The effect of environmental management activities on the financial performance of food processing companies listed on the Johannesburg Stock Exchange

by

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I declare that this Dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

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SIGNATURE DATE

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ABSTRACT

The study sought to investigate the effect of environmental management activities on the performance of JSE-listed food processing companies. Also, it seeks to identify environmental management activities that JSE-listed food processing companies conduct and the extent to which they reported their environmental management activities in their financial statements. The study involved 13 JSE-listed food processing companies and covered a ten-year period, ranging from 2012 – 2021. Quantitative data was obtained from the companies' integrated financial statements published on their official websites. Findings show that the companies reported 15 different environmental management activities. Of the activities, water efficiency, Waste reduction, Greenhouse gas emissions, Energy reduction, and non-compliance with environmental legislations were the most reported by the companies. In contrast, environmental management systems, carbon tax, environmental non-compliance fees, environmental training, environmental community projects, nature reserves as well as air quality management and animal protection were the least reported. The fixed effect model panel data regression analysis and hierarchical regression analysis revealed that environmental management activities did not have significant relationship with the ROA and EPS of the JSE-listed food processing companies. The study recommends that other studies can use actual environmental costs instead of environmental management activities. JSE food processing companies are urged to participate in environmental management activities. The South African government should strengthen environmental legislative requirements that encourage companies to engage in the environmental management activities.

Keywords: Environmental management accounting**;** financial performance; environmental activities; Johannesburg stocks exchange and food processing companies

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CHAPTER 1:

INTRODUCTION

1.2 BACKGROUND

Many studies conducted across the world addressed the impact that environmental management activities have on companies are listed on stock exchanges across the world (Egbetokun et al., 2019: 21; Rehman et al., 2021). Poor oversight on how companies manage environmental activities including in Asia, has led to environmental degradation and it is a major challenge in the food market and the market as a whole (Phelan et al, 2022). Some businesses reported significant decline in financial performance as a result of investments aimed at addressing environmental degradations and these include some in the food industry in China (Shen, Ma & Wang, 2019: 1946). Environmental contaminations have also significantly affected developing countries in Latin America, Africa, Eastern Europe, the Middle East, Asia and Oceania (Ferronato & Torretta, 2019: 1060). Most scholarly studies indicate that environmental degradation in developing countries involve contamination due to pollution that is caused by open waste dumping and burning of fossil fuel (Ferronato & Torretta, 2019: 1060). Environmental pollution has also been reported in African countries. For instance, Mashura (2021: 629) revealed that environmntal factors such as carbon emission, rainfall, and temperature have affected food production in West Africa.

The manufacturing industry in South Africa is reported to have recorded a 0,2% increase in the gross domestic product, which is largely attributed to the food processing industry (stats SA, 2022). Like most sectors, companies that process food in South Africa have reported negative consequences, largely caused by the frequent and intense events associated with changes in climate, including challenges of low levels of dam water reaching approximately 40% in the past 5 years (Zwane, 2019:01). In prior years, one of JSE-listed companies in South Africa reported significant financial loss caused by death of poultry because of persistent and intense droughts and the company's competitiveness and profitability has since been slacking

(Nkukwana, 2018: 870). One of major contributors to decreased profitability and competitiveness in the poultry industry is the cost of feed which amounts to approximately 75% of the total production costs (Nkukwana, 2018: 870). Recurrent and intense droughts have not been the only environmental management activities that has troubled the South African feed and food market. In 2019, South Africa experienced heavy floods which damaged physical infrastructure, to an estimated R71 million (Bopape et al., 2021: 02).

The study by Bopape et al (2021: 02) further indicated that floods, droughts, wildfires, and large storms are the most common natural disasters reported in South Africa. Lassalla et al (2017: 07) argued that companies incur distinctive environmental activities due to differences in the geographical area and industry that the company is situated in. Thus, not all environmental management activities are applicable to all food processing companies as they are situated in different areas, and they are in different industries. Some companies benefit from investing and contributing to environmental projects while others incur financial burden from investing and contributing to environmental projects (Egbetokun et al., 2019:21).

In 2010, a study conducted on a food processing company in South Africa, Woolworths, reported that droughts had a significant negative effect on their production (Santos, 2010: 384). As a result of the environmental impacts, the company devised strategies to overcome future environmental impacts and minimize the operational impacts on the environment by participating in the environmental projects (Santos, 2010: 384).

A heavy storm that occurred in Durban damaged infrastructure of the Municipality and thereby forced it to spend funds meant to improve its 11% contribution to the total GDP of the country (Reddy & Olanrewaju, 2022:3). Within Durban, some companies expressed that their production was vulnerable to environmental contaminations that was caused by the heavy storm (van der Vyver, 2018: 129). Companies in South Africa incur distinctive environmental management activities and they apply different

approaches in accounting for these in their financial statements (Ibanichuka & Oyadonghan, 2014: 222). Among main causes of the distinct effects of these costs is that each company operates in certain areas that at times, experience unique environmental challenges (Kitsikopoulos et al., 2018: 27).

This study focused on environmental management activities that are reported by the food processing companies that are listed on JSE. Thus, there are fewer JSE-listed food processing companies in South Africa and this explains why their environmental challenges have a direct impact on production and food security in South Africa, and surely, this is a concern that requires attention (Arndt, 2020: 111). The food industry contributes to economic development through creating employment as well as improving the GDP and food security (Meyfroidt, 2018: 12). The food industry has reported a decline in profits in recent years due to the high unemployment rate, meaning, fewer people are able to buy certain products (Arndt, 2020: 111). There are numerous measures that can be used to assess the performance of companies. One such is that which this study used, that is, using the financial statements ratio as a measure of assessing the financial performance of food processing companies. The financial statements ratios are used as a common measure of evaluating companies' performance (Syafii et al., 2020: 07).

In 2018, one of the largest food processing companies in South Africa had to shut its operations due to an outbreak of listeriosis that was discovered in some of their products. The South African Health Department reported that as a result of the outbreak, 937 patients were diagnosed with listeriosis (Thomas., 2020: 632). The company had to effect measures to address it, as the South African Department of Health reported that the infections were as a result of a bacteria (Thomas et al., 2020: 632). Among measures to eradicate it, the company developed sound operational strategies and indeed, they mitigated the situation and food processing resumed. This circumstance appears to have influenced the companies to engage in environmental management activities.

Based on the report from the National Department of Health in early 2017, listeriosis contaminated the environment and as expected, its outbreak led to contamination of some space and some products in the company (Nhundu, 2017). The outbreak of listeriosis is caused by an environment that is contaminated, and it has a significant health impact on people (Kitsikopoulos et al., 2018: 27). Most food processing companies process food through using machines, equipment, and plants and altogether, these burn fossils fuels, natural gas, oil and coal. Burning fossil fuels increase the concentration of greenhouse gases, leading to contamination of the environment (Stock & Gillingham, 2018: 53). Some studies have revealed other different environmental problems that affect the financial performance of companies (Davis, 2017: 1-2).

The negative effects that human activity and/or climate events had on the degradation of the environment have encouraged states across the world to enforce environmental legislations (Okafor, 2018: 02). Currently, most countries have enacted environmental policies and laws that bind companies to participate in the environmental management activities (Efobi et al., 2018: 2882–2897). Of the policies, the most notable is that on the Nigerian Constitution Section 2 of the Environmental Impact Assessment Act of 1992 which states that public and private institutions should embark on the environmental projects to protect the environmnt (Efobi et al., 2018: 2883). In South Africa, companies that are listed on the JSE are encouraged to comply with the KING IV Part 5.1 Principle 3. It states that: “the governing body should ensure that the company is seen as a responsible citizen by monitoring and overseeing, on an ongoing basis, the environment, including the responsibility in respect of pollution, waste disposal and protection of biodiversity” (Ramahlo, 2016: 45).

1.2.1 The importance of the food processing industry

Food security is a challenge that affect most countries across the globe. For example, Yapp & Fairman (2004) reported on strategies that the UK government implemented as mitigating factors to overcome food insecurity. The mitigating factors include advocating for education through schools visits and providing training courses on measures to strengthen food security for residents (Thompson, 2019: 14). Companies

that prcocess food play a vital role in the economy of most countries. Among other reasons, food security is an important contributor to the economic development of countries. It is against this background that this study, aimed at assessing the impact that environmental management has on the financial performance of companies, will benefit companies involved in food processing, governments, communities, and academics, through providing results that can serve as valuable information pertaining to the food processing companies and environmental management activities. The extent to which environmental management activities that are related to environmental protection impact the financial perfromance of JSE-listed food processing companies have rarely been addressed by prior studies. This study seeks to provide financial managers and other managers of food processing companies with relevant information on how environmntal activities can affect the financial performance of the companies.

Mashura, (2021: 629) highlighted that majority of countries in Africa experience food insecurity, largely due to reduced yield and poor-handled harvested or stored agricultural products, that is caused by changes in climate. Food security in South Africa is largely affected by damages caused by environmental factors. Hlahla & Hill (2018: 06), conducted a study in Kwa-Zulu Natal and revealed that changes in climate affected food security more than other natural factors. Another study conducted in South Africa showed that disruptions caused by changes in climatic events are significant in the Durban Region of South Africa, mainly as a result of high frequency of floods and cyclones that negativey affects the food companies in the area (Reddy & Olanrewaju, 2022: 02).

The food processing sector in South Africa is relatively dominant and larger compared to other countries in the southern Africa (Nhundu et al., 2018: 18). Despite the dominance, some of these companies are affected by natural disasters that occur in the country (Olanrewaju & Reddy: 2022: 03). South Africa seeks to address environmental management issues by complying with ISO 14001 that is enforced by United Nations and it is believed that compliance with it can enhance the

environmental performances of companies (Mitchel & Hill, 2009: 58). Compliance with environmental legislation plays a vital role in companies.

1.4 Problem statement

Challenges associated with environmental management activities are a common occurrence that is reported by companies in South Africa, therefore, there is a necessity to assess the impact of these activities on the financial performance of companies (Molina-Azorı´n et al., 2019: 1083). Studies conducted in South Africa concluded that environmental management activities have negative impacts on financial performance of the companies (Hlahla & Hill, 2018: 06). Intriguingly, these studies have not assessed the extend to how the environmental management activities impact the food processing companies that are listed on the JSE.

Normally, food processing involves the use of processing plants, machines, and equipment, and all these cause air pollution, water and sound pollution, and consequently, damage the environment (Sadham, Molot & Retief 2008: 155). Noteworthy, some companies involved in the food processing industry invest in environmental projects that aim to address the negative impact that their activities cause. These investments have become a burden on many companies (Farooq, 2018:3). Thus, there is a need for research that evaluates the financial impact of environmental management activities pursued by food processing companies. Lately, environmental management activities have been an emerging concern in most countries including South Africa where companies are concerned about the financial burden of managing the environment (Kitsikopoulos et al., 2018:27).

1.5 Research aim and specific objectives

This section entails the aim of the study, specific objectives, and the research questions.

1.5.1 Aim of the study

This study aimed to determine the effect of the environmental management activities conducted by JSE-listed food processing companies on their financial performance.

1.5.2. Specific objectives of the study

1. To identify the environmental management activities that are conducted by the JSE listed food processing companies.

2. To determine the JSE food processing companies' level of reporting environmental management activities in integrated financial statements.

4. To assess the effect of the environmental management activities on the financial performance of JSE listed food processing companies.

1.6 Research questions

1. What environmental management activities do JSE listed food processing companies conduct?

2. What is the JSE listed food processing companies' level of reporting environmental management activities in integrated financial statements?

4. Does the environmental management activities have effect on the financial performance of JSE listed food processing companies?

1.7 Hypotheses

H_0: The environmental management activities do not have an effect on the financial performance of the JSE listed food processing companies.

H_1: The environmental management activities influence the financial performance of JSE listed food processing companies.

1.8 Thesis statement

Companies that pay attention to environmental management are likely to have higher financial and non-financial performance.

1.9 Delineation and limitations

This section focuses on the delineation and limitation that are applicable to the study.

1.9.1. Delineation

This study focused on the impact of environmental management activities on the financial performance of the 13 food processing companies that were listed on the JSE. Data was extracted from published annual integrated financial reports of the food processing companies for the period 2012-2021.

1.9.2. Limitations

The limitation of the study included the following:

- Most companies did not report environmental management information in monetary form, which made obtaining data on their environmental management costs difficult. For this study, the researcher used environmental management activities that had been disclosed and reported in the integrated financial reports of the 13 companies.
- During the collection of data, some of the 13 food processing companies had not published all the integrated financial statements for the period 2012-2021. Out of 130 integrated financial statements that had been proposed to be analyzed, 123 were found on the companies' websites.
- The study relied on the environmental management activities and the financial performance that had been reported on the integrated financial statements, however some companies may have participated in the environmental activities and meanwhile not disclosed such information in the integrated financial statements.

1.10 Research assumptions

(i) There are costs incurred by the companies in carrying out environmental activities.

(ii) Some companies regard the environmental costs as an expense to the business while some regard the costs as an investment which leads to an increase in the value of the business

(iii) Companies are reporting all their environmental management activities in the annual integrated final reports.

1.11 Definitions of terms and concepts

Biological species refers to a group of living organisn of which are able to interbreed and are fertile (Bush, 2016: 02). Example of such includes animals and plants.

Environmental costs are regarded by companies as expenditure or investment on environmental factors that are incurred in fulfilment of the environmental protection responsibilities, and compliance to laws, regulations and policies that prevent the impact of pollutant emissions, waste recycling of material and environmental damage (Huang & Songqing, 2011:147).

Environmental legislations are the legislations that are implemented by the government to prevent environmntal degradation and to promoto environmntal sustainability (Bush, 2016: 02).

Climate change is defined as an environmental degradation problem that is caused by greenhouse gases resulting from burning fossil fuels (Vlassopoulos, 2012: 104).

Financial perfromance evaluation of company's financial perfromance (Bhunia et al, 2011: 269).

Non-renewable goods are natural resources that includes oil or natural gas, which can significantly change the market if the supply of those resources drops. (Bush, 2016: 02).

Pollution is described as a substance that is introduced to the environment that is harmful and/or poisonous (Sunkad, 2021:73).

Weather fluctuation is known as the change in weather that is mainly caused by patterns of ocean circulation and atmospheric pressure that can potentially affect the production of companies (Bush, 2016: 02: online).

1.12 Research methodology

This study seek to identify environmental management activities that JSE-listed food processing companies report. Therefore, the study aimed to further determine the extent of the reporting and to determine the relationship of the environmental management activities with the financial performance. A correlational approach was adopted with the purpose of achieving the objective of this study. Data was collected from integrated financial statements of the 13 JSE-listed food processing companies' websites. The data was considered reliable and accurate because the integrated financial reports had been audited as per the JSE listing requirement. Panel data of period from 2012-2021 was used to reach data saturation.

The number of environmental management activities has been used as the dependent variables and the ROA and EPS has been used as an independent variable. Solvency ratio, net profit margins, company's assets, company's age, total sales and the sales growth margin were used as control variables. Correlation matrix is conducted using STATA version 18 to determine the relationship between the environmental management activities and the financial performance of the JSE-listed food processing companies. This chapter is further discussed in detail in chapter 4 of this study.

1.13 Ethical consideration

Permission to conduct the study was granted by the UNISA College of Accounting Sciences Ethics Review Committee. The study complied with POPI act no.4 of 2013, where the study did not publish false and misleading information about the companies.

1.14 Significance of the study

This study seek to play a vital role in providing statistical evidence showing a relationship between the environmental management activities and the financial performance of companies. Companies that intended to partake on environmental activities were made aware of possible implications on their financial performance.

The research findings are vital to future researchers, decision makers in the company, government officials and the community at large who have interest in the food processing industry.

1. 15 Chapter summary

This chapter provides a thorough introduction to the study as well as the background of the study. It further details the problem statement on which the gap that motivated the study was explained. In addition, the chapter presents the study's aim, objectives, and questions. The chapter further outline the explanation of key terms. Lastly, the chapter briefly outline the methodology that was adopted in conducting this study. The next chapter, chapter 2, focuses on literature review, where current and prior scholarly studies are assessed thoroughly. Topics that are addressed in the section on literature review include a detailed discussion on environmental management activities, environmental legislation binding food processing companies internationally and in the South African context, and the financial performance of JSE-listed food processing companies.

CHAPTER 2:

LITERATURE REVIEW

2.1 Introduction

The previous chapter introduced the background to the study and the problem under investigation in this study. It also highlighted the significance of this study and the research gap which the study sought to fill. Furthermore, the chapter outlined the research aim, objectives, and research questions. Lastly, chapter one outlined the delineation, limitation and the ethical compliance that are applicable to this study.

This chapter discusses the theoretical framework that underpinned this study, the empirical review and the conceptual framework. The empirical review section reviews published literature that has contributed knowledge on effects that environmental activities have on the financial performance of companies and the conceptual framework displays the relationship between the variables in this study.

2.2 Theoretical Framework

The study was guided by the open system theory, stakeholder theory, ecological modernization theory and the sustainability theory. A theory is a statement of abstracts or ideas that describe and anticipate similarities between the phenomena (Kivunja, 2018: 45). The aforementioned theories were deemed appropriate for the study and aligned with the objectives of this study. Kivunja (2018: 46) described a theoretical framework as theories that are expressed by prior scholars that are in the relevant study. These theories underpinning this study are explained below.

