increase the return on equity for the owner. This applies as long as the total return on the project is higher than the cost of additional debt.

4.3.3.2. Impact of environmental disclosure on Return on Equity

Table 10: Model 3 Regression Results for OLS Estimation (ROE)

Variables	Coefficients	Std. Error	t-ratio	p-value
(Constant)	-.598	1.393	-.429	.671
EAD	1.395	1.991	.701	.488
SIZE	-5.636	.000	-1.532	.135
INDTYP	-.070	.434	-.161	.873
YLRSE	-.018	.031	-.572	.571
BSIZE	.102	.154	.663	.512
FINLEV	-.005	.017	-.308	.760
EAD*SIZE	7.230	.000	1.525	.037**
EAD*FINLEV	.004	.028	.158	.875
EAD*INDTYP	-.138	.589	-.234	.017**
EAD*YLRSE	.033	.044	.751	.458
EAD*BSIZE	-.173	.220	-.785	.438
Adjusted R Square		.272		
F-stastics		2.492	Sig	.021

* p –value < 0.10, ** p –value < 0.05, *** p –value < 0.01

a. Dependent Variable: ROE

b. Predictors: (Constant), *FINLEV*, *YLRSE*, *BSIZE*, *EAD*, *SIZE*, *INDTYP*, *EAD_By_CYLRSE*, *EAD_By_CFINLEV*, *EAD_By_CINDTYP*, *EAD_By_CSIZE*, *EAD_By_CBSIZE*

Source: Analysis Extracted from Stata 18

Analysis from **Table 13**, reveals that none of the control variables has significant impact on ROE. Environmental accounting disclosure, by itself and as moderated by, firm size, board size, number of years listed in the PSE, Board size and financial leverage, has no significant effect on Return on Equity; thus, we fail to reject the null hypothesis for most of the variables used in Model 2.

This regression relationship implies that listed companies in RSA with a higher quality of environmental accounting disclosures will have a lower Return on equity. Reminding that

ROE is an indicator of a corporation's profitability and how efficiently it generates those profits. is a measure of the performance of the firm relative to shareholder investment.⁵ Since this is a measure of shareholder returns rather than overall firm profitability, interest expenses are subtracted out of income for this measure. The higher the ROE, the better a company is at converting its equity financing into profits.

The absence of significant impact can be due to the fact that disclosing environmental information triggers capital investment along with disbursement of funds, especially for environmental protection and rehabilitation. This result supports findings of Kalash, (2020); Carandang and Ferrer, (2020). based on the aforementioned finding related to environmental disclosure index, where it was found that the nature of disclosure is rather voluntary than regulatory, that to mean that companies that invest too much in environmental capital protection, get little or even nothing as return and as a consequences, the more they invest the less they get as return on equity. The results contradict and support at the same time the study of Nagornova, (2026) who found significant and negative relationship to Return on Equity and mandatory sustainability disclosures while the results of voluntary disclosure coefficients were insignificant at all levels.

The analysis reveals also a negative and significant impact on environmental disclosure moderated by industry type. This result supports the idea that industrial firms reporting more environmental information experience a under-performance in terms of return on equity.

4.3.3.3. Impact of disclosure on Earning Per Share

Table 14: Model 1 Regression Results for OLS Estimation (EPS)

Variables	Coefficients	Std. Error	t-ratio	p-value
(Constant)	408.305	133.130	3.067	.004***
EAD	-530.021	190.231	-2.786	.009***
SIZE	4.178	.000	1.189	.243
INDTYP	-98.162	41.435	-2.369	.324
YLRSE	1.841	2.996	.615	.543
BSIZE	-44.53	14.699	-3.030	.005***
FINLEV	-.344	1.601	-.215	.831
EAD*SIZE	-5.793	.000	-1.278	.210
EAD*FINLEV	.672	2.683	.250	.804
EAD*INDTYP	125.894	56.249	2.238	.032**
EAD*YLRSE	-.759	4.204	-.181	.858
EAD*BSIZE	59.092	21.040	2.809	.008***
Adjusted R Square		.691		
F-stastics		9.926	Sig	.021

* p-value < 0.10, ** p-value < 0.05, *** p-value < 0.01

a. Dependent Variable: EPS

b. Predictors: (Constant), FINLEV, YLRSE, BSIZE, EAP, SIZE, INDTYP, EAP_By_CYLRSE, EAP_By_CFINLEV, EAP_By_CINDTYP, EAP_By_CSIZE, EAP_By_CBSIZE

Source: Analysis Extracted from Stata 18

Table 14 is the panel regression analysis of environmental accounting disclosures on EPS. As shown by all the high p-values, the variables EAD itself and moderated by board size affect negatively and significantly EPS. Thus, we reject all null hypotheses related to absence of effect of environmental accounting disclosures on EPS except for the variable board size and

the environmental disclosure moderated by board size. While these results support the study of Solanke et al, (2021) who detected a negative causal relationship in Nigeria, they contradict those of Dhar & Chowdhury, (2021) ; Norhasimah et al, (2015) stating that environmental reporting has no significant impact on EPS.