2.2.1 Open system theory

The open systems theory was developed by Bertalanffy (Bertalanffy, 1950:23). Open system theory states that a company's success can depend on the environment that they operate in (Lee, 2022). The environment, as used in the definition, pertains to social factors, political factors, economic factors, and natural factors that affect the

company. Kleiner (1986: 190) is of the view that the open system theory implies that a company is influenced by the environment in which it operates in. In this instance, food processing companies must take responsibility for the environmental wellbeing of the community in which they operate in. The theory is also based on the view that the survival and effectiveness of an organization are firmly influenced by their environment (Bastedo, 2004:01). The system is divided into two sections in organizations, namely the external environment and the internal environment (Bastedo, 2004:01). The external environment includes stakeholders such as government, customers, suppliers, research scholars and investors, while internal stakeholders include employees, management, and shareholders (Bastedo, 2004:01). Stakeholders have a potential to enforce business decisions that involves the environmental management activities that the company may undertake (Bush, 2016). Thus, this theory is suggested in this study with a view that the stakeholders have an influence on the environmental management activities that the company undertakes. Therefore, this theory is relevant for this study as it focuses on the authority that the stakeholders of the company have on the environmental management activities that the company reports and participates in.

2.2.2 Stakeholders theory

The stakeholders theory was proposed in the early 1980's by Freeman (Freeman, 1984). Stakeholders are explained as persons or groups of associates that have interest in the procedural activities of the company (van der Vyver, 2018: 133). The stakeholders theory suggests that all the activities that are done by a company should be accepted by its stakeholders (Kalash, 2020: 96). In addition, Santos (2010:386) suggests that the business should ensure that the environment they operate in is prioritized. However, Okafor (2018: 03) points out that it is vital that the relationship of the stakeholders and management of the company be in harmony for the company to be successful Sarumpaet (2017: 69) states that stakeholders ought to initiate pressure for companies to disclose information on environmental management activities.

The stakeholders within a company can be categorized into primary stakeholders: workers, owners, donors, project managers as well as secondary stakeholders:

external personnel such as SARS, consumers, government, and law enforcers other investors besides shareholders, and researchers (Worimegbe 2021:1523). This theory is suggested in this study with a view that stakeholders should be interested in issues pertaining to environmental protection and enhancements. Thus, this theory underpinned this study because the theory that external stakeholders such as government and consumers are considered to initiate pressure on the company to engage in environmental management activities. Environmental management activities provide environmental protection and enhancement; hence stakeholders are expected to ensure that the company plays a role in the environmental projects. In support of this theory, Brulhart, Gherra & Quelin (2017:28) indicated that the stakeholders such as government, customers and financial institutions rate the companies based on their level of participation in environmental management activities. With that view, this theory is considered to be relevant to this study and accurately supports this study. Furthermore, Kalash (2020: 96) used the stakeholder theory in a similar study of determining the impact of the environmental `disclosure on the financial performance of the company.

Furthermore, Freeman (1984: 20) suggests that the companies executives should also consider the interests of their stakeholders. Some of the stakeholders advocates for the environmntal wellness programmes which they promote the programmes to the companies (Freeman,1984: 20). However such environmental wellness advocacies includes providing evironmnetal trainings which is considered to be one of the environmental management activities that financially impact some companies (Davis & Gibler: 2003). Stakeholder's theory is the relevant pillar that addresses the foundation of the environmental management activities and financial performance that this study seeks to address.

2.2.3 Ecological modernisation

The ecological modernisation theory was proposed in early 1800 by Huber, Jänicke and Simonis (Mol & Spaargaren, 2000: 24). This theory suggests that environmental sustainability can be achieved by society and the state through using the available technology and restructuring of the economy (Murphy & Gouldson, 2020: 277). The

ecological modernisation theory was constructed with the purpose of finding solutions to environmental degradation, making efficient use of technology to solve environmental problems and enhancing ecological modernisation (Gibbs, 2016: 02). Furthermore, this theory is implemented with a purpose to transform companies in order to eliminate the ecological crisis and to assist societies find progressive ways in reducing the environmental problems (Gibbs, 2016: 02). This theory is relevant to this study with a view that the environmental management activities that performed to protect the company from environmental contaminations and degradations. Kalash (2020:108) emphasised that environmental issues have gained extensive attention because of the impacts they have on industries, companies, people and governments infrastructures across the world. However, Gibbs (2016: 07) criticised the ecological modernisation that it promotes inequality in societies and erosion of cultures in the society.

2.2.4 Sustainability theory

The sustainability theory was proposed by Hart in early 1995, and suggested by Carson, Leopold and the Brundtland commissions in 1997 (Hart & Dowell, 2011). The sustainability theory suggests that businesses must consider environmental sustainability when they use environmental resources in their production processes (Gibson, 2012). Environmental resources include natural resources such as forests, water, air, soil, animals and energy (Worimegbe, 2021:1523). This theory suggests that business should participate in environmental management activities that protect environmental resources. Egbetokun et al (2019) pointed out that the businesses interest in environmental participation is mostly based on the returns that the company generates. Furthermore, the sustainability theory comprises of three strategies that include preventing pollution, product supervisory and sustainable development (Hart, 1995). The weakness of the stakeholder's theory is that it is likely that the shareholders conflicting interest may become an obstacle to participate in the environmental management activities (Hart & Dowell, 2011). This theory is relevant in this study because it suggests that businesses must consider the environmental management activities as a vital strategy to participate in environmental sustainability.

2.3 Empirical review

This part of the literature review focuses on the review of studies that have addressed similar objectives to those in this study. This section is divided into two subheadings: environmental management activities and review of companies' financial performances of companies that reports the environmental management activities.

2.3.1 Background of environmental problems

The concept of natural environment refers to the physical surrounding where people live and it comprises of land, animals, plantation, water, and micro-organisms (Muganyi & Mbohwa, 2018: 260). Environmental issues are mainly caused by natural disasters and they cause disruptions in the environment (Javed & Said, 2022:02). Most environmental disruptions that occur affect the companies and communities in such that the companies' results in a loss and damage of properties (Kitsikopoulos et al., 2018: 27). Apart from natural disasters, human activities such as pollution, burning fossil fuels, and deforestation also contribute to causes of destruction in the environment (Al-Ghussain, 2019:14). Furthermore, Javed & Said, (2022:02) emphasised that human activities such as burning of coal, oil, or gas and dumping of wastes also plays vital role in increasing the risk of natural disaster through emissions that causes climate change. Food processing companies in South Africa should be aware of the possibility of occurrence of the environmental disasters. In support of that, Olanrewaju & Reddy: 2022:11) highlighted that food companies in South Africa have a high probability of incurring natural disasters mainly floods, heavy rains, cyclone, and heavy storms.

Furthermore, environmental factors such as pollution, global warming, climate change, disposal of waste, availability of natural resources, and environmental policies are ranked among factors that affect the survival of businesses across the world (Farooq, 2018: 3). Moreover, some companies resort to using their facilities which are meant for production, such as plants, machines and equipment and resources to participate in environmental projects (Klausbruckner et al., 2016: 72). There is also a concern that workers of a company who use these production facilities with intention to eradicate environmental damage may experience health problems (Parvin et al., 2020: 21831).

Every company experiences distinctive environmental activities that are more likely determined by the environment within which they are situated (Phelan et al., 2022: 129827). It appears that the environmental management activities that companies undertake depend on the environmental factors within the area that the company is situated in.

Sunkad (2021:73) identified pollution as a major environmental factor that causes environmental problems. It appears that companies also experience distinctive pollution, depending on the environment in which they are situated in. Studies reveal that the manufacturing process may emit pollutants that pollute the environment (Egbetokun et al., 2019: 1477-7835). In some cases, companies that pollute the environment end up being victims of the same damage and results in having a decline in their financial performance (Egbetokun et al., 2019: 21). Taking mitigating measures to control pollution can be used to resolve environmental degradation that affects companies (Munnick et al., & Law, 2010: 03). It appears that the majority of companies are participating in environmental management activities that are advocating for reduction of emission that causes pollution (Sunkad, 2021: 72).

2.3.2 Measuring monetary environmental management activities.

Environmental management activities that are monetary include expenditure that a company incurs in relation to minimising harm on the environment as well as protecting and enhancing the environment (Worimegbe, 2021: 1519). However, some studies define monetary environmental management activities as the costs that are associated with investing in environmental protection and enhancements (Rambau, 2011: 23). Worimegbe (2021:1519) highlighted that monetary environmntal activities are more likely to be incurred by companies that operate in environments that experience natural disasters more often. Environmental degredation is believed to be caused by natural disasters or human waste. Furthermore, Monetary environmntal management activities include environmntal projects, environmental trainings, carbon tax, environmntal audit and assessments as well as environmntal non-compliance fees (Rambau 2011: 24).

Environmental damage is mostly caused by natural causes such as greenhouse gases, solar energy variations, volcanic activity and the sun's activity as well as human activities such as disposal of hazardous and toxic waste in public environments (Riyadi et al., 2020: 1848). Chang (2013: 134) emphasizes that companies should play a role in protecting the environment from environmntal damages by participating in the environmental management activities. However, Stock et al (2018: 58) highlighted that other environmental management activity that companies participates in include investing in expensive technology such as Direct Air Carbon Capture and Storage (DACCS) used to reduce emissions relating to coal, natural gas, solar photovoltaics. DACCS storage technology is another type of expenditure that should be classified as monetary environmental management activity. It appears that some companies are having challenges with achieving their desired environmental management activity (Brulhart et al., 2017: 26).

Environmental management activities are associated with an investment in projects that are aimed at preventing emissions and wasting of resources that are used to produce products (Ionela, 2003: 265). De Villiers (1995: 45) revealed that environmental costs incurred by companies in South Africa are not legislated, specifically there is no disclosure compliance and requirement in the financial statement. However, this means that companies that incur such costs in their production process have discretion on disclosing the cost in their financial statements (De Villiers, 1995:45).

The Institute of Directors in Southern Africa introduced the King report in 1994 that overlooked legislation on environmental disclosure (Ramahlo, 2016: 45). The King report has been enforced by companies that operate in South Africa for many years, however the recent KING IV report in South Africa requires companies to act as a responsible citizen and oversee their environmental responsibilities (Ramahlo, 2016: 45). In most countries, disclosure of environmental management activities in financial statements is not mandatory, however, some companies resort to disclosing the environmental management activities in their financial statements for the purpose of

presenting the environmental projects figures to the stakeholders (Davis & Gibler, 2003: 1-4).

Companies need to take responsibility for environmental accountability by providing education and training to the company's stakeholders that includes workers, directors, and shareholders (Mbedzi, 2020: 25-26). Factors such as in JSE listing requirements, internal processes, availability of experienced employees and sustainability committees are regarded as factors that influences the level of environmental management activities that the companies participate in (Kitsikopoulos et al., 2018: 27). It is vital for companies to understand that environmental healthiness plays a vital role in the sustainability of companies (Onwubik, 2017).

Some companies that operate in South Africa experience environmental problems mostly due to climate change, which affects productivity and efficiency (Kitsikopoulos et al., 2018: 27). Recent studies revealed that in some areas, there are food processing companies that use facilities that produce significant pollution which contaminates the environment (Chu et al., 2020: 212). Such pollution is hazardous to the environment and the negligence of the said companies has a negative effect on the operation of companies operating nearer them. Considering that environmental damage can also be caused by water pollution and other pollutant emissions such as waste recyclable materials, such environmental damages may have production impact on the companies (Mbedzi, 2020: 25-26). There are companies that operate in the same geographic areas which resort to sharing the cost of mitigating the impact, by contributing to environmental enhancement projects (Thomsen, 2005: 619).

2.3.2.1 Environmental projects

Environmental projects are common activities that generate the environmental costs of the companies. Investing in environmental projects is not mandatary in South Africa (Ramahlo, 2016: 45). However, companies that are listed on the JSE are encouraged by the King IV report to act responsibly and oversee their environmental reposibilities (King IV, 2016). Thus, reporting the environmntal project helps improve the reputation

of the companies (Jindal & Jain, 2018: 978). This appears to be one of the reason that encourages the companies to report their environmental projects so that they can improve their reputation. Indeed, De Villiers (1995:45) also pointed out that some companies that invest in environmental projects aim to enhance their publicity to communities around them. In most countries, disclosure of environmental cost in financial statements is also not mandatory (De Villiers, 1995:45). However, some companies resort to disclosing environmental projects in their financial statements for the purpose of presenting such figures to stakeholders which are interested in the environmental management activities (Davis & Gibler, 2003: 1-4).

2.3.2.2 Environmental audit and assessment

Section 31D of National Environmental Management Act 107 of 1998 of South Africa states that: “An environmental management inspector, within his or her mandate in terms of section 31D, may issue a compliance notice in the prescribed form and following a prescribed procedure if there are reasonable grounds for believing that a person has not complied-(a) with a provision of the law for which that inspector has been designated in terms of section 31D; or (b) with a term or condition of a permit, authorisation or other instrument issued in terms of such” (NEMA 2023, online). This act bound companies to prepare and employ environmental assessors who ought to provide environmental assessment reports (Sunkad, 2021: 72). In order for a company to receive a positive environmntal assessment and audit report, its management ought to take responsibility and accountability in ensuring that it comply with environmental standards (Kitsikopoulos et al., 2018: 27). Some countries including Turkey, Lebanon, Alegria, Tunisia, United Arab Emirates, and Egypt use Environmental impact assessment (EIA) to assess the environmental protection (Badr, 2009). EIA procedure involves screening to detect and identify the environmental impacts caused by the company (Badr, 2009).

2.3.2.3 Environmental non-compliance fees

Most countries have environmental policies to guide companies so that they conform to environmental legislations (Muganyi & Mbohwa, 2018). In South Africa, The NEMA

act 197 of 1998 states that: “The Minister may by regulation specify offences in terms of this Act or a specific environmental management Act in respect of which alleged offenders may pay a prescribed admission of guilt fine instead of being tried by a court for the offence law” (NEMA, 2023: online). Raimi & Sawyerr (2019: 112-118) indicated that enforcing the environmental penalties necessary to prevent companies from contaminating the environment. Many companies incur environmntal non-compliance costs becouse they do not have adequate knowledge of environmental legislations (Bush, 2016: 02). This results to companies being in contravention of environmental legislations (Olawale, 2019).

2.3.2.4 Environmental training

Companies that provide environmental training to their employees incur training costs such as tuition fees as a sponsorship to employees (Khan et al., 2021). Noteworthy, companies are not obliged to provide environmental training to their employees (Ramahlo, 2016: 45). However, most companies that are interested in environmental wellness have found interest and purpose in educating and empowering their employees with environmental legislation (Khan et al., 2021).

2.3.2.5 Environmental management costs

Costs incurred by food processing companies in relation to environmental management include prevention costs, appraisal costs as well as internal failure costs and the external failure costs (Psomas et al., 2018: 1885). Costs concerning prevention and appraisal are more likely to be higher than internal failure costs and external failure costs (Basuki & Irwanda, 2018: 175). However there are fewer studies that have addressed the effect of these environmental management costs on food processing companies. Most studies have highlighted the impact of the environmental management costs on other variables such as human and economy (Al-Ghussain, 2018: 18). Hussein (2018: 311) these environmental management costs are addressed by many companies globally. The prevention costs, appraisal, internal failure and external failure costs are discussed on the subheadings below:

(i) Prevention costs

Prevention costs are costs that are incurred by companies to prevent and avoid any deficiencies that might occur and causes defects in production (Balouchi et al., 2019: 137). Furthermore, Psomas et al (2018: 185) highlighted that prevention costs includes education and training costs, survey of suppliers and teams for improving quality of production. The advantage of investing on prevention costs is that it assists companies to prevent future defects in production (Balouchi et al., 2019: 1137). In addition, Basuki & Irwanda (2018: 175) also outlined that prevention cost can amount to 94,79% of the total operating costs of the company. The second environmental costs includes appraisal costs which is explained below.

(ii) Appraisal costs

Apart from preventative costs, appraisal costs is the other classification of the environmental management costs that is associated with responding to environmental impact. Appraisal costs are defined as costs concerned with monitoring the production process to ensure that the products are not defective (Balouchi et al., 2019: 137). The appraisal cost includes the costs to pay the inspectors who ensures that the production is operating accordingly (Psomas et al., 2018: 185). Appraisal costs are also known as the detection costs and also includes the costs related to auditing the environmental performance, testing pollution, developing measures of the environmental development and verifying the quality of the products (Basuki & Irwanda, 2018: 175). The third class of environmental costs includes internal failure costs.

(iii) Internal failure costs

Internal failure costs are costs that are incurred by a company along with those costs associated with the delivery of the product to customers (Balouchi et al., 2019: 137). A study by Psomas et al (2018: 1885) indicated that internal failure costs include non-conformance, rework, re-evaluation, and correction of design. The last environmental costs include the external failure costs.

(iv) External failure costs

External failure costs are costs of defective products that would have reached customers and found defective during use (Psomas et al., 2018: 185). Studies have highlighted that an example of the external failure costs includes warranty costs, reputational costs, customer's complaints and the legal fees related to unsatisfied customers (Balouchi et al., 2019: 1137).

2.3.3 Environmental management activities of global companies

The global economy also expressed the negative impacts environmental factors that have prodigiously negative impact on production processes (Lin, Huang & Yao, 2020: 01). The United Nations Environment Programme (UNEP) was established by the general assembly resolution 2997 in June 1972 with the aim of addressing environmental issues across the world (Feng et al., 2021: 03). The UNEP is based in Africa, Asia and pacific, Europe, America, and Caribbean continents. Based on the statistical review from UNEP, there are expenditures that are associated with environmental issues and amount to 6,3 million dollars and such expenditures resulted in 10,48% of the international Gross domestic product (GDP) in 2008 (Feng, 2021: 01). In recent years, the environment associated expenditure reported by UNEP amounts to 72.4 million dollars (UNEP, 2022).

The USA Government encourages companies to disclose the amount of money they incur concerning environmental management activities that they participate in for the financial years (Fox et al, 2019). Van der Poll (2015) indicated that it is vital that companies disclose the correct amount they spend on environmental management activities. US companies use Lawrence Berkeley National Laboratory to estimate the correct amount that they spend on environmental activities (Site Environmental Report for 2019, 2020).

Globally, it appears that there are countries that have higher Gross Domestic product that experience environmental challenges. China is one such country and is reported impacted by challenges related to the environment (Liu & Raven, 2010: 824). China

has the second largest GDP of 13,4 trillion after United States that has the highest GDP of 20,49 trillion (Maital & Barzani, 2020: 08). There is evidence that some companies that operate in countries that have high GDP are burdened by environmental costs, some of those companies become liquidated and shut down, (Kompas, Pham & Che, 2018: 1169). Unfortunately, such deflates the GDP of a country. Companies should have mitigating strategies in place to avoid being negatively impacted by the burden of environmental costs (Kompas, Pham & Che, 2018: 1169).

Most companies across the globe use information from Inter-governmental panel on climate change (IPCC) reports (Al-Ghussain, 2018:18). Based on the recent IPCC report, there is a likelihood that temperatures across the globe may increase by 3.0 degree Celsius, resulting in an increase of 24% in flooding to an estimated cost of 63 billion dollars related to food security (IPCC reports, 2021). The IPCC report is considered necessary as it assists companies to predict future possibilities of environmental contaminations and environmental costs (Al-Ghussain, 2018:18).

The environmental management activity that is incurred by most companies is attributed to environmental contamination that is caused by pollution (Hasnat, Kabir & Hossain (2018: 02). Pollution is the introduction of wasteful materials and contaminants into natural environments (Molina-Azorı´n et al., 2009: 1084). Companies in Asian countries are affected by various types of pollution namely, air pollution, water pollution, noise pollution, and soil pollution (Mashura, 2021: 628). Studies have highlighted that pollution is caused by harmful waste deposited into oceans, dams, rivers, and lakes. The effect of pollution is deemed to be significant in food production as a polluted environment is rarely able to support the production of vegetation and crops, and lack sanitation (Sunkad, 2021:73). Of the different types of pollution, Omozue, (2022: 99) explained that air pollution is mainly caused by gas flaring emissions from oils, vehicles and manufacturing industries, and water. Noise pollution is caused by sounds from loudspeakers while soil pollution occurs because of dumping of harmful waste on the land (Hasnat et al., 2018: 02). Some of the

environmental damages are caused by human wastage, contributing to the environmental costs that companies incur (Farooq, 2018: 3).

The food processing industry in China, Spain, and Morocco have experienced challenges in the production process partly caused by chemical contamination of the environment associated with human waste (Thompson & Darwish, 2019: 01). Such chemicals also have an impact on environmental factors such as water, food, air, and soil. The negative impact of chemical contamination is that food processing companies that specialize in raring livestock experience a decline in production because livestock are directly affected by such contamination though inhalation, direct ingestion of contaminated food, air, water, and soil (Thompson and Darwish, 2019: 01). In Asia, there is a report that indicate that contaminated environments have impacted Indonesia by means of Floods, tornado, earthquakes, volcano, landslide, droughts, tsunami, abrasion, forest and land fire and tsunami that companies and human suffered from 2001 to 2019 (Supian & Mamat, 2021: 05).

Companies in Africa have also expressed their concern regarding the high costs of funding environmental projects (Okafor, 2018: 1-2). Other studies highlighted that some of the environmental cost that companies in Africa incur include costs on training employees, donations to environmental projects, and medical costs to residents that get harmed by environmental factors such as floods, storms, earthquakes, droughts, and wildfires (Worimegbe, 2021: 1524). The Nigerian food processing industry is reportedly larger as compared to that in other countries in Africa with companies that are sub-divided into 13 categories based on the type of food they produce (Liberty & Echiegu, 2015: 80). The environmental contamination caused by pollution in Nigeria seems to be an underlying issue. Liberty & Echiegu (2015: 80) determined that majority of food processing companies in Nigeria experience pollution that is caused by solid, liquid, and gas.

Apart from costs incurred as a result of pollution, Worimegbe (2021: 1524) revealed that costs dedicated to training employees on environmental related projects and

donations to medical aid schemes of environmentally affected communities are also considered as environmentalal costs that are incurred by companies in Nigeria. However, Efobi et al (2018: 2883) speculate that majority of countries in Africa are affected by pollution that is caused by burning fossils fuels for generating energy, transportation, industry, and activities in households. It appears that some of the companies in Africa lack proactiveness in responding to issues that relate to environmntal contaminations (Santos, 2010: 390).

2.3.4 Environmental management activities of South African companies

Wingard & Vorster (2001) conducted correlational analysis on the impact of the environmental management activities on companies listed on the JSE in South Africa and they discovered that there exists a slight positive correlation between their environmental management activities and financial performance. Environmental management activities are activities associated with an investment in projects that are aimed at preventing emissions and wasting of resources that are used to produce products (Ionela, 2003: 265). De Villiers (1995: 45) revealed that environmental compliance is less regulated, specifically in South Africa because in the past, companies were not required to disclose activities it. This means that companies in South Africa had discretion of whether to disclose environmental informations or not in their financial statements (De Villiers, 1995:45).

The Institute of Directors in Southern Africa (IoDSA) introduced the King report in 1994 that overlooked legislation on environmental diclosure (Ramahlo, 2016: 45). However, the King report has been enforced by listed companies in South Africa for over years years. South African listed companies complies with King requirements with a view that King reports requires that must companies act in a manner that is responsible and oversee their environmental reposibilities (Ramahlo, 2016: 45). Funding the environmental projects that aims to reduce pollutions and emmisions is considered as one of strong measures to reduce the environmental degradation (Munnick et al., 2010: 03). In most countries, disclosure of environmental information in the financial statements is not mandatory, however, most companies prefer being transparent by including their environmental management activities in their financial statements

(Davis & Gibler, 2003: 1-4). Providing environmental trainings to stakeholders such as workers, directors, and shareholders seems to be an ideal way of promoting environmental sustainability (Mbedzi, 2020: 25-26). JSE listing requirements, internal processes, and the employment or or consultation of experienced employees coupled with consultation of sustainability committees appears to have strong influence in ensuring that the environmental management activities are promoted and implemented by companies (Kitsikopoulos et al., 2018: 27).

2.3.5 Benefits of reporting environmental management activities

Reporting environmental activities in financial statements has numerous benefits including providing investors and stakeholders of the company with actual figures on environmental management activities (Kalash, 2020). Secondly, reporting on environmental activities assists a company with promoting environmental awareness within the industry and country (Kalash, 2020). Thirdly, it promotes a culture of protecting and enhancing the environment (Kalash, 2020). Lastly, it helps improve the public image of a company to its stakeholders and it helps a company to achieve competitive advantage in the market (Kalash, 2020).

Furthermore, Muza & Magadi (2014) emphasized that the benefit of environmental costs exceeds the costs that the company might have incurred. Fewer studies seem to have discouraged the reporting of environmental management activities. White & Lang (2012) is one of the few studies that have expressed disadvantages of reporting the environmental management activities. Javed et al (2022) speculate that larger companies are major contributors of environmental degradation. In that regard, such companies should be encouraged get to involved in environmental management activities and to disclose the activities that they undertake.

2.3.6 Accounting disclosure of environmental management activities

Other companies recognize environmental management activities as a component of production cost and they integrate it with other production costs when they determine the total costs (Huang & Songqing, 2011: 149). As opposed to the above, Basuki &

Irwanda (2018: 173) highlighted that other companies record the environmental management activities that are incurred in the financial year as expense in the financial statement. Furthermore, Rounaghi (2019: 506) points out that the accounting treatment of the environmental management activities is based on discretion of the company.

For a company that adds environmental related costs to product cost, they must classify those costs as overheads costs (Basuki & Irwanda, 2018: 173). However, Huang & Songqing (2011: 149) explain that costs that are classified as overheads costs must be allocated to production using either activity-based costing or traditional costing method. In cases where environmental costs are included on some companies' financial reporting, the item is broken down as costs of environmental coordination fees, maintenance of facilities, costs of treatment of waste, environmental audit fees, cleaning of environment, and education and training of the employees (Basuki & Irwanda, 2018: 174). Activity-based costing is explained as the allocation of overheads cost to production based on activity pool incurred and the traditional overheads allocation of overheads is the allocation of the total overheads based on single allocation base (Huang & Songqing, 2011: 149). Van der Poll (2015:02) adds that activity-based costing can be used by companies as a measure to reduce the environmental costs.

Okafor (2018: 02) also points out that some companies' record on environmental management activities include environmental remediation and pollution control costs, costs of non-compliance with environmental regulations and the donations made to charity that is related to environmental enhancements. Challenges that pertain to environmental management activities seems to be an underlying topic in South Africa and the rest of the globe.

Managing the environment comes with a financial cost, however most companies tend to classify environmental projects as investments so that they can report lower operating costs (Kusnikamal & Akhmetova, 2019: 94). Research conducted in South

Africa revealed that long-term debts affect the financial performance of companies, in this instance, some food processing companies use long-term debts to finance the environmental projects, and therefore incur borrowing costs that affect their profitability (Yusheng & Muhammed, 2019: 93). Most companies use profitability ratios such as net profit on average assets and net profit on average equity to evaluate their financial performance (Trindade & Garcia, 2019). With the complexity of classifying the environmental cost in the financial statement, Ibanichuka & Oyadonghan (2014: 2222) suggest that environmental management activities that are monetary can either be recorded on a statement of financial position or statement of profit or loss and other comprehensive incomes. However, the cost derived from an environmental project can be recorded in the financial statement based on whether they have been classified as an expense or a liability (Ibanichuka & Oyadonghan, 2014: 2222).

2.3.7 Environmental management accounting

Environmental accounting is a tool that is used to measure, report, and present environmental information in a company's financial reporting to ensure fair presentation of environmental information (Ionela et al 2003: 269). Ambe (2007: 60) suggested that companies in South Africa should adopt the environmental management accounting (EMA) in reporting the financial records related to environmental expenditure as this would assist accountants to address the environmental management activities in their financial statements.

EMA is described as the process of identifying, managing, estimating, and recording environmental activities and costs (Chichan et al., 2021). Ambe (2007:60) indicated that implementing environmental management accounting (EMA) would assist companies to be able to identify opportunities and to reduce costs that have no value. Secondly, the EMA could assist companies to discover potential hidden environmental costs in overheads accounts. Thirdly, the EMA would assist companies discover income from sale of waste resources. Fourthly, using the environmental management information systems (EMIS) to integrate the managing of environmental projects with business management and lastly, to discover the best suitable method that can be

used to account for environmental impacts accordingly. Environmental information can be recorded in physical form and/or monetary form (Phan et al, 2017: 361).

Physical Environmental Management Accounting (PEMA)

Physical environmental management accounting relates to identifying, analyzing, and reporting of environmental information in the form of activities rather than monetary form (Sofia et al., 2022: 68). Physical environmental management activities include activities such as water efficiency, waste reduction, energy reduction, carbon emission reduction, animal protections, and nature conservations (Phan et al., 2017: 361). The majority of companies appear to be reporting environmental information in the physical form (Song et al., 2017: 1053). However, in recent years, the international sustainability standard board (ISSB) has developed a reporting standard that assist companies to fairly present the environmental activities in the financial reporting (Teixeira, 2023).

Monetary Environmental Management Accounting (MEMA)

Monetary environmental management accounting involves recognizing and classifying environmental information in monetary form (Phan et al, 2017: 361). An example of monetary environmental expenditure can be categorised as either prevention cost, appraisal cost, internal failure costs or the external failure costs (Basuki & Irwanda, 2018: 175). Such environmental costs are incurred to prevent and mitigate damages that are caused by the environmental factors (Ibanichuka & Oyadonghan, 2014: 44). The monetary environmental expenditure is primarily incurred with a view that a company will benefit from economic resources that a company has used in environmental protections projects (Sofia et al 2022: 68).

Jasch (2006) highlighted that some companies record monetary environmental expenditure in the form of donations that they make to environmental projects. The donations are made with a view to promoting environmental sustainability. Environmental costs can also be recognised in three forms; firstly, as direct cost that

includes expenditure of cleaning and recovering from environmental damage, secondly, as indirect costs that includes administration and legal fees of complying with environmental legislations, and lastly, as losses incurred that includes research costs (Ibanichuka & Oyadonghan, 2014: 45). Jindal and Jain (2018) state that corporate social responsibility and sustainability policies encourage companies to make monetary donations to environmental projects. Reporting MEMA is found apparent than reporting PEMA (Phan et al, 2017; 368).

2.3.8 Benefits of adopting environmental management accounting

Environmental management accounting plays an important role in that it assists managers of companies to determine environmental costs internally and to use environmental reporting information to improve companies' public image in the community (Rounaghi, 2019: 506). However, most of the companies' strategies involve using insurance as a way of insuring themselves against possible effects of environmental contaminations (Supian & Mamat 2021: 02). A study conducted in South Africa suggest that one of the effective ways of overcoming costs related to the hazards and emissions is to employ environmental experts that have relevant experience in discovering the environmental problem and offer advice on how to overcome the environmental problems (Olanrewaju & Reddy, 2022: 03). Environmental management accounting plays a vital role in promoting sustainable development in a country (Chichan, Hutman & Alabdullah, 2021). Sustainable development is beneficial to companies as they can have a proper environment to perform production process using infrastructure that is more improved (Rehman, Ma & Ozturk, 2021). Lastly, Ambe (2007) emphasized that the benefits of adopting environmental management accounting are greater than costs that may be attached to implementation controls.

2.3.9 Criticism of adopting environmental management accounting

Most studies hint on benefits of adopting environmental management accounting (Song et al., 2017, Onwubiko, 2017, Sarumpaet 2005 and Molina-Azorı´n, 2009). However, Johnstone (2020) stated that adopting environmental management requires money that a company could be using for other business activities that would generate

profit. Furthermore, Chichan et al (2021) noted that adopting environmental management accounting requires time, training, and resources that may burden companies. Whatever the case, Rehman, et al (2021) encourage companies to adopt environmental management accounting and overlook the criticism.

Santos (2010: 388) emphasized that reducing energy costs is an effective strategy that helps food processing companies to account for lesser operational costs. For example, the measure that Woolworths SA adopted to reduce energy consumption of heating, refrigeration, air-conditioning, and lighting helped the company in 2010 and as a result, it reported 10% in energy costs (Santos, 2010: 388).

2.3.10 Effect of environmental management activties on financial performance of companies

The effect that environmental management activities have on the financial performance of companies remains a prevalent topic in recent studies. The financial performance of a company involves the evaluation of performance through financial statements (Bhunia et al., 2011: 269). Furthermore, Bhunia et al, (2011: 269) indicated that liquidity ratios, debt-equity ratios, return on investment ratios, and profitability ratios are highly desirable and useful financial performance measurements that companies should use in evaluating their financial performance. In addition, Hasanaj & Kuqi (2019: 22) emphasized that financial statement ratios are standard financial performance measurement that companies use to evaluate their financial performance. Moreover, the financial statement ratios play vital role in determining the financial performance of the companies (Hasanaj & Kuqi, 2019: 22).

Lassalla et al (2017:01) used the return on equity (ROE) and return on assets (ROA) as financial performance measurements to measure the environmental management activities of companies that are based in Spanish market. The findings suggest that there is a positive relationship between environmental management activities and ROE and ROA of companies that are based in the Spanish market (Lassalla et al., 2017:14). Molina-Azorı´n et al (2009: 1085-1092), reviewed 32 studies that assessed

the impact of environmental costs on financial performance of European and American companies and found that majority of them used ROE, ROA, profitability and ROI as measures of financial performance measurement.

Molina-Azorı´n et al (2019:1085-1099) presented over 30 published studies that summarized the effect of the environment related costs on financial performance of companies involved in food production, manufacturing, and agriculture. The authors correlated various environmental management activities such as greenhouse gas, environmental legislations, waste resources and natural disaster to financial performance. Of the 30 studies, 18 concluded that environmental management activities affect the financial performance of the companies, where ten studies concluded that environmental factors do not have correlation or impact on financial performance while two studies had conflicting results (Molina-Azorı´n et al., 2019:1085-1099). In addition, Song et al (2017: 1051-1056) expressed that environmental management activities have a significant relationship with financial performance of companies. The study emphasizes that investing in environmental projects impacts some companies negatively while it impact others positively (Song et al, 2017: 1051-1056).

Moreover, there are studies that have expressed a contrast in effects associated with investing in environmental projects, the benefit and criticism have been highlighted. In support of this, a study conducted in the United Kingdom (UK) highlighted that a company can either benefit investing in environmental projects, which can also be burdened by such an investment (Manrique & Martí-Ballester, 2017:5). On the contrary, a study that was conducted in Turkey expressed that firms may increase their reputation and public trust by being transparent with the environmental involvement through recording and disclosing their environmental management activities in their financial statements (Kalash, 2020: 96). Although, it appears that companies encounter challenges as whether to classify the funds should be capitalized as investment or be expensed in the financial statements (Ibanichuka & Oyadonghan, 2014: 41-42). Most companies incur the cost of enhancing an environment that has been affected by pollution (Sunkad, 2021: 72).

2.2.10.1 Financial performance of South African companies

The financial performance of companies can be measured by return on equity (ROE), return on assets (ROA), debt ratio, company size, and profitability ratios (Lassala et al, 2017: 03). The concept of financial performance is widely reported in published scholarly studies conducted in the South African context. While some studies evaluated the relationship between financial performances against other variables such as corporate governance. Tshipa et al (2018: 22) expressed that the relationship between financial performance and environment-related costs differs based on the industry in which each company operates.

Most companies use environmental involvement and enhancement as a way of improving their financial performance (Thomsen, 2005: 620). Interestingly, it is largely companies that are listed on the JSE that report higher financial performance when they invest more in the environment (Wingard & Vorster, 2001: 313-332). This is most probably because the companies invest in community projects with the aim to improve their public image within communities (Thomsen, 2005: 620). The stakeholders of food processing companies, both internal such as employees and management and external such as customers, suppliers, government and banks, use the financial statement to evaluate the performance of a company (Manrique & Martí-Ballester, 2017: 1957).