As the indicator EPS measures a firm's financial performance indicating the corporate wealth and provides disclosure advantage (Oeyono et al. 2011)¹⁰⁷, All listed companies are required to disclose their EPS on the statement of profit or loss. EPS relates to the profit attributable to equity shareholders for the year divided by average equity shares during the year. The result after analysis reveals that, in Rwanda, the more listed companies report environmental information, the less the company record in terms of profit attributable to shareholders.

According to Malarvizhi & Matta, (2016) that despite these benefits firms are reluctant to disclose more information due to a lack of evidence linking disclosure with improved firm performance.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1. SUMMARY

This study examines the relationship between environmental disclosures with the firms' financial performance of the listed companies in Rwandans stock exchange. Based on both causal and exploratory research design, it aimed at determining the effect of environmental accounting in terms of environmental disclosures to firm profitability measured as net profit margin, earning per share and return on equity.

Relying on existing literature, this study was carried out recognizing the fact that the link between environmental reporting and financial performance is a complex subject in business research and treated even as ambiguous because of the divergent nature of empirical results opposing positive and negative causal effect.

In this regard, the issue is broadly discussed in the literature review as part of this study. To capture EAD, many of these works have used EAD index constructed out of a predefined checklist and environment cost disclose. On the other side, to measure financial performance, previous studies have adopted a variety of indicators namely Earnings per share (EPS), return on assets (ROA), return on equity (ROE), return on investment (ROI), return on capital employed (ROCE), gross profit to sales (GPS), net profit margin (NPM), dividend per share (DPS), earnings before interest, tax, depreciation and amortization (EBITDA), total assets, sales growth, asset growth, and operating income growth as a measure of profitability. Most of existing researches through their finding have documented no significant association between sustainability disclosures and financial performance.

Therefore, for the purpose of presenting a new innovative idea to the research in this area, this study utilizes return on Equity (ROE), earnings per share (EPS) and Net profit margin (NPM) as a proxy for firm's profitability with listed companies on RSE as target population.

It is based on the aforementioned that this study, as a whole, comes within the scope of environmental accounting, given the issues it addresses. The question addressed in this work,

that of the possible link between environmental disclosure and financial performance, is a very common preoccupation in accounting and business research, and the interest of studying it lies both in the complexity of the issues and in the difficulty of understanding its mechanism.

To this end, our study is one of several attempts to not only identify the factors that explain the extent to which listed firm in Rwanda report environmental information but to determine the effect of green reporting on financial performance.

Moreover, in the light of the findings after content analysis, correlating and panel regression and on the basis of the information drawn from the theoretical review on the issue, we can say overall that many of our hypotheses have been confirmed. However, it is important to place our findings in the current theoretical and empirical context and thus validate the various theories over environmental disclosure. At the same time, our work will be compared with previous similar studies.

5.2. CONCLUSION

Environmental issues have obtained increased attention around the world because of the catastrophic effects resulting from non-clean production. Society and stakeholders are pressuring firms to provide more information about their activities related to environmental matters. Under these conditions, firms may tend to disclose more environmental information to legitimize their operations, and to reduce the information asymmetry and cost of capital, resulting in better financial performance.

As for this study, we have attempted to investigate the determinants of environmental disclosure and its effect on financial performance of 10 Rwandan firms listed on Rwanda Stock Exchange during the period 2018-2022. We started from reminding the problematic that consisted in recalling the role of environmental accounting disclosure practices worldwide, in Africa and East Africa in particular. Focusing on Rwanda as case study, we underscored that this very little is known about this issue in Africa and in Rwanda particularly and this is despite all efforts made by the country in terms of environmental practices promotion.

The main questions guiding our work were to determine the extent to which companies listed on the Rwanda Stock Exchange implement environmental accounting practices. Then to ascertain the influence of industry type, Auditor type, Firm size, Years' operating in business, Years listed on RSE, Board size, Environment Certification and financial leverage as determinant factors of environmental accounting practice within listed companies on RSE before assessing the influence or impact of reporting environmental information on financial performance of the concerned companies identify the explanatory or determining factors behind credit rationing among SMEs.

The Panel regression setup and applied to explain environmental accounting practices not only had the advantage of using secondary qualitative and quantitative data that are relatively easy to collect, but also enables us to construct measurable proxies for our variables.