2.3.10.2 Relationship between environmental management activities and financial performance

Studies conducted in Malaysia investigated the impact of environmental activities on the financial performance of companies, and their results show that some companies experience a reduction in their financial performance while some experience an increase in financial performance (Albrrishi et al., 2020: 100). Some scholars have argued that the environmental costs which companies incur in the current financial year would result in a significant positive impact on future financial performance (Song, Zhao, & Zeng 2017: 1051-1056). A study conducted in Australia revealed that

companies that invest in greenhouse gas emissions tend to have positive results on financial performance (Wang et al., 2014: 507). While most companies have been inconsistent with disclosing environmental costs, Albrrishi et al (2020: 106) recommend that this can be managed through adopting the Activity-Based costing method where environmental costs are allocated to companies whose costs accounts are based on their cost allocations.

2.3.11 Environmental Accounting regulation

Environmental legislation plays a vital role in governing companies to refrain from causing environmental degradation and to accurately report the environmental activities and costs (Mngoma, 2011). The implementation of Corporate Environmental Reporting (CER) has existed since the late 1980's with a purpose to encourage companies to disclose their environmental activities (Pramanik et al., 2008:148). Ibanichuka & Oyadonghan (2014: 41) encourage environmental reporting and disclosure of the company's material environmental involvements and obligations to users of financial statements.

The International Sustainability Standards Board (ISSB) was established in March 2022 with the purpose of standardizing companies' reporting of environmental activities (Avi 2022: 1182). The ISSB issued two IFRS standards, IFRS S1 and IFRS S2, in June 2023 which guides how companies should disclose some environmental matters (Teixeira, 2023: 08). IFRS S1 ensures general sustainability and related financial disclosures while IFRS S2 is intended for companies to report on issues regarding climate (Law & Szewczul, 2023:1117). The food processing industry is included among that which are expected to report environmental activities (Teixeira, 2023: 20). Some of the benefits of complying with the ISSB standard includes the companies' transparency with disclosing climate and other general environmental activities (Law & Szewczul, 2023:1117-1118). With a motive to ensure success and accurate application of the ISSB reporting standards, companies are given time to prepare themselves and familiarize themselves with the standard up until enforcement date on 1 January 2024 (Avi 2022: 1182).

2.3.11.1 Global Environmental Management regulation compliance and disclosure costs

Globally, the food industry has food standards and legislations that companies are obligated to meet and achieve (Thompson & Darwish, 2019: 07). Yapp & Fairman (2006: 43) discovered some barriers that could prevent food companies from complying with environmental legislations, including lack of money, lack of time, lack of experience, lack of access to information, lack of support, lack of interest, and lack of knowledge.

The Australian government established a National Greenhouse and Energy Reporting (NGER) Act in 2007 and was intended to ensure that companies whose activities result in the emission of large pollutants are compelled to disclose their environmental costs in financial statements (Wang et al., 2014: 509). In fact, in companies in Australia are obligated to submit their financial reporting to the clean energy regulator act No. 163 of 2011 that is enforced by the Australian constitution. Furthermore, companies in North America also have an environmental legislation named, 'The National Environmental Policy Act (NEPA) of 1969 and the California Environmental Quality Act (CEQA) of 1970' which requires companies to consider environmental impacts when they conduct their business operations (Berkey, 2020: 20). In Africa, Nigeria's National Environment Standards and Regulation Enforcement Agency (NESREA) Act of 2007 imposes a non-compliance fine that range between N10 000 to N200 000 to people and companies who violate environmental regulations. NESREA is implemented in Nigeria with a purpose of bounding individuals and companies to protect the environment and promote environmental sustainability (Suleiman et al., 2019: 112-118).

In India, large companies are required to spend 2% of their profits on environmental protection through corporate social responsibility initiatives (Jindal & Jain, 2018: 978). Laws such as this, that guide companies in the environment, are mostly enforced in selected countries that have integrated legislative systems. For example, Efobi et al (2018: 2882–2897) showed that Ghana and Nigeria do not make it mandatory for companies to take part in environmental protection activities. Although investing in

environmental protection seems to be increasing the expenditure of a business, it has been argued that in some instances, some companies record lower operational costs because of adopting environmental protection policies (Efobi et al., 2018: 2883).

Some developing countries such as Indonesia, Malaysia, and Thailand have emphasized on the importance of having environmental legislation (Lindrianasari et al., 2018: 47-52). In Indonesia, Act no. 40 of 2007 states that companies are obliged to report on social and environmental activities (Lindrianasari et al., 2018: 47-52). Meanwhile, Malaysia issued 12 environmental policies during the period between 2007 and 2009 which were imposed to emphasize the importance of environmental policies to companies and people in the country. On the international front, there exist standards that concern environmental reporting and one such is ISO 1400 which states that companies are required to report on environmental performance (Sreseli, 2023). Furthermore, the Kingdom of Thailand B.E.2550, 2007, states the environmental management in Thailand changes from the imposition of the previous constitution where companies were not obliged to engage in environmental activities (Lindrianasari et al., 2018: 47-52).

The Nigerian government enacted a national policy of food hygiene and safety in 2000 which aimed to improve food hygiene and safe practice during food processing in order to promote health food production and to minimise the risks of diseases (Ojinnaka, 2011: 589). In addition, the country's environmental legislation is enforced to protect and enhance the environment. Legislation include Federal Environmental Protection Agency Decree 1990 which focuses mainly on governing pollution and other factors that degrade the environment and Harmful Waste (Special Criminal Provisions) Act 1988 which aims in protecting the land by prohibiting dumping of waste (Omozue, 2022: 102). Overall, Nigerian food processing company are bound to comply with environmental legislations that are enforced by the government.

In some countries in Africa, environmental legislation is enforced by the constitution and the focus is on protecting the environment and enhancing the efficient

management of the environment that companies must comply with (Omozue, 2012). Some legislations in Nigeria include: Federal Environmental Protection Agency Act of 1988 (FEPA Act) which includes the National Environmental Protection (Effluent Limitation) Regulations, National Environmental Protection (Pollution Abatement in Industries and Facilities Generating Wastes) Regulations and National Environmental Protection (Management of Solid and Hazardous Wastes) Regulations, Environmental Impact Assessment Act of 1992 (EIA Act) And Harmful Wastes (Special Criminal Provisions etc.) Act of 1988 (Harmful Wastes Act) (Moses et al., 2019).

Egypt has the Egypt Environmental Law No. 4 of 1994, which is basically an environmental impact assessment (EIA) system that focuses on protecting the environment (Badr, 2019: 194). Countries in the Middle east and in the north of the African continent, including Oman, Turkey, Tunisia, United Arab Emirates, Kuwait and Syria adopted the EIA system after its inception by the Egypt Environmental Law No. 4 of 1994. Badr (2019: 194) highlighted that their adoption of it is despite the fact that the Environmental Law No. 4 of 1994 does not clearly have details on compliance procedures and legal consequences for non-compliance with the EIA. Efobi et al (2018: 2883) identified several Ghanaian and Nigerian companies that comply with the countries' environmental legislation: National Environmental Standards and Regulations Enforcements Agency (NESREA) and Environmental Protection Agency (EPA). The study noted the following percentage of companies in Ghana and Nigeria are complying with environmental regulations (Table 2.1):

Table 2.1 Compliance with environmental regulation

Related environmental regulations	Ghana	Nigeria
Reducing solid waste	35%	38%
Reducing gaseous emissions	44%	22%
Reducing liquid waste	14%	24%

(source: Efobi et al, 2018: 2883)

Ensuring that companies comply with environmental legislation seems to be an approach used by many countries. For example, in Zimbabwe, a penalty of fees is

imposed for non-compliance with national environmental policies such as Natural Resources Act, 9 of 1996; the Atmospheric Pollution Prevention Act, 31 of 1996, the Hazards Substances and Articles Act, 76 of 1996, and the Noxious Weeds Act, 16 of 1993 (Mangena, 2014: 225).

Nigeria, Ethiopia, Ivory Coast, and Ghana enforce compliance with the environmental legislation named The Environmental Protection Agency (EPA, 1995 [6]) and it states that information on the environmental cost ought to be managed internally (Okafor, 2018: 2-3). Management internally mean that these countries have a discretion to report the environmental costs in their financial statements (Okafor, 2018: 2-3). The purpose of EPA is to support stakeholders, companies and society in response to natural disasters that affect the environment.

2.3.11.2 South African environmental regulation compliance and disclosure costs

Previously, companies that operated in South Africa were not legislated and therefore not bound and required to disclose and present their environmental involvement in financial statements (De Villiers & Vorster, 1995: 45). In recent years, the country implemented the IFRS S1 and S2, which bind companies to fairly disclose their environmental information (Avi, 2022: 1177). However, the King report and companies act 71 of 2008 does not have a requirement that bind companies to disclose environmental costs (Mitchell & Hill, 2009:56). In the past, some companies in South Africa did not disclose environmental information because the transaction was seen as negatively impacting financial records and creating complex financial information that companies had to present to the public (White & Lang, 2012:40).

King IV corporate governance code suggest that a company's governing body should ensure that it is seen as a responsible corporate citizen by overseeing and monitoring the environment including responsibility in respect of pollution, waste disposal and protection of biodiversity (King IV report, 2016: 45). Even though it is not mandatory for companies to invest in environmental projects and comply with King IV code,

companies that are listed on JSE are encouraged to comply with King IV code and act in the best interest of the society by engaging in activities that benefit the company and society (King Iv report: 2016). Furthermore, ISO 14004 states that companies must include the profile of the organization environmental item, environmental policies and the objective, process of environmental management, evaluation of environmental performance and the opportunities for future improvements in their financial reporting (De Villiers, 1999: 33-34).

i. National environmental management Act (NEMA) no 107 of 1998

The national environmental management Act no 107 of 1998 was enforced by South African government in 2006 to companies and citizens with the purpose of protecting the environment by preventing environmental degradation and pollution (Sadham et al, 2008: 156). Furthermore, Muganyi & Mbohwa (2018: 260) indicated that companies and individuals within the South African region can be fined for non-compliance with the national environmental management act. Consequently, companies that contravene the NEMA act may be forced to cease operations (Muganyi & Mbohwa, 2018: 260). Waste Act, 2008 (Act 59 of 2008) falls under the mandate of the NEMA and is implemented with a purpose of protecting the environment from wastages to prevent pollution (Mngoma & Reddy, 2011: 108).

ii. Environmental Conservation Act, 73 of 1989

The environmental conservation act (ECA) is another environmental protection act that is enforced by the South African constitution (Mngoma & Reddy, 2011: 108). Non-compliance with it results in heavy penalties and may result in companies ceasing operation (Muganyi & Mbohwa, 2018: 260). The approach by the South African government is in alignment with that effected in other countries such as Nigeria, Zimbabwe, Ghana, China, and the USA which impose legal fees to companies that do not comply with environmental legislation.

Mngoma et al (2011:115) reported that the South African environmental laws such as Environmental Conservation Act, 73 of 1989 and the National Environmental Management Act, 1998 are challenged by a lack of training and education on environmental governance. Environmental governance is explained as the decision - making process of managing and controlling environmental issues and natural resources (Sreseli, 2023).

2.3.11. 3 Consequences of Compliance with environmental legislation

Environmental legislations are legal policies implemented by a country's constitution to prevent, restrict, and regulate environmental practices that are harmful (Efobi et al., 2018: 2883). Each country ought to have its own environmental regulations. Van der Poll (2015: 05) expresses that compliance with environmental regulations is vital as companies incur non-compliance costs for failing to comply with the country's environmental legislative requirements. Managers have the responsibility to make decisions, lead, and control functions that includes finances, human resources, information resource and physical resources in a company (Griffin, 2021). However, Kundu et al (2019) highlighted the levels of managers that have an authority to give perspective with regards to responding to issues related to environment, which includes: Senior management level, Middle management level and Lower management level. Furthermore, King IV suggest that within a corporate governance body, it is the board of directors that must carry the responsibility of the company (king report, 2016).

Compliance with environmental regulations and legislations require companies' management to be aware of the rules and understand them, be willing to comply with the relevant regulations, and legislations as well as be able to comply with them (Yapp & Fairman, 2006: 49). Ambe (2007: 64) indicates that some companies in South Africa limit energy usage, water usage and usage of materials to avoid waste that results in environmental contaminations. It is at the discretion of the company to decide the best possible way to address the environmental contaminations (Efobi et al., 2018: 2882).

Ramahlo (2016: 45) advocates that companies that comply with King IV report would benefit the following: Public trust, increased turnover, and increased efficiency. Manrique & Martí-Ballester (2017:5) indicated that while companies' compliance with the environmental legislation is influenced by the strength of the environmental regulations that are imposed in the country. This implies that countries that have companies that do not comply with environmental legislation lack severe environmental penalties for non-compliance. Similarly, countries that comply with environmental legislations are those which impose severe penalties for non-compliance with environmental legislations (Manrique & Martí-Ballester, 2017:5). In addition, the benefits of conformance with the environmental legislation have also been underlined by other studies that it creates public trust and confidence in the company (Okafor, 2018: 01).

According to chartered institute of Management accountant (CGMA), management accountants have the main responsibility of making decisions which include addressing environmental related challenges that affect the company (van der Poll, 2015: 03). Although companies address environmental issues differently, Brulhart et al (2017:28) highlighted that other companies address environmental issues when they threaten their operations while other companies address environmental issue as guided by the overall company management strategy. Furthermore, Shareholders of the company also has responsibility's role in decision making that concerns the company's environmental involvements and participation (Gibson, 2012).

Compliance with environmental regulations seems not mandatory for some companies in other countries. However, the countries that have weaker penalties for non-compliance with environmental regulations have fewer companies that comply and on the contrary, countries that face severe penalties for non-compliance with environmental regulations tend to comply with environmental regulations (Manrique & Martí-Ballester, 2017: 05).

2.4 The conceptual framework

The conceptual framework presented in figure 2.1 refers to logical orientation of variables that formed part of the study (Kivunja, 2018: 47). Based this study, the orientation of this framework was based on argument of whether the environmental activities and level of reporting environmental activities have an impact on financial performance of the selected food processing companies.

The conceptual framework shown below reveals a relationship between the variables that are discussed in the literature review. The upper side of the framework depicts environmental management activities that are incurred by companies. The upper side also includes the control variables and the level of reporting of the environmental activities. The lower part depicts the financial performance measures that are used to evaluate the impact of the environmental costs on the food processing companies.

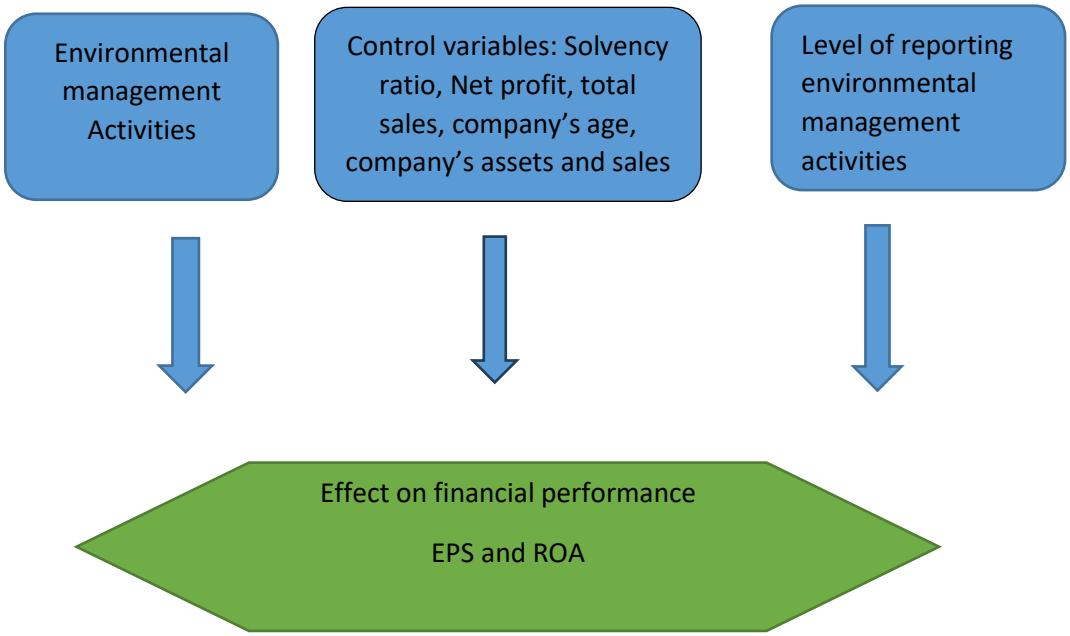

Figure 2.1 Conceptual framework

2.4.1 Operationalization of dependent variables

Published information has shown that it is possible to use financial statement ratios to determine the effect of environmental costs and activities on financial performance

and revealed a negative effect, positive effect, and conflicting effect. In support of this, Kalash (2020: 108) conducted a study in Turkey and used financial statement ratios to determine the impact of environmental costs reporting on financial performance and results of the study showed that the environmental costs have no impact on the financial performance. Another study done in Nigeria also used financial statement ratios to determine the effect of the environmental costs on the financial performance of oil companies and results revealed that the environmental costs assist companies' profitability and financial performance (Okafor, 2018: 06). Moreover, Molina-Azorı´n et al (2009) indicated that financial statement ratios are the relevant financial performance measurements that can be used to assess the company's financial status. Financial statement ratios such as liquidity, solvency, efficiency, and profitability ratios have been fairly used by many countries across the world (Bhunia et al., 2011: 270).

On the contrary, there also exist studies that have used financial statement ratios when analyzing the effect that environmental costs have on the financial performance of companies. For example, Manrique & Martí-Ballester (2017: 05) used the ROA, liquidity, profitability Ratios to assess the impact of environmental costs on financial performance of companies. However, Molina-Azorı´n et al (2009) found conflicting results, showing that other companies are affected by environmental costs and others are not affected. Okafor (2018: 05) also used financial statement ratios to analyse the effect that the negative impact of environmental activities has on performance of small micro-medium enterprises (SMME's).

2.4.1.1 Operationalisation of dependent variables

The dependent variable of this study is the financial performance of the food processing companies that are listed on JSE. Financial performance is measured using ROA and EPS. Furthermore, the operationalization of dependent variables that are used to measure financial performance are explained in Table 2.2 as follows:

Table 2.2 Operationalization of dependent variables

Financial performance measurement	Operationalisation of the dependent variables	Source
EPS (ordinary shares)	Determines the value earned by shareholder per share. EPS is determined by adding the net earnings of a company divided by the number of ordinary shares available.	(Onwubiko, 2017:71).
Return on assets (ROA)	The ROA is the profitability ratio that estimates the profit that is earned from the companies' assets.	(Sarumpaet, 2005: 92)

Source: the researcher (2024)

The financial performance variables that are used in this study are disclosed in the financial statement of the food processing companies. However, the solvency ratio is determined by the following formula (Breuer et al, 2012).

$$Solvency \ = \frac{Total\ assets}{Total\ liabilties}$$

2.4.2 Operationalization of Independent variables

Independent variables in this study include the environmental activities that food processing companies report in their integrated financial statements. The physical environmental management activities (PEMA) have been used in this study as the independent variables. PEMA are non-monetary environmental activities that companies report (Phelan et al, 2022: 129827). Environmental activities that food processing companies incur include non-monetary factors such as environmental impact assessments, efficiency of energy, water reduction, mobile fossil fuels, raw materials, waste reduction, carbon emission reduction, and air quality management. Monetary environmental activities on the other hand include costs items that are identified and classified either expenditure or investments in the financial statements (Munnick & Law , 2010: 03).

Using environmental activities as an independent variable to determine the association with financial performance seems prominent given that most scholars have shown interest in this area (Sarumpaet, 2005). Furthermore, environmental activities that are incurred in compliance with NEMA act 197 of 1998 include environmental projects, environmental assessments and audits, carbon tax, environmental non-compliance fees, and the environmental training costs (NEMA, 2023 online).

2.4.2.1 Summary of Operationalization of Independent Variable: Environmental management Activities.

Table 2.3 presents a summary of the environmental management activities reported in literature.

Table 2.3 Environmental management activities that are cited in literature.

	INDEPENDENT VARIABLES: Environmental Activities	SOURCE
1	Fossil fuel reduction	(Efobi et al, 2018: 2883)
2	Energy reduction	(Robert et al, 2020: 2-9)
3	Water efficiency	(Robert et al, 2020: 2-9)
4	Material and resource efficiency	(Song et al, 2017: 1054)
5	Environmental impact assessment and audits	(Onwubiko, 2017: 71)
6	Waste reduction	(Teixeira, 2023: 22)
7	Environmental community projects	(Johnstone, 2020)
8	Environmental management training Programme	(Robert et al, 2020: 2-10)
9	Level of carbon tax	NEMA, 2023 online
10	Environmental non-compliance costs (prosecution and fines)	(Efobi et al, 2018: 2883)
11	Environmental management systems	(Sarumpaet, 2005: 95)

12	Greenhouse Gas (GHG) Emissions (Climate change)	(Law & Szewczul, 2023: 1117)	
13	Air quality management	(Robert et al, 2020: 2-9)	
14	Nature conservation	(Nkukwana, 2018: 872)	
	Control variables		
Solvency ratios		Measures the ability of a company to meet it long term obligations by calculating dividing the total assets with the total liabilities of a company.	(Bhunia et al, 2011: 270-272).
Net profit margin		Net profit margin is the profitability ratio that estimates the profit that is generated from the revenue.	(Onwubiko, 2017: 71)
Sales growth %		Measures the percentage increase or decrease of sale from one financial period to another	(Onwubiko, 2017: 71).
Company size		The size of the company is measured by the size of the assets.	(Song et al, 2017: 1054)
Company age		The number of years which the company has been operating	Okafor (2018)

Source: the researcher (2024)

Environmental management activities are not limited to those shown in table 2.3. The conclusion that addresses whether the JSE-listed food processing companies are reporting these environmental management activities is presented in chapter 4.

Furthermore, the dependent variable is also not limited to variables listed on table 2.1. More variables are applied by other studies to reach a conclusion of similar study.

2.5 Chapter summary

This chapter reviewed extant literature on environmental management activities, most companies worldwide experience environmental issues and scholars are finding interest in this area of study. Some companies have invested in environmental enhancements through supporting environmental projects. The most common environmental issues reported in literature are pollution, climate change, weather fluctuations, and global warming. Some studies indicated that some companies reported negative financial performance while others benefited more from the investment in environmental projects. The next chapter address the methodology that was used in determining the environmental activities conducted by South African JSE listed food processing companies, the level of reporting of the activities in the integrated reports and the impact of the environmental activities on financial performance of the companies.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter involved a review of literature on environmental management accounting, environmental management activities, environmental legislation and financial performance of companies. Furthermore, in the chapter, the researcher presented the theoretical framework and conceptual framework for the study. This chapter presents the research strategies that are used to address the objectives of the study. It further discusses the methodology used to conduct the study, including the research designs and the research paradigm. Also, it describes methods that were used to collect data and select the target population. Research methodology refers to the tools, techniques, and procedures which a researcher uses to collect, analyze, and interpret results (Wahyuni, 2012: 72). Quantitative research was adopted in this study.

3.2 Research design

The study sought to identify the environmental management activities and to determine the effect on the financial performance of JSE-listed food processing companies. The research design is described as a process and method that is used to collect the data, measure, and analyse the data (Lin et al., 2021). The study adopted the longitudinal approach by using the integrated financial statement for a period of 10 years. Furthermore, this study is regarded as ex-post facto correlational research design. Worimegbe (2020: 1524) explained ex-post facto correlational research design as a study that investigates the relationship between variables that historically exists. The study employed the ex-post facto research design because the aim of the study is achieved by determining the relationship between the environmental management activities and the financial performance that are historically presented in the integrated financial statements.

A correlational design is used in studies that measure the relationship of two or more variables (Senthilnathan, 2019: 02). The correlational research design has also been employed in this study to measure the relationship between the environmental management activities and the financial performance of the JSE-listed food processing companies. Correlational design was relevant for this study because previously been

used by prominent studies that aim to achieve similar objectives. Onwubiko (2017) has also used the correlational approach in determining the relationship between two variables. Kalash (2020) also used the correlational approach and justified that it effectively achieved the objectives of the study.

3.3. Research paradigm

According to Wahyuni (2012: 69), a research paradigm concerns a researcher's worldview, belief, or system of thinking and/or interpretation and the behaviors of the research. Furthermore, Park et al (2020: 690) explained the positivism research paradigm as a deductive method that mostly uses quantitative data to determine the relationship between independent and the dependent variables. Therefore, this study seeks to identify the environmental management activities and to determine the extent of reporting as well as the impact on the financial performance of the JSE listed food processing companies. The positivism research paradigm is relevant for this study because the study is quantitative and seeks to identify the relationship between environmental management activities and financial performance. However, for the purpose of this study, financial performance is measured by EPS and ROA.

Ismail & Zainuddin (2013: 53) highlighted four benefits of using the positivist paradigm which includes, Firstly, there is accuracy in the results because the population is represented by larger sample. Secondly, the reliability of the study is guaranteed using experiments, survey methods and statistical methods. Thirdly, the use of positivist is replicable in a way that different studies can use the same study method and yield the same results that can be used comparative feedback (Abbadia, 2022). Lastly, the positivist paradigm has high objectivity. The use of a positivism approach is employed with a view that the study will be accurate, comparative and objective.

3.4 Data collection

Secondary data was used and collected in this study. Secondary data is described information that has historically been collected for different purposes, however the study used such information for further and new analysis (Shen et al., 2019). Hox &

Boeije (2005: 595) further explained secondary data as that which was collected by other person beforehand, more particularly on government publications, websites, books, journal, articles and financial statements records. Therefore, the study used the information that was published in the JSE-listed food processing company's integrated financial statements. The integrated financial statement was published in companies' websites and therefore usually used by company's stakeholders (van der Vyver, 2018: 133). This study used the same information in the integrated financial statement that is initially used by the company's stakeholders.

All 13 food processing companies that were listed on JSE have publicly published their integrated financial statements on their websites. The information obtained in the integrated financial statement adequately and satisfactorily addressed the objectives of this study.

Secondary data was collected from published financial statements of the JSE-listed food processing companies on company websites. Internet search was used to access the companies' websites. Obtaining secondary data from the company website assisted the study to produce information that was relevant and related to environmental activities and financial performances. Lin et al (2021) supported the view that the secondary data that is obtained from a company's websites is valid to produce relevant study.

3.4.1 Target population and sample size

Quantitative data was collected from JSE-listed food processing companies. According to Nhundu (2017:10), so far, South Africa has 13 companies that are involved in food processing, that are listed on the JSE. In that regard, data was collected from all the 13 companies. Data sampling relates to selection of groups from a large population (Taherdoost, 2016). The 13 study companies appeared to be fewer for consideration as eligible to be sampled. Therefore, all the 13 food processing companies listed on the JSE were included in the study. Panel data was used to

expand the dataset to achieve data saturation. The panel data involved information from financial statements of 10 years period, from 2012-2021.

Table 3.1 presents the lists of the 13 food processing companies whose details were used in this study. The links to all companies' websites where the integrated financial statements were obtained from, are also included in the table below.

Table 3.1 Food processing companies' that are listed on JSE.

Name of company	Food processed	Company's website links
All Joy Foods Limited	Canned foods products and variety of sauces	*https://alljoy.co.za/results/*
Astral Foods Ltd	animal feed pre-mixes, broiler genetics, sale of day-old chicks and variety of fresh, frozen and value-added chicken products	*https://www.astralfoods.com/investor-centre.html*
AVI Ltd	hot beverages, savoury and sweet biscuits, snacks and frozen convenience meals	*https://www.avi.co.zat/investor/results-and-presentations/current-year/*
Clover Industries Ltd	Dairy products, snacks and beverages	*https://www.clovercorp.com.au/en/invest-our-business/reports-and-presentations/*
Crookes Brothers Ltd	Bananas, Macadamia and sugar canes	*https://www.cbl.co.za/investor/integrated-reports/*

Oceana Group Ltd	Sea food and canned foods	https://www.oceana.co.za/investors-information-integrated-reports
Pioneer Foods Group Ltd	bakery, beverages, Rice, mealie meal and snacks	https://pioneerfoods.co.za/financial-results/
Quantum Foods Hldgs Ltd	Animal feeds and poultry products	https://quantumfoods.co.za/annual-reports/
RCL Foods Limited	Poultry products, sugar, bread, milling, snacks	https://rclfoods.com/investor-center/financial-results-and-investor-presentations/
Rhodes Food Grp Hldg Ltd	Spices, canned foods, beverages	https://www.rfg.com/investor-relations/
Sovereign Food Inv Ltd	Vegetables and poultry products	http//www.sharedata.co.za/data/001029/pdfs/SOVFOOD_ar_feb17.pdf/
Tiger Brands Ltd	Bakeries, milling, rice pasta, snacks. beverages and vegetables treat	https://www.tigerbrands.com/investor/resultscentre
Tongaat Hulett Ltd	Sugar	https://www.tongaat.com/investors/integrated-reports/

Source: the researcher (2024)

3.5 Data analysis

Objective one of this study sought to determine environmental activities that the JSE-listed food processing companies reported on. This objective was achieved by tabulating the total number of environmental management activities per company. The table was used to clearly present the total number of environmental management activities that each company undertook and the total number of years each

environmental activity was reported within a period of 2012-2021. Furthermore, the table includes a summary of the EPS, solvency ratios, ROA, net profit % and the assets of each of the companies. Compound growth rate % has been used to determine the growth rate of the variables for the period of 2012-2021. The second objective sought to determine the extent to which the JSE-listed food processing companies reported environmental information in their integrated reporting. This objective was achieved by determining the percentage of each environmental activity reported by the companies. The percentage was determined based on the number of years over ten years that the environmental management activity was reported per company.

The third objective was to determine the relationship between the environmental management activities and the financial performance of JSE-listed food processing companies. Descriptive statistics were used to describe the mean, minimum, maximum, standard deviation, and variance of the data. The secondary data was analyzed using panel data multiple linear regression analyses on STATA software version 18. The fixed effect model is applied in this study which assumes that the error terms of the variables are constant. Using regression analysis in this study is considered appropriate and relevant as similar previous studies used the method to analyze data. Molina-Azorı´n et al (2009: 1084) used the linear regression to determine the relationships between the environmental activities on the financial performance of the selected companies across the world. Furthermore, Handayani & Wahyudin (2020:196) also used multiple regression to determine the role of financial performance on environmental performance.

To achieve the purpose of this study, the independent variable was measured by the number of environmental activities conducted by the food processing companies each year. The dependent variables included ROA, EPS. Control variables is considered to be useful in regression models in order to determine if the dependent variables are influenced by other factors apart from the independent variable (Wahyuni, 2012). Therefore, the control variables in this study includes the solvency ratio, total sales, sales growth %, company age and company's assets.

3.5.1 Testing assumption for panel data regression analysis

Data was checked to see if it meets the assumptions for carrying out panel data regression analysis. First a normality test (Jargue Bera test) was undertaken to determine whether the data are drawn from the normal distribution or either the residuals are normally distributed or not distributed (Kilmer & Rodríguez, 2017). The data is normally distributed when the p-value is greater than 0,05 significant level and the p-value of less than 0,05 significant level means that the data is not normally distributed. Secondly, the heteroscedasticity test was carried out to assess whether the errors of variances are constant in all levels of independent variables. Heteroscedasticity exists when the P-value is greater than the significant level 0.05 and the Heteroscedasticity does not exist when the p-value is below significant level of 0.05. Lastly, the Multicollinearity test was conducted to determine the correlation between the independent variables as guided by Kalash (2020). The Multicollinearity test is applicable in this study because there are control variables that are used as independent variables. STATA version 18 has been used to determine the normality test, heteroscedasticity tests and the multicollinearity. The normality test, multicollinearity test and the heteroscedasticity are determined to determine whether the data meets the conditions to use the panel data regression. Using more than four variables is considered adequate to achieve the objective of the study (Okafor, 2018: 04).

This study adopted the fixed effect regression to measure the relationship between environmental management activities and financial performance. The fixed effect regression was developed by Ragnar Frisch and furtherly advocated by Jacob Mincer in 1969 as a method that is suitable for use in the analysis of data by determining the test statistics and the probability values (Kilmer & Rodríguez, 2017). The regression model used in this study is mathematically expressed as follows:

Model 1 $= ROA_{it} = \beta_0 + \beta_1(ED_{it}) + \beta_2(SG_{it}) + \beta_3(TA_{it}) + \beta_4(TS_{it}) + \beta_5(CA_{it}) + \beta_6(SR_{it}) + \epsilon_{it}$

Model 2 $= EPS_{it} = \beta_0 + \beta_1(ED_{it}) + \beta_2(SG_{it}) + \beta_3(TA_{it}) + \beta_4(TS_{it}) + \beta_5(CA_{it}) + \beta_4(SR_{it}) + \epsilon_{it}$

Where:

β_0 =The model intercept

β_1= slope coefficient

ϵ_{it} = estimated error

ROA= Return on assets

EPS= Earnings per share

SR= solvency ratio

SG= Sales growth percentage

TA= company size (measured by total assets)

TS= total sales

ED= environmental management activities

NP= net profit margin

CA= Company's age

3.6 Reliability, validity and ethical considerations of the study

This section entails the reliability, validity, and ethical considerations of the data that were used in this study. This section is vital because if data are not reliable and valid, the findings of a study remain questionable and invalid.

3.6.1 Reliability and validity

According to Saunders et al (2009:156), data is reliable when it can sufficiently and adequately be used to provide consistent results. Therefore, the variables used in this study were analyzed using different statistical software to achieve similar results. According to Sunkad (2021), data is authentic if it is trustworthy, relevant, reliable, and valid. The data from the 13 JSE-listed food processing companies were considered valid and trustworthy because they were obtained from a trusted company's website. The integrated financial reports are issued to the public for stakeholders to have access to the company's performance. Moreover, information that the JSE listed companies published on their company website is trustworthy.

Salkind (2012: 73) describes validity as intensity to which a study has measured its intended purpose. Therefore, this explains that the data that is used in this study should sufficiently address the purpose of this study. The data used in this study was deemed sufficient as it adequately explained the association between the variables that were used in this study. Timeframe is an important element that achieves the validity of the study. For this study, a time frame of 10 years covering 2012-2021 financial years of food processing companies was used.

The validity of a research design is supported by studies that would have been conducted prior to it (Handayani & Wahyudin 2020; Bhunia et al 2011; Nejatianpour & Esmaeili 2018; Rambau 2011). The Regression method is a valid statistical measure to be used in a quantitative study (Kalash, 2022). The validity of the research instrument that was used in this study was proficient as it had been done with assistance of competent and qualified statistician.

3.6.2 Ethical considerations

Ethical issues were considered during this study. In particular, the researcher prevented providing information that was considered could harm or impact any company or person. The risk level was relatively low in this study because there was no human participation. The researcher did not present information that is false and misleading in a way that might put these companies into disrepute. The study complied with POPI act no.4 of 2013, where information obtained from companies was used solely for the purpose of this study and for publication in reputable journals.

The university research committee issues research ethics clearance certificates when the study is ethically sound. The ethical certificate was granted by the UNISA CAS. The ethical certificate deemed this study to be following the institution's ethical requirements. However, all information that was used in this study was obtained from public domain. Therefore, the author did not need permission to obtain the information.

Pseudonyms names were used to identify the companies. The companies were coded as company A up to company M.

3.7 Summary of the chapter

The chapter highlighted the methodology that the study adopted. The feature of the methodology includes the correlational research design and the positivism research paradigm that the study adopted. The chapter described the research method and data collection method that was used. Furthermore, the chapter discussed the data analysis and the STATA software that was used to determine the correlation of variables. And lastly, the chapter discussed the reliability, validity, and ethical consideration of the study. The next chapter looks at the data presentation, analysis and the discussions of the results.