We have assumed that industry type, Auditor type, Firm size, Years' operating in business, Years listed on RSE, Board size, Environment Certification and financial leverage have impact on the extent to which a firm will disclose environmental information. Furthermore, it has been hypothesized that environmental disclosure moderated by Firm size, Industry type, Board size, Audit type or financial leverage has no significant effect on financial performance.

From a global perspective, our findings reveal that the nature of environmental disclosure observed among listed companies in RSE, seems to be rather voluntary than compulsory and even though some firms disclose not too much environmental information in their annual reports, they disclose in parallel the same or even more information on their websites, including sustainability and social reports. Furthermore and expected manufacturing firms followed by financial institutions disclose more environmental information. From regression models, we have found that larger firms operating as manufacturer, listed in RSE for quite a long time and with a significant board of directors members number are more likely to disclose more environmental information.. Regarding the relationship between environmental disclosure and financial performance as proxied by Return on equity (ROE), Net profit margin (NPM) and Earnings per share (EPS), the results indicated that environmental accounting disclosure, by itself and as moderated by industry type and board size has positive and significant effect on net profit margin. Furthermore, results reveal that none of the control variables has significant impact on ROE. Environmental accounting disclosure, by itself and as moderated by, firm size, board size, number of years listed in the PSE, Board size and financial leverage, has no significant effect on Return on Equity and finally the variables board size , the variable EAD itself and moderated by board size affect negatively and significantly Earning per share.

These findings offer insights and implications for different interested groups and offer important message indicating that managers can use environmental disclosure as an important tool to reduce the cost of capital by decreasing the agency costs of debt and equity.

5.3. LESSON LEARNED AND RECOMMENDATIONS

From the above conclusion drawn out of findings, we have retained the following lessons based on which recommendations are made:

In Rwanda, all companies listed on RSE from 2018 to 2022 have disclosed environmental information in their annual report, though disclose is not too much significant, its extent differs from companies depending on industry type, firm size and number years listed in RSE and a given other number of factors mentions above.

Despite the involuntary and mandatory legal requirement nature of environmental audit in Rwanda, the environmental information disclosed in annual report tended to have resulted from voluntary strategic policies than from compulsory regulatory measures and in addition to that they are more qualitative than quantitative in nature.

Larger firms operating as manufacturer listed in RSE for quite a long time and with a significant board of director's member's number are likely to disclose more environmental information than other companies not meeting these characteristics.

Broadly speaking, the fact that a company listed in RSE disclose environmental information in its annual report, doesn't necessarily affect its financial performance as claimed a variety of theoretical and empirical evidences but when moderated by variables characteristic to the firm, its effects turns to relatively significant.

Based on these observations, we recommend to government of Rwanda to strengthen measures making environmental reporting even more mandatory to ensure increase in the level of reporting and as a result, improve the impact on their performance. On top of that, the Government focuses on policies and strategies to raise Corporates knowledge and awareness of the benefits of better environmental performance and encouraged to comply with the requirements for long term survival. And finally, as part of environmental governance government should include education on ethical environmental disclosure at societal level and school level.

Building on the findings, the following recommendations were distilled for listed companies on RSE to inform through annual rapport all environmental costs they generate; Develop proxies that anticipate future costs and other measures of performance and to Incorporate environmental accounting into ongoing business processes and stop considering environmental cost a miscellaneous cost incurred during operating activities in order to improve its impact on performance.

Finally, as can be observed through the entire research project the environmental challenge resulting from economic activities is enormous and involves all parties sparing no country or community. Environmental accounting disclosure practices has been presented by both scholar and practitioners to be an effective tool for alleviating environmental impact of firms and consequently to improve their financial health. Despite progress made in promoting environment, the practices of environmental accounting in Rwanda are still at an initial stage and a lot still to be done. We therefore expect future research to be extended to more than five year and to be applied on a more diversified categories of firms other than those listed on RSE.

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1. <https://impactday.eu/blog/environmental-impact-in-business/#:~:text=The%20issues%20related%20to%20environmental,and%20the%20loss%20of%20biodiversit>
2. <https://rwandatoday.africa/rwanda/lifestyle/how-to-carry-out-proper-sustainability-reporting-3415922>
3. B2B Cert, 2020
4. ¹ <https://africanfinancials.com>

INDEXES

1. Multicolineraty Test

Variable	VIF	1/VIF
CERT	5.74	0.174265
INDTYP	3.69	0.271221
BSIZE	3.54	0.282234
YLRSE	2.75	0.363120
AUDTYP	2.33	0.429804
AGE	2.26	0.441575
SIZE	1.98	0.504435
FINLEV	1.95	0.513047
Mean VIF	3.03	

2. Heteroskedasticity test

Breusch-Pagan/Cook-Weisberg test for heteroskedasticity
 Assumption: Normal error terms
 Variable: Fitted values of EAP