CHAPTER 4: DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.1 Introduction

The previous chapter discussed the methodology that was used in this study. It presented the research design, research paradigm, data collection, data analysis, target population and sample, definition of variables and lastly, reliability, validity, and ethical considerations. This chapter presents data and analyses it using STATA version 18. The discussion of the research findings is also included in this chapter. Pseudonym names were used instead of real company names to comply with the ethical requirements of this study. The companies' names were referred to as company A, B, C, D,E,F,G,H,I,J,K,L, and M.

The findings are presented in three parts. The first part presents the environmental activities that were carried out by the 13 food processing companies listed on the JSE from 2012 to 2021. To achieve the first objective, the total number of environmental management activities that were conducted by each company in each year and for a period of 10 years were identified. The second part involved determining the most common environmental management activities that were consistently reported by the food processing companies. Furthermore, to achieve the second objective, the extent of reporting environmental management activity is presented in diagrams and tables. The third part of this chapter presents the relationship between the environmental management activities and the financial performance of the JSE-listed food processing companies. The financial performance was measured by EPS and ROA. Furthermore, net profit, total sales, solvency ratio, sales growth %, company assets and company age were also used as a control variable in achieving the third objective. The variables used in this study are relevant because previous studies used similar variables in addressing similar research objectives (Handayani & Wahyudin, 2020:196). The environmental management activities that were identified from the 13 JSE listed food processing companies are:

- Fossil fuel reduction
- Energy reduction
- Water efficiency
- Material and resource efficiency

- Environmental impact assessment and audits
- Waste reduction
- Environmental community projects
- Environmental management training Programme.
- Level of carbon tax
- Environmental non-compliance costs (prosecution and fines)
- Environmental management systems
- Greenhouse Gas (GHG) Emissions (Climate change)
- Air quality management
- Nature conservation
- Animal protection

4.2 Environmental management activities conducted and costs incurred by JSE listed food processing companies for the period 2012 to 2021

This section represents the environmental management activities and cost items that were identified from the companies' integrated financial reports covering a 10-year period from 2012 to 2021. The environmental management activities or cost items are presented from table 4.1 to table 4.13. The tables present the number of environmental management activities or cost items reported in each year from 2012 to 2021 and the total number of years each environmental management activity or cost item was repeatedly reported, and this is expressed as a percentage of 10 years. The **'X'** in tables 4.1 to table 4.13 denotes the years in which the specified environmental management activity or cost item was not reported in the integrated financial report. The symbol **'√'** denotes a year in which an environmental management activity or cost item was reported. The list of integrated financial reports for each company is presented in appendix 1.

The financial performance measures are also presented in this section on table 4.1 - 4.13. The EPS, solvency ratio, ROA, net profit margin % and company size (measured by total assets) for each company are also presented in this section from table 4.1 to table 4.13. The EPS, ROA and net profit margin are good when they yield positive results, and they are deemed bad when they yield negative results. The solvency ratio

is satisfactory when it exceeds a benchmark of 1:1 (Bhunia et al, 2011; 271). The solvency ratio benchmark of greater than 1:1 implies that the company has more assets than liabilities and the solvency of below benchmark of 1:1 implies that the company has more liabilities than assets. The average growth rate of EPS, ROA, solvency ratio, net profit margin and a Company's assets are determined by compound annual growth rate (CAGR) formula. The CAGR is appropriate for determining the growth rates of financial performance (Nikmah & Fajarini, 2020: 179). The CAGR formula is presented below.

$$\text{CAGR} = \left(\frac{EV}{BV}\right)^{1/n} - 1 * 100\%$$

Where:

EV = figure at the end of the period

BV =figure at the beginning of the period

n = number of years

4.2.1 Environmental Management activities conducted, or costs incurred by company A for the period 2012 to 2021.

Table 4.1 presents the environmental management activities or cost items that were disclosed by company A for a period of 10 years, 2012 to 2021.

Table 4.1 Environmental management activities and cost items disclosed by company A from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	x	x	X	X	X	X	x	x	x	x	0
2	Energy reduction	x	x	X	X	X	X	x	x	x	x	0
3	Water efficiency	x	x	X	X	X	X	x	x	x	x	0
4	Material and resource efficiency	x	x	X	X	X	X	x	x	x	x	0
5	Environmental impact assessment and audits	x	x	X	X	X	X	x	x	x	x	0
6	Waste reduction	x	x	X	X	X	X	x	x	x	x	0
7	Environmental community projects	x	x	X	X	X	x	x	x	x	x	0
8	Environmental management training Programme	x	x	X	x	X	x	x	x	x	x	0
9	Level of carbon tax	x	x	X	x	X	x	x	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	x	x	X	x	X	x	x	x	x	x	0
11	Environmental management systems	x	x	X	x	X	x	x	x	x	x	0
12	Greenhouse Gas (GHG) Emissions (Climate change)	x	x	X	x	X	x	x	x	x	x	0

13	Air quality management	x	x	X	x	X	x	x	x	x	x	0
14	Nature conservation	x	x	X	x	X	x	x	x	x	x	0
15	Animal protection	x	x	X	x	X	x	x	x	x	x	0
Totals number of activities conducted or reported		0	0	0	0	0	0	0	0	0	0	0
Percentage of activities conducted, or cost items incurred		0	0	0	0	0	0	0	0	0	0	0
Financial performance ratios												Growth rate (%)
EPS		3,59	1,99	(4,41)	1,36	1,56	1,29	1,06	5,81	7,97	10,1	10,90%
Solvency Ratio		1,65	1,46	1,38	1,3	1,36	1,28	1,3	1,27	1,39	1,46	-1,22%
ROA (%)		7,52	2,86	(9,75)	2,71	2,3	1,49	1,2	4,78	6,49	7,27	-0,34%
Net profit margin (%)		3,43	1,31	(4,43)	1,37	1,12	0,8	0,7	3,35	4,13	5,66	4,95%
Company Assets (R'000 000)		48,65	62,63	55,86	71,39	69,13	88,34	90,49	124,09	125,07	140,34	11,18%

Source: the researcher (2024)

Company A did not disclose any information related to environmental management activities or cost items. The study assumes that environmental management activities or cost items disclosed by companies in the integrated financial reports were conducted or incurred by the companies in the reporting year. Based on this assumption, any company which did not disclose an environmental management activity or cost item in its integrated financial statement is considered as having not conducted the activity or incurred the costs in the reporting year. However, reporting of accounting and information related to the environment has been discretional by companies in prior years (Okafor, 2018: 2-3). However, the new ISSB standards IFRS S1 and IFRS S2 which guides reporting of environment related information will become operational in 2024 (Law et al: 1117-1118).

The company was able to maintain growth in their assets, EPS and net profit margin % even though it had not reported any environmental management activities. Mashura (2021: 628) highlighted that the companies that record the environmental management activities have a high chance of generating increased financial performance. However, the company did not report any of the environmental management activities that are listed in table 4.1 and the net profit and the EPS increased. Johnstone (2020) pointed out that the companies that participate in environmental management activities tend to have a decrease in their assets and become solvent. It appears that the solvency ratio of company A had a slight decrease though the company did not report any environmental management activity. This implies that the environmental management activity was not a contributing factor that affected the decrease of the solvency ratio of company A. However, the company managed to maintain the solvency ratio that was greater than the benchmark of 1:1 throughout 2012-2021. The assets of company A increased. This implies that the company was able to generate more assets even though they had not been reporting environmental management activities. Therefore, it cannot be concluded that environmental management activities contributed to the increase in company A's assets since the company did not report any environmental management activities. The ROA fluctuated throughout the years 2012-2021.

4.2.2 Environmental management activities conducted, or cost items incurred by company B from 2012 to 2021

Table 4.2 presents the environmental management activities or cost items that were disclosed by company B for a period of 10 years, 2012 to 2021.

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Table 4.2 Environmental management activities and cost items disclosed by company B from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/ cost incurred (%).
1	Fossil fuel reduction	√	√	√	√	√	√	√	√	√	√	100
2	Energy reduction	√	√	√	√	√	√	√	√	√	√	100
3	Water efficiency	√	√	√	√	√	√	√	√	√	√	100
4	Material and resource efficiency	√	√	√	√	√	√	√	√	√	√	100
5	Environmental impact assessment and audits	√	√	√	√	√	√	√	√	√	√	100
6	Waste reduction	√	√	√	√	√	√	√	√	√	√	100
7	Environmental community projects	x	√	√	√	x	√	√	x	x	√	60
8	Environmental management training Programme	x	X	x	√	x	√	x	x	x	x	20
9	Level of carbon tax	x	x	x	x	x	x	x	√	√	√	30
10	Environmental non-compliance costs (prosecution and fines)	x	x	x	x	x	x	x	√	x	x	10
11	Environmental management systems	√	√	x	x	x	x	x	x	x	x	20

12	Greenhouse Gas (GHG) Emissions (Climate change)	x	x	x	x	x	x	x	x	x	x	0
13	Air quality management	x	x	x	x	x	x	x	x	x	x	0
14	Nature conservation	x	x	x	x	x	x	x	x	x	x	0
15	Animal protection	x	x	x	x	x	x	x	x	x	x	0
Totals number of activities		7	7	8	8	6	8	7	8	7	8	
Percentage of activities conducted, or cost items incurred		47%	47%	53%	53%	40%	53%	47%	53%	47%	53%	
Financial performance ratios												Growth rate (%)
EPS		0,87	0,64	0,88	2,01	0,95	1,95	3,69	1,66	1,44	1,23	3,52%
Solvency Ratio		1,82	1,76	1,8	1,97	1,91	2,31	2,53	2,55	2,28	2,13	1,59%
ROA (%)		13,8	7	11,9	24,1	11,3	21	33,8	14,2	12,4	9,7	-3,46%
Net profit margin (%)		4,08	2,89	3,55	6,92	3,12	6,11	11,05	4,81	4,03	2,99	-3,06%
Company Assets (R'000 000)		3,56	3,92	4,38	4,81	4,98	5,36	6,17	6,24	7,33	7,84	8,21%

Source: the researcher (2024)

Company B seem to have conducted more environmental management activities compared to the other study companies. For example, it reported 11 environmental management activities during the period 2012-2021. Fossil fuel reductions, energy reductions, water efficiency and waste reduction activities were conducted consistently in each of the 10 years under study. However, environmental community projects, carbon tax, environmental training, environmental impact assessment and the environmental non-compliance fees were reported in few years. The company did not report Greenhouse Gas (GHG) Emissions (Climate change), Air quality management, Nature conservation and Animal protection.

Efobi et al (2018: 2883) revealed that companies that invest in reducing fossil fuel are most likely to perform poorly. However, company B appears to be have made significant investment in reducing fossil fuel though they were able to generate net profit in a fluctuating value throughout the years 2012-2021. Furthermore, Santos (2010: 388) highlighted that companies that invest in energy reduction have a high chance of increasing their net profits. This appears not to be correct since company A has a fluctuating net profit while they reported a higher reduction in energy. Therefore, this implies that there are other underlying factors that affected the net profit of company B to be fluctuating other than the energy reduction and fossil fuel reductions. Thompson & Darwish (2019: 01) pointed out that the companies that engage in waste reduction have a possibility of increasing their assets. Thus, company B assets keep increasing over years, which implies that there is a possibility that company B assets increase because of their participation in waste reduction. Kalash et al (2020) revealed that the increase in ROA can be caused by the company's participation in environmental management activities. Therefore, this justifies the decrease of company B ROA since they highly report the environmental management activities.

Company B reported the environmental training programs in 2015 and 2017 only. During these two years, the company increased EPS. This appears that the environmental training programs have a positive influence over the EPS. This is supported by Chichan et al (2021) who revealed that the companies that invest in promoting environmental training to their employees tends to yield positive financial

performance. However, even the ROA, Net profit margin and company assets have significantly increased in both 2015 and 2017. Furthermore, the company reported environmental non-compliance fees in 2019, where ROA, EPS, net profit margin % and company's assets have drastically decreased. This implies that the environmental non-compliance fees contributed to the decrease in these financial performance measures. This is supported by Mangena (2014: 225) who emphased that the environmental non-compliance costs have negative impacts on the financial performance of companies.

Environmental management system has been reported in 2012 and 2013, this environmental management activity seems to affect the company negatively because in 2012 and 2013 company B had lower Net profits, EPS, ROA and assets. The company managed to maintain a solvency greater than the benchmark of 1:1 for the entire period of 2012-2021. This implies that company B has been solvent throughout the period of 2012-2021 and was able to fulfil its long-term obligations when they fall due. (Santos, 2010: 388) suggests that companies that participate in activities that concern management of air quality have a possibility of gaining public trusts which increase the profits. Company B did not participate in the Air quality management; hence the net profits margin % decreased.

4.2.3 Environmental management activities conducted, or cost items incurred by company C from 2012 to 2021

Table 4.3 presents the environmental management activities that were disclosed by company C.

Table 4.3 Environmental management activities and cost items disclosed by company C from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	√	√	√	√	√	√	√	√	√	√	100
2	Energy reduction	√	√	√	√	√	√	√	√	√	√	100
3	Water efficiency	√	√	√	√	√	√	√	√	√	√	100
4	Material and resource efficiency	√	√	√	√	√	√	√	√	√	√	100
5	Environmental impact assessment and audits	x	x	x	x	x	x	x	x	x	x	0
6	Waste reduction	X	x	x	x	x	x	x	x	x	√	10
7	Environmental community projects	X	x	x	x	x	x	x	x	x	x	0
8	Environmental management training Programme	X	x	x	x	x	x	x	x	x	x	0
9	Level of carbon tax	X	x	x	x	x	x	x	√	√	√	30
10	Environmental non-compliance costs (prosecution and fines)	X	x	√	√	√	x	√	√	x	x	50

11	Environmental management systems	√	√	√	√	√	√	√	√	√	√	100
12	Greenhouse Gas (GHG) Emissions(Climate change)	√	√	√	√	√	√	√	√	√	√	100
13	Air quality management	X	x	x	x	x	x	x	x	x	x	0
14	Nature conservation	X	x	x	x	x	x	x	x	x	x	0
15	Animal protection	X	x	x	x	x	x	x	x	x	x	0
Totals number of activities		7	7	8	8	8	7	8	9	8	9	
Percentage of activities		47%	47%	53%	53%	53%	47%	53%	60%	53%	60%	
Financial performance ratios												Growth rate (%)
EPS		316,7	340,1	419,3	417,7	460,7	479	513,1	488,7	591,6	498,9	4,64%
Solvency Ratio		2,86	2,27	2,46	1,96	1,99	2,1	2,14	1,86	2,06	2,84	-0,07%
ROA (%)		29,4	27,4	27,6	28,3	27,9	28	28,7	26,9	24,8	27,6	-0,63%
Net profit margin (%)		1,42	1,4	1,28	1,42	1,59	1,49	1,4	1,62	1,91	2,04	3,68%
Company Assets (R'000 000)		5,53	6,57	7,10	8,03	9,03	9,27	9,66	9,80	9,77	8,85	4,81%

Source: the researcher (2024)

Company C also reported high number of environmental management activities throughout the period of 2012-2021. Table 4.3 shows that the company reported 10 environmental management activities. Company C reported the majority of the environmental management activities consistently for the period of 2012-2021. All these activities appear to have not affected the stability of the company's EPS, assets and net profit margin %. The environmental management activities that were not incurred consistently throughout the period of 2012-2021 includes environmental non-compliance fines, carbon tax, and packaging (recycling).

Company C's net profits and assets growth agree with that shown in Santos (2010: 388) and Song et al (2017: 1054) who revealed that companies that report energy reduction and material and resource efficiency have possibility of increasing the net profits. Therefore, these studies justify the increase in net profit margin of company C because this company have consistently reported energy reduction and material and resource efficiency. The company reported fossil fuel reduction consistently, however its net profits margin % and assets increased. This implies that the net profits % and assets of company C did not agree with Efobi et al (2018: 2883) who expressed that a company that reports on activities related to fossil fuel reduction exhibit a decrease in profits.

According to Mashura (2021: 628), companies that report water reduction are likely to have higher EPS. This agrees with the findings shown on company C because it consistently reported water reduction and its EPS increased. The company appears to be maintaining a solvency ratio that was above the benchmark of 1:1. This implies that the company managed to keep an asset that was greater than the liabilities during the entire period of 2012-2021. Thompson & Darwish (2019: 01) expressed that companies that report waste reduction experience an increase in their assets. Company C managed to maintain growth in their assets even though they only participated in waste reduction activity in 2021.

Furthermore, the company incurred environmental non-compliance costs for 5 years throughout the period of 2012-2021. Mangena (2014: 225) and Ramahlo (2016: 45) pointed out that companies that incur such environmental non-compliance costs are likely to generate lower net profit and EPS. However, results for company C appears to disagree with these studies since the net profits margin % and EPS kept improving over the years. Mbedzi (2020: 25-26) also suggested that companies must participate in Greenhouse Gas (GHG) Emissions (Climate change) so that they can earn public trust that increase their net profits margins % and EPS. Company C appears to have fulfilled this as they reported on the Greenhouse Gas (GHG) emissions (Climate change) consistently and their net profits margins % kept increasing over the years. Although the ROA and the solvency have in overall shown a slight decline for a period of 2012-2020, the company maintained a solvency that was above benchmark and the ROA that was positive throughout. The company non-disclosure of Air quality management Nature conservation, Animal protection, Environmental impact assessment and audits environmental community projects and the environmental training programs seems not to affect their EPS, ROA, net profit margins % and the assets.

4.2.4. Environmental management activities conducted, or cost items incurred by company D from 2012 to 2021.

Table 4.4 presents the environmental management activities that were disclosed by company D for a period of 10 years.