H0: Constant variance

chi2(1) = 37.39
 Prob > chi2 = 0.0000

3. Normality Test

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
EAP	45	0.81779	7.890	4.378	0.00001
SIZE	45	0.39822	26.059	6.910	0.00000
AGE	45	0.85703	6.191	3.864	0.00006
INDTYP	45	0.90873	3.952	2.913	0.00179
AUDTYP	45	0.71668	12.269	5.313	0.00000
YLRSE	45	0.91422	3.715	2.781	0.00271
BSIZE	45	0.96798	1.387	0.693	0.24427
CERT	45	0.99435	0.245	-2.984	0.99858
FINLEV	45	0.60472	17.117	6.019	0.00000

Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
ROE	45	0.92894	3.077	2.382	0.00861
EPS	45	0.68925	13.457	5.509	0.00000
NPM	45	0.86808	5.712	3.693	0.00011

Index 2: Environmental disclosures index check list.

	Villiers and Standen's Proposed Environmental Checklist (2006)	Company_{it}	Company_{it}
	General Information		
1	Environmental information in annual report		
2	Corporate mission statement have a policy on environment		
3	Separate environment policy		
4	Executive director entrusted with environmental responsibility		

5	One of senior management entrusted with environmental responsibility		
6	Environmental audit mentioned		
7	External awards for environmental activities		
8	Mention of sustainability or sustainable development		
9	Accounting policy notes on environmental accounting		
10	Compliance with environmental regulation mentioned		
	Specific Information		
11	Quantitative information on environment activities		
12	Measurable standards for environmental objectives		
13	Disclose achievement of objectives		
14	Mention of environmental risks and impacts		
15	Impacts and risks site-by-site basis		
16	Mention of negative aspects of environmental activities		
17	Environmental audit attested independently (external)		
18	Quantitative non-Financial information disclosed		
19	Financial environmental information		
20	Other environmental issues		
	TOTAL RAW SCORE		
	Percentage		

Source: Jamil and Ferrer (2020)

	Years	FINLEV	ROE	EPS	NPM
BK Group	2018	3.5	0.172	39.5	0.104
	2019	3.6	0.18	41.4	0.11
	2020	4	0.16	42.6	0.109
	2021	4.5	0.191	57.4	0.107
	2022	4.8	0.198	65	0.097
BRALIRWA	2018	1.45	0.194	7.04	0.07318552
	2019	1.32	0.032	1.16	0.0118382
	2020	1.12	0.233	8.75	0.08958327
	2021	1.27750822	0.34285491	17.04	0.142
	2022	1.77850412	0.40157817	21.91	0.143
CIMERWA	2018	0.65	0.06209843	4.91	0.05550326

	2019	0.65	0.06209843	4.91	0.05550326
	2020	0.52	0.03389653	2.78	0.03093473
	2021	0.015	0.06677755	5.9	0.06115349
	2022	0.34	0.17595968	18.7	0.14307042
Equity Group	2018	33.9864318	0.20876818	5.25	0.37242157
	2019	5.02701808	0.218	5.93	0.34539192
	2020	6.32173744	0.153	5.24	0.25004354
	2021	6.40624663	0.276	10.38	0.39261255
	2022	6.94139761	0.261	11.9	0.35870005
I&M Bank	2018	6.43452702	0.25301985	14.78	0.32958579
	2019	10.57	0.1516	4.97	0.2547782
	2020	10.02	0.1099	4.72	0.2108027
	2021	11.62	0.1569	6.61	0.31782786
	2022	12.34	0.1303	6.15	0.27045228
KCBG	2018	5.2845919	0.22	7.83	0.33417824
	2019	5.92589081	0.207	7.83	0.29851366
	2020	5.93574774	0.144	6.1	0.2062168
	2021	0.219	0.224	10.61	0.31258747
	2022	0.318	0.23	12.71	0.25117774
MTN	2018	0.1216	0.2019	5.7	0.07614274
	2019	0.7194	0.1781	5	0.05475035
	2020	0.6569	0.4805	15	0.134141
	2021	0.7842	0.423	16.1	0.11998685
	2022	0.715	0.2733715	14.1	0.08537532
NationMediaGroup	2018	0.42149893	0.14185793	5.9	0.11567604
	2019	0.5513562	0.10977878	4.5	0.09457623
	2020	0.68121347	0.07769962	0.2	0.07347642
	2021	0.6	0.12	2.5	0.12774138
	2022	0.51878653	0.16230038	1.7	0.18200635
RHBophelo	2018	0.01	0.04	0.42	0.52
	2019	0.01024119	0.03991718	0.42	0.51502468
	2020	0.03799736	0.10824003	1.31	0.66411591
	2021	0.07129508	0.15185841	1	0.69487855
	2022	0.08010455	0.05916676	0.62	0.60527862