Table 4.4 Environmental management activities and cost items disclosed by company D from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	x	x	x	x	X	x	x	x	x	x	0
2	Energy reduction	x	x	x	x	X	x	x	x	x	x	0
3	Water efficiency	x	x	√	√	√	√	√	√	x	x	60
4	Material and resource efficiency	√	√	√	√	√	√	√	√	x	x	80
5	Environmental impact assessment and audits	x	x	x	x	X	x	x	x	x	x	0
6	Waste reduction	√	√	√	√	√	√	√	√	x	x	80
7	Environmental community projects	x	x	x	x	X	x	x	x	x	x	0
8	Environmental management training Programme	x	x	x	x	X	x	x	x	x	x	0
9	Level of carbon tax	x	x	x	x	X	x	x	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	x	x	x	x	X	x	x	x	x	x	0

11	Environmental management systems	x	x	x	x	X	x	x	x	x	x	0
12	Greenhouse Gas (GHG) Emissions(Climate change)	√	√	√	√	√	√	√	√	x	x	80
13	Air quality management	x	x	x	x	X	x	x	x	x	x	0
14	Nature conservation	x	x	x	x	X	x	x	x	x	x	0
15	Animal protection	x	x	x	x	X	x	x	x	x	x	0
Totals number of activities		3	3	4	4	4	4	4	4	0	0	
Percentage of activities		20%	20%	27%	27%	27%	27%	27%	27%	0%	0%	
Financial performance ratios												Growth rate (%)
EPS		2,65	3,68	0,59	0,06	1,34	2,2	4,59	6,12	7,51	3,61	3,14%
Solvency Ratio		4,26	4,57	4,22	5,1	4,14	4,24	3,74	2,52	3,41	3,88	-0,93%
ROA (%)		11,19	14,65	2,45	0,27	3,05	8,53	14,58	13,51	15,32	7,63	-3,76%
Net profit margin (%)		11,39	13,78	3,56	0,33	2,83	7,6	12,05	13,17	14,14	9,92	-1,37%
Company Assets (R'000 000)		0,04	0,04	0,04	0,04	0,04	0,04	0,05	0,07	0,08	0,08	7,18%

Source: the researcher (2024)

The results shown in table 4.4 show that company D reported 4 activities on environmental management throughout the period of 2012 to 2021. Information related to 2020 and 2021 financial years was missing because the integrated financial statements for the years were not available on the company's website. The results related to financial performance were obtained from the five-year financial review that had been presented in the 2019 integrated financial report. The EPS, ROA solvency ratio, net profit margin % and the assets of company D seem to deviate throughout the years. Mashura (2021: 628) and Song et al (2017: 1054) reported that the companies that participate in water efficiency and material and resource efficiency are likely to have an increased financial performance. This does not agree with the financial results of Company D since the company generated a significant increase in their EPS, ROA, net profit margin % and assets. This implies that the water efficiency and material and resource efficiency had not contributed to the increase in the financial performance of this company. Mbedzi (2020: 25-26) expressed that the company that participates in Greenhouse Gas (GHG) Emissions (Climate change) have a possibility to increase profit. However, company D net profit decreased during the years 2012-2021. This implies that Greenhouse Gas (GHG) emissions (Climate change) did not assist company D to generate more profit.

Even though the company's solvency ratio is -0,93%, the company managed to maintain the solvency of greater than benchmark of 1:1 for the entire period 2012-2021. This implies that even though the company reported a low number of environmental management activities, it maintained to be solvent and able to meet their long-term obligations when they fall due. Kompas et al (2018: 1169) pointed out that companies that report the least number of environmental activities are probably insolvent. This does not agree with the results of this company since the results in table 4.4 show that this company is solvent. Johnstone (2020) suggested that the company's financial results may be improved by engaging more in environmental management activities, thus company D seemed in line with these suggestions because the net profits and ROA were slightly dropping while they reported less environmental management activities. The company had low assets; however, it kept improving over the years. Thompson & Darwish (2019: 01) expressed that companies

that engage in waste reduction have an increase in assets. This agrees with the results of company D since its assets increased over the years.

4.2.5 Environmental management activities and cost items disclosed by company E from 2012 to 2021

The table shown below presents the environmental management activities that were disclosed by company E for a period of 10 years.

Table 4.5 Environmental management activities conducted, or cost items incurred by company E from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	X	x	X	X	x	x	x	x	x	x	0
2	Energy reduction	√	√	√	√	√	√	√	√	√	√	100
3	Water efficiency	X	x	X	X	x	x	x	x	x	x	0
4	Material and resource efficiency	X	x	X	X	x	x	x	x	x	x	0
5	Environmental impact assessment and audits	X	x	X	X	x	x	x	x	x	x	0
6	Waste reduction	X	x	X	X	x	x	x	x	x	x	0
7	Environmental community projects	x	√	√	√	√	√	√	√	√	√	90
8	Environmental management training Programme	x	x	X	X	x	x	x	x	x	x	0
9	Level of carbon tax	x	x	X	X	x	x	x	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	x	x	X	X	x	x	x	x	x	x	0

11	Environmental management systems	x	x	X	X	x	x	x	x	x	x	0
12	Greenhouse Gas (GHG) Emissions (Climate change)	x	x	√	√	√	√	√	√	√	√	80
13	Air quality management	x	x	X	X	x	x	x	x	x	x	0
14	Nature conservation	x	x	X	X	x	x	x	x	x	x	0
15	Animal protection	x	x	X	X	x	x	x	x	x	x	0
Totals number of activities		1	2	3	3	3	3	3	3	3	3	
Percentage of activities		7%	13%	20%	20%	20%	20%	20%	20%	20%	20%	
Financial performance ratios												Growth rate (%)
EPS		631,9	760,8	1 609, 60	323,9	366,9	424,7	(49,7)	167,6	57,2	152,2	-13,27%
Solvency Ratio		3,22	3,63	3,91	3,39	4,55	3,63	2,92	2,7	2,47	2,64	-1,97%
ROA (%)		16	17,4	28,3	5	6,2	8,5	(0,3)	3	1,6	2,8	-15,99%
Net profit margin (%)		23,99	25,92	46,1 7	8,2	11,38	14,49	(0,61)	6,11	3,37	6,74	-11,92%
Company Assets (R’000 000)		0,73	0,80	1,03	1,11	1,33	1,45	1,57	1,68	1,79	1,75	9,14%

Source: the researcher (2024)

Table 4.5 shows that company E reported three environmental management activities, which is low compared to that of the other study companies. Energy reduction was the only environmental activity reported on consistently for the period of 2012-2021. Table 4.5 shows a significant decline in EPS, ROA and Net profit margin % during the period 2012-2021. This implies that the financial performance is not in alignment with Santos (2010: 388); Kalash (2020: 96) and Mbedzi, (2020: 25-26) who speculated that the companies that reports Energy reduction, environmental projects and Greenhouse Gas (GHG) emissions (Climate change) activities tend to have increased financial performance.

Lassalla et al (2017:01), Ramahlo (2016: 45) and Okafor (2018: 05) reported that the financial performance of the companies is negatively affected by the number of environmental management activities that they report. Company E has only reported Energy reduction, environmental projects, and Greenhouse Gas (GHG) Emissions (Climate change) which could be the ones to negatively impact the EPS, ROA and Net profit margin %. Furthermore, the company also managed to maintain a solvency of greater than a benchmark of 1:1 throughout the 2012-2021 period. This implies that the company managed to fulfil its long-term debts as they fall due.

4.2.6. Environmental management activities conducted, or cost items incurred by company F from 2012 to 2021.

Table 4.6 presents the environmental management activities that were disclosed by company F for a period of 10 years.

Table 4.6 Environmental management activities and cost items disclosed by company F from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	x	X	x	x	x	x	x	x	x	x	0
2	Energy reduction	√	√	√	√	√	√	√	√	√	√	100
3	Water efficiency	√	√	√	√	√	√	√	√	√	√	100
4	Material and resource efficiency	x	X	x	x	x	x	x	x	x	x	0
5	Environmental impact assessment and audits	√	√	√	√	√	√	√	√	√	√	100
6	Waste reduction	√	√	√	√	√	√	√	√	√	√	100
7	Environmental community projects	√	x	x	x	x	x	x	x	√	√	10
8	Environmental management training Programme	√	x	x	x	x	x	x	x	x	x	10
9	Level of carbon tax	x	x	x	x	x	x	x	x	x	x	0

10	Environmental non-compliance costs (prosecution and fines)	x	x	x	x	x	x	x	x	x	x	0
11	Environmental management systems	√	√	√	√	√	√	√	√	√	√	100
12	Greenhouse Gas (GHG) Emissions (Climate change)	√	√	√	√	√	√	√	√	√	√	100
13	Air quality management	x	x	x	x	x	x	x	x	x	x	0
14	Nature conservation	x	x	x	x	x	x	x	x	x	x	0
15	Animal protection	x	x	x	x	x	x	x	x	x	x	0
Totals number of activities		8	6	6	6	6	6	7	7	7	7	
Percentage of activities		53%	40%	40%	40%	40%	40%	47%	47%	47%	47%	
Financial performance ratios												Growth rate (%)
EPS		443,3	489,5	555,7	587,7	785,8	401,3	734,6	528,3	650,9	570,7	2,56%
Solvency Ratio		0,3	0,3	0,27	0,59	0,55	0,24	0,2	0,17	0,18	0,21	-3,50%
ROA (%)		45	41	46	29	20	13	15	14	14	13	-11,68%
Net profit margin (%)		9,98	11,15	12,08	10,41	11,62	6,22	11,52	8,48	9,82	9,41	0,59%
Company Assets (R'000 000)		2,52	2,88	2,98	3,99	3,92	10,04	10,70	11,34	12,64	11,34	16,23%

Source: the researcher (2024)

Company F reported a high number of environmental management activities. Efobi et al (2018: 2883) pointed out that companies that report fossil fuel mostly results in decrease of financial performance, however in this case, company F had not reported on fossil fuel reduction but it still experienced a drop in their ROA. This means fossil fuel reduction did not have influence on the ROA of company F. The company consistently reported a reduction on energy, waste reduction, water efficiency, environmental impact assessments, waste reduction, environmental management systems, and Greenhouse Gas (GHG) Emissions (Climate change) throughout 2012-2021. However, the environmental community projects only took place in 2012, 2020 and 2021 while the environmental training took place in 2012. It appears that all these environmental management activities did not help the company to generate satisfactory ROA. However, the EPS, net profit margins % and assets increased over the years. This implies that the company did well despite reporting a total of seven environmental management activities in table 4.6.

Santos (2010: 388) pointed out that energy reduction increases net profit of a company. This agrees with net profits of company F since it consistently recorded the energy reduction and the net profit has been slightly increasing. Furthermore, the financial results of company F agree with findings of Thompson & Darwish (2019: 01) which reported that waste reduction assists companies increase net profits. Ambe 2007:60 and Mbedzi 2020: 25-26 also pointed out that companies that report Environmental management systems and Greenhouse Gas (GHG) Emissions (Climate change) report higher profits. Indeed, company F yielded positive net profit throughout the years. Sarumpaet (2005: 91) noted that companies that manage to maintain an increase in net profit tend to remain competitive by funding more environmental projects. This is evident from table 4.6 since company F was able to report more environmental management activities throughout the years.

Thompson & Darwish (2019: 01) also pointed out that companies that participate in waste reduction programs have potential to maintain high level of assets of which is evident from the asset growth rate of company F. The company achieved a high increase in assets throughout the years 2012-2021. However, the solvency ratio of

company F is below the benchmark of 1:1. This implies that the company had more liabilities than assets.

4.2.7 Environmental management activities and cost items disclosed by company G from 2012 to 2021

Table 4.7 below presents the environmental management activities that were disclosed by company G for a period of 10 years.

Table 4.7 7 Environmental management activities conducted, or cost items incurred by company G from 2012 to 2021.

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	X	x	x	x	x	x	x	x	x	x	0
2	Energy reduction	√	√	√	√	√	√	√	√	x	x	80
3	Water efficiency	√	√	√	√	√	√	√	√	x	x	80
4	Material and resource efficiency	X	x	x	x	x	x	x	x	x	x	0
5	Environmental impact assessment and audits	X	x	x	x	x	x	x	x	x	x	0
6	Waste reduction	√	√	√	√	√	√	√	√	x	x	80
7	Environmental community projects	x	x	x	x	x	x	x	x	x	x	0
8	Environmental management training Programme	x	x	x	x	x	x	x	x	x	x	0
9	Level of carbon tax	x	x	x	x	x	x	x	√	x	x	10
10	Environmental non-compliance costs (prosecution and fines)	x	x	x	x	x	x	x	x	x	x	0

11	Environmental management systems	x	x	x	x	x	x	x	x	x	x	0
12	Greenhouse Gas (GHG) Emissions(Climate change)	√	√	√	√	√	√	√	√	x	x	80
13	Air quality management	x	x	x	x	x	x	x	x	x	x	0
14	Nature conservation	x	x	x	x	x	x	x	x	x	x	0
15	Animal protection	x	x	x	x	x	x	x	x	x	x	0
Totals number of activities		4	4	4	4	4	4	4	5	0	0	
Percentage of activities		27%	27%	27%	27%	27%	27%	27%	33%	0%	0%	
Financial performance ratios												Growth rate (%)
EPS		335,6	275	526,5	612,8	912,1	390,3	574,6	479	-	-	4,55%
Solvency Ratio		2,4	2,52	2,07	2,35	2,39	2,63	2,37		-	-	-0,17%
ROA (%)		5,7	4,26	7,48	9,3	12,49	5,62	7,41	-	-	-	2,66%
Net profit margin (%)		3,25	3,07	5,46	6,04	8,2	3,71	5,34	-	-	-	5,09%
Company Assets (R'000 000)		0,01	0,01	0,01	0,01	0,01	0,01	0,01	-	-	-	0%

Source: the researcher (2024)

Company G had not published the integrated financial statement for 2020 and 2021 on their website. The company reported greenhouse gas, waste management, waste reduction, and energy reduction consistently throughout 2012-2021 years. Carbon tax was introduced in 2019 in South Africa; hence carbon tax was only recorded in 2019. The company seemed to be maintaining their good financial performance with positive compound growth rates except for a slight decline in solvency. Net profit appears to be the highest increasing financial performance measure of company G. Santos (2010: 388) indicated that net profits of a company tend to increase when it consistently engage in energy reduction. This agrees with the net profit of this company as the net profit increased markedly while the company consistently reported energy reduction.

Mashura (2021: 628) also pointed out that companies gain positive financial performance when they participate in water efficiency programs. This finding agrees with the increased value of EPS, ROA and net profit margin % of company G while the company reported consistently on water efficiency programs. Furthermore, the financial results of company G aligns with that of other studies (Thompson & Darwish 2019: 01; Mbedzi 2020: 25-26) which showed that companies improve their financial performances when they participate in Waste reduction and Greenhouse Gas (GHG) Emissions (Climate change) activities. However, there is a study that was conducted by Kompas, Pham & Che (2018: 1169) which pointed out that environmental management activities reduce the solvency status of the company. However, even though the compound growth rate of solvency in table 4.8 shows a slight decrease -0,17%, the company managed to maintain solvency ratio that is above benchmark of 1:1. This reflects the fact that the company maintained assets that were greater than its liabilities throughout the years. Also, the assets of the company had been consistently lower throughout the years.

4.2.8 Environmental management activities conducted, or cost items incurred by company H from 2012 to 2021.

Table 4.8 presents the environmental management activities that were disclosed by company H.

Table 4.8 Environmental management activities and cost items disclosed by company H from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	x	x	x	x	x	x	X	x	x	x	0
2	Energy reduction	x	x	√	√	√	√	√	√	√	√	80
3	Water efficiency	x	x	√	√	√	√	√	√	√	√	80
4	Material and resource efficiency	x	x	x	x	x	x	X	x	x	x	0
5	Environmental impact assessment and audits	x	x	√	x	x	x	X	x	x	x	10
6	Waste reduction	x	x	√	√	√	√	√	√	√	√	80
7	Environmental community projects	x	x	x	x	x	x	X	x	x	x	0
8	Environmental management training Programme	x	X	x	x	x	x	X	x	x	x	0
9	Level of carbon tax	x	X	x	x	x	x	X	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	x	X	x	x	x	x	X	x	x	x	0

11	Environmental management systems	x	X	x	x	x	x	X	x	x	x	0
12	Greenhouse Gas (GHG) Emissions (Climate change)	x	X	x	x	x	x	X	x	x	x	0
13	Air quality management	x	X	x	x	x	x	X	x	x	x	0
14	Nature conservation	x	X	√	√	√	√	√	√	√	√	80
15	Animal protection	x	X	x	x	x	x	X	x	x	x	0
Totals number of activities		0	0	5	4	4	4	4	4	4	4	
Percentage of activities		0	0	33%	27%	27%	27%	27%	27%	27%	27%	
Financial performance ratios												Growth rate (%)
EPS		-	(123)	(4)	54	39	55,7	164,3	92,6	80,1	53,9	191,24%
Solvency Ratio		-	1,06	3,5	3,67	3,38	4	3,81	3,71	3,48	3,55	14,37%
Net profit margin (%)		-	(8,23)	(0,24)	3,66	2,33	3,15	8,79	4,28	3,04	1,96	185,26%
Company Assets (R'000 000)		-	1,95	2,05	2,08	2,27	2,25	2,51	2,51	2,64	2,78	4,01%

Source: the researcher (2024)

Information pertaining environmental management activities of 2012 and 2013 was missing because the company did not present the integrated financial statements of both years, on their website. The company reported on energy reduction, nature conservation, waste management, and water efficiency throughout the period. Environmental audit and assessments were reported on in 2014. Surprisingly, the Company recovered from a loss after 2014 when they initially started reporting the environmental audit and assessment. This implies that there is a probability that the environmental audit and assessment enabled the company to generate profit. Onwubiko (2017:71) reflected that activities that related to environmental audit and assessments helped the company to improve their environmental performance because it influences employee's morale. It appears that company H recovered from a huge loss that was incurred from 2012-2014 because of implementing environmental audit and assessments.

Sarumpaet (2005: 91) emphasizes that an increase in EPS and ROA influence companies' shareholders and executives to allow for participation in environmental projects. However, this company increased their EPS and ROA significantly from 2015-2021 but they did not increase the number of environmental management activities. This implies that the ROA and EPS played no significant role to justify it undertaking more environmental management activities. The company's findings are in alignment with findings by Santos (2010: 388); Mashura (2021: 628); Thompson & Darwish (2019: 01) and Nkukwana (2018: 872) as they believe that companies that report on energy reduction, nature conservation, waste management, and water efficiency increase financial performance. Compound growth rates estimated a significant in EPS, ROA and net margin % while it reports these activities. However, the assets of the company and its solvency appeared to increase over the years. This implies that the company was able to participate in energy reduction, nature conservation, waste management, and water efficiency and able to generate more assets. The solvency has been over the benchmark of 1:1 throughout the periods 2014-2021. This implies that the company was able to maintain assets that are greater than its liabilities.

4.2.9 Environmental management activities and cost items disclosed by company I from 2012 to 2021

Table 4.9 presents the environmental management activities that were disclosed by company I for a period of 10 years.

Table 4.9 Environmental management activities conducted, or cost items incurred by company I from 2012 to 2021.

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	√	√	√	√	x	x	X	x	x	x	40
2	Energy reduction	√	√	√	√	√	√	√	√	√	√	100
3	Water efficiency	√	√	√	√	√	√	√	√	√	√	100
4	Material and resource efficiency	x	X	X	x	x	x	X	x	x	x	0
5	Environmental impact assessment and audits	x	X	X	x	x	x	X	x	x	x	0
6	Waste reduction	√	√	√	√	√	√	√	√	√	√	100
7	Environmental community projects	x	X	X	x	x	x	X	x	x	x	0
8	Environmental management training Programme	x	X	X	x	x	x	X	x	x	x	0
9	Level of carbon tax	x	x	X	x	x	x	X	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	x	x	X	x	x	√	√	√	√	√	50

11	Environmental management systems	x	x	X	x	x	x	X	x	x	x	0
12	Greenhouse Gas (GHG) Emissions (Climate change)	√	√	√	√	√	√	√	√	√	√	100
13	Air quality management	√	√	√	√	√	√	√	√	√	√	100
14	Nature conservation	x	x	X	x	x	x	X	x	x	x	0
15	Animal protection	x	x	X	x	x	x	X	x	x	x	0
Totals number of activities		6	6	6	6	5	6	6	6	6	6	
Percentage of activities		40	40	40	40	33	40	40	40	40	40	
Financial performance ratios												Growth rate (%)
EPS		88,3	4,5	46,7	102,4	65,4	59,7	106,6	(12,7)	(103)	111,8	2,39%
Solvency Ratio		2,26	1,68	1,9	2,06	1,99	4,19	3,25	3,65	1,78	1,91	-1,36%
ROA (%)		(6,38)	0,04	(1,39)	4,38	0,9	2,44	4,18	(0,9)	(4,26)	4,44	-196,05%
Net profit margin (%)		(24,3)	0,07	(1,42)	3,68	0,73	1,91	3,58	(0,71)	(3,45)	3,14	-179,66%
Company Assets (R'000 000)		5,20	17,39	19,91	19,69	20,23	19,51	20,99	20,41	22,49	22,41	15,73%

Source: the researcher (2024)

Company I reported on more environmental management activities. The company reported fossil fuel reductions from 2012-2015 during the years which the company's ROA and net profit margin % was negative. However, the company seem to recover from the loss in 2015 where the net profit and ROA recovered. Efobi et al (2018: 2883) indicated that companies that report activities that are related to fossil fuel reduction experience decreased financial performance. This was evident from company I as it picked up when they dropped participating in fossil fuel reductions. The company incurred environmental non-compliance fees from 2017 which ultimately financially strained the company. Ramahlo (2016: 45) highlighted environmental legal costs negatively impacts the net profit of the company. During the years 2019 and 2020, the company's net profit margin % dropped drastically when they incurred environmental non-compliance fees.

Energy reduction, Water efficiency, waste reductions, Greenhouse Gas (GHG) Emissions (Climate change) and Air quality management have been incurred consistently throughout the period of 2012-2021. These environmental management activities appear not to be negatively affecting the financial performance of company I because the company's financial results decreased and recovered during the years on which they were reported. This implies that the financial performance of this company may have been be affected by other factors other than the environmental management activities that they reported. Furthermore, the company managed to maintain a solvency ratio that greater and was able to generate a high level of assets while they participated in more environmental activities. This also implies that the company can generate a return to their shareholders and is able to fulfil its long-term obligations.

4.2.10 Environmental management activities conducted, or cost items incurred by company J from 2012 to 2021.

Table 4.10 below presents the environmental management activities that were disclosed by company J for a period of 10 years.

Table 4.10 Environmental management activities and cost items disclosed by company J from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	x	x	X	x	X	x	x	x	x	x	0
2	Energy reduction	x	x	X	x	X	x	x	√	√	√	30
3	Water efficiency	x	x	X	x	X	x	x	√	√	√	30
4	Material and resource efficiency	x	x	X	x	X	x	x	x	x	x	0
5	Environmental impact assessment and audits	x	x	X	x	X	x	x	x	x	x	0
6	Waste reduction	x	x	X	x	X	x	x	√	√	√	30
7	Environmental community projects	x	x	x	x	X	x	x	x	x	x	0
8	Environmental management training Programme	x	x	x	x	X	x	x	x	x	x	0
9	Level of carbon tax	x	x	x	x	X	x	x	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	x	x	x	x	X	x	x	x	x	x	0
11	Environmental management systems	x	x	x	x	X	x	x	x	x	x	0

12	Greenhouse Gas (GHG) Emissions (Climate change)	x	x	x	x	X	x	x	√	√	√	30
13	Air quality management	x	x	x	x	X	x	x	√	√	√	30
14	Nature conservation	x	x	x	x	X	x	x	x	x	x	0
15	Animal protection	x	x	x	x	X	x	x	√	√	√	30
Totals number of activities		0	0	0	0	0	0	0	6	6	6	
Percentage of activities		0	0	0	0	0	0	0	40	40	40	
Financial performance ratios												Growth rate (%)
EPS		-	-	47,9	77,1	132,1	95,9	61,1	82,7	82,7	82,6	7,05%
Solvency Ratio		-	1,15	1,19	1,7	1,68	2,19	4,29	2,11	2,14	2,16	7,25%
ROA (%)		-	2,59	4,91	6,85	9,43	5,71	3,37	4,57	4,41	4,23	5,60%
Net profit margin (%)		-	2,05	3,37	5,62	7,08	5,11	3,09	3,98	3,69	3,64	6,59%
Company Assets (R'000 000)		-	1,48	1,68	2,48	3,11	4,11	4,58	4,71	4,90	5,12	14,79%

Source: the researcher (2024)

Company J only reported on environmental information for the years 2019-2021, however, the company did not publish integrated financial statement for the year 2018 and for years prior to it. The company reported on 6 environmental management activities consistently from 2019 to 2021. Due to missing information, the study cannot conclude that the company did not participated in the environmental management activities for the period of 2012-2018. However, the study used the 5 years financial reviews that were published in the integrated financial statements to produce financial performance for the year 2019 and prior. The financial performance report for the years 2013 and 2014 was obtained from the financial statement which has been published by sharenet.co.za website. However, the website did not produced the environmental management activities that correspond to the years 2013-2014. Kalash (2020: 99) explains that the companies that experience an increase in financial performance are more likely to be able to fund more environmental management activities. This is evident from company J because they generated an increase in their EPS, ROA, net profit margin % and assets, hence they were able to maintain to report high number of environmental management activities.

Lassalla et al (2017:01) who expressed that companies which participate in the environmental management activities tend to be financially impacted. However, company J reported on 6 environmental management activities though their EPS, ROA, net profit margin % and assets, as having improved over years. Furthermore, Kompas (2018) has also expressed the same sentiments that companies that participate more environmental management activities incur financial loss. It appears that company J financial performance did not align with those sentiments. The company reported on energy reduction, water efficiency, waste reductions, Greenhouse Gas (GHG) Emissions (Climate change), air quality management and the nature conservation of which (Santos 2010: 388; Mashura 2021: 628; Thompson & Darwish, 2019: 01; Mbedzi 2020: 25-26; Nkukwana 2018: 872) claims that companies that report on these activities tend to improve their financial performance. It is evident from the increase in EPS, ROA, net profit % and the assets of company J that the environmental management activities that they participated in did not affect their financial performance. The company also managed to maintain a solvency ratio

greater than the benchmark of 1:1 yearly. This implies that company J managed to be solvent and had assets that were greater than its liabilities.

4.2.11 Environmental management activities conducted, or cost items incurred by company K from 2012 to 2021.

Table 4.11 presents the environmental management activities that were disclosed by company K for a period of 10 years.

Table 4.11 Environmental management activities and cost items disclosed by company K from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	x	x	x	x	x	X	x	x	x	x	0
2	Energy reduction	x	x	x	√	√	√	x	x	x	x	30
3	Water efficiency	x	x	x	√	√	√	x	x	x	x	30
4	Material and resource efficiency	x	x	x	x	x	X	x	x	x	x	0
5	Environmental impact assessment and audits	x	x	x	x	x	X	x	x	x	x	0
6	Waste reduction	x	x	x	√	√	√	x	x	x	x	30
7	Environmental community projects	x	x	x	x	x	X	x	x	x	x	0
8	Environmental management training Programme	x	x	x	x	x	X	x	x	x	x	0
9	Level of carbon tax	x	x	x	x	x	X	x	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	x	x	x	x	x	X	x	x	x	x	0
11	Environmental management systems	x	x	x	√	√	√	x	x	x	x	30

12	Greenhouse Gas (GHG) Emissions (Climate change)	x	x	x	√	√	√	x	x	x	x	30
13	Air quality management	x	x	x	x	x	X	x	x	x	x	0
14	Nature conservation	x	x	x	x	x	X	x	x	x	x	0
15	Animal protection	x	x	x	√	√	√	x	x	x	x	30
Totals number of activities		0	0	0	6	6	6	0	0	0	0	
Percentage of activities		0%	0%	0%	40%	40%	40%	0%	0%	0%	0%	
Financial performance ratios												Growth rate (%)
EPS		-	-	58,5	101,9	108,3	(47,7)	-	-	-	-	-196,00%
Solvency Ratio		-	-	0,58	0,58	0,48	0,54		-	-	-	-1,77%
ROA (%)		-	-	8,3	12,6	12,4	(2,6)	-	-	-	-	-179,28%
Net profit margin (%)		-	-	4,9	6,7	6,9	(1,1)	-	-	-	-	-174,17%
Company Assets (R’000 000)		-	-	1,07	1,21	1,46	1,48	-	-	-	-	8,45%

Source: the researcher (2024)

Integrated financial statements for the years 2012-2013 and the years 2018-2021 were unavailable on the website of the company. The integrated financial statements that were available on the website showed results for the years 2014 to 2017. Thus, the study can give conclusion based on the financial report of 2014-2017. The compound growth rates of the company predicted that there had been a drastic drop in the company's EPS, ROA, solvency and net profit margin %. Kalash (2020: 102) expresses that a company is affected by the number of environmental management activities that they participate in. It appears that company K reported more activities on environmental management activities and resulted in decrease in the EPS, ROA, Net profit margin %and solvency ratio during the years 2014-2017.

The company's solvency was below the benchmark of 1:1 for the entire period of 2014-2017. This implies that the company struggled to minimize its liabilities. However, the assets of the company seem to have recovered throughout the years. This increase of assets agrees with Thompson & Darwish (2019: 01) which speculated that companies that participate in waste reduction activities can save on resources and increase their assets. EPS appears to drop drastically in 2017. Okafor (2018: 05) expressed that the environmental management activities could affect the company at large. In this regard since the net profit of the company dropped, the EPS also drops holistically. (Phan et al 2017: 361) encouraged the companies to participate in animal protection to improve their net profits of which it did not help company K to yield a positive financial result.

4.2.12 Environmental management activities conducted, or cost items incurred by company L from 2012 to 2021.

Table 4.12 presents the environmental management activities that were disclosed by company L for a period of 10 years.

Table 4.12 Environmental management activities and cost items disclosed by company L from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	X	x	x	X	x	X	x	x	x	x	0
2	Energy reduction	X	x	x	X	x	X	x	x	x	x	20
3	Water efficiency	√	√	√	√	√	√	√	√	√	√	100
4	Material and resource efficiency	√	√	√	√	√	√	√	√	√	√	100
5	Environmental impact assessment and audits	X	x	x	X	x	X	x	x	x	x	0
6	Waste reduction	√	√	√	√	√	√	√	√	√	√	100
7	Environmental community projects	X	x	x	x	x	X	x	x	x	x	0
8	Environmental management training Programme	X	X	x	x	x	X	x	x	x	x	0
9	Level of carbon tax	X	X	x	x	x	X	x	x	x	x	0
10	Environmental non-compliance costs (prosecution and fines)	X	X	x	x	x	X	√	√	x	x	0
11	Environmental management systems	X	X	x	x	x	X	x	x	x	x	0

12	Greenhouse Gas (GHG) Emissions (Climate change)	√	√	√	√	√	√	√	√	√	√	100
13	Air quality management	X	X	x	x	x	X	x	x	x	x	0
14	Nature conservation	X	X	x	x	x	X	x	x	x	x	0
15	Animal protection	X	X	x	x	x	X	x	x	x	x	0
Totals number of activities		4	4	4	4	4	4	5	5	4	4	
Percentage of activities		27%	27%	27%	27%	27%	27%	33%	33%	27%	27%	
Financial performance ratios												Growth rate (%)
EPS		1 707,00	1 608,00	1 261,60	1 068,10	2 034,40	1 914,90	1 431,30	2 332,60	612,2	1 142,30	-3,94%
Solvency Ratio		3,82	4,55	2,28	2,24	2,89	3,56	3,7	3,35	3,76	3,2	-1,76%
ROA (%)		15,59	10,51	7,5	3,79	13,33	12,65	10,16	17,54	6,81	7,89	-6,58%
Net profit margin (%)		11,99	9,51	6,2	2,99	10,69	9,69	8,57	13,31	5,01	5,82	-6,97%
Company Assets (1’000 000)		0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0,02	0%

Source: the researcher (2024)

As shown in table 4.12, the company recorded five environmental management activities for the period of 2012-2021. The company consistently reported water efficiency, resource efficiency, waste reduction and Greenhouse Gas (GHG) Emissions (Climate change) for the entire period of 2012-2021. Though the EPS, ROA, net profit margin %, company assets and solvency ratio kept deviating over the years. Moreover, the company compound growth rate did not agree with findings by Mashura (2021: 628) who emphasized that companies which report water efficiency can improve their financial performance. However, Song et al (2017: 1054) highlighted that that companies that engage in resource efficiency can either be negatively or positively impacted. This implies that company L was in accordance with Song et al (2017: 1054) as the compound growth rates of all the financial performance measures appeared to drop holistically. (Mbedzi, 2020: 25-26) also urges that companies involved in reducing Greenhouse Gas (GHG) Emissions (Climate change) of which company L consistently reported on for the period of 2012-2021. These environmental management activities appeared to have contributed to the company's ability to keep their ROA, EPS, net profit margin %, company assets and the solvency ratio stable throughout the years.

Furthermore, the company reported environmental non-compliance fees in 2018 and 2019. Mangena (2014: 225) pointed out that environmental non-compliance fees affect company's financial performance negatively. However, company L experienced a drop in EPS, ROA and net profit margin % during the period of 2018 and 2019. This implies that there is a possibility that this company was negatively affected by the environmental non-compliance fees. Johnstone (2020) pointed out that companies that reports on environmental management activities are more likely to have a decrease in net profit, perhaps the decline in net profit over the years may be influenced by the environmental management activities that they reported. On a good note, the company has been able to maintain a positive EPS, ROA, net profit, and the solvency ratios that are above the benchmark of 1:1 throughout 2012-2021. The company has reported a low level of assets.

4.2.13 Environmental management activities conducted, or cost items incurred by company M from 2012 to 2021.

Table 4.13 below presents the environmental management activities that were disclosed by company M for a period of 10 years.

Table 4.13 Environmental management activities and cost items disclosed by company M from 2012 to 2021

	Environmental management activities conducted, or costs incurred.	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Number of years activity/cost incurred (%).
1	Fossil fuel reduction	√	√	√	√	√	√	√	√	√	√	100
2	Energy reduction	X	X	x	x	x	x	x	x	x	x	0
3	Water efficiency	√	√	√	√	√	√	√	√	√	√	100
4	Material and resource efficiency	X	X	x	x	x	x	x	x	x	x	0
5	Environmental impact assessment and audits	X	X	x	x	x	x	x	x	x	x	0
6	Waste reduction	√	√	√	√	√	√	√	√	√	√	100
7	Environmental community projects	X	X	x	x	x	x	x	x	x	x	0
8	Environmental management training Programme	X	X	x	x	x	x	x	x	x	x	0
9	Level of carbon tax	X	X	x	x	x	x	x	√	√	√	30
10	Environmental non-compliance costs (prosecution and fines)	X	X	x	√	x	x	x	x	x	x	10
11	Environmental management systems	X	X	x	x	x	x	x	x	x	x	0

12	Greenhouse Gas (GHG) Emissions (Climate change)	√	√	√	√	√	√	√	√	√	√	100
13	Air quality management	X	X	x	x	x	x	x	x	x	x	0
14	Nature conservation	X	X	x	x	x	x	x	x	x	x	0
15	Animal protection	X	X	x	x	x	x	x	x	x	x	0
Totals number of activities		4	4	4	5	4	4	4	5	5	5	
Percentage of activities		27%	27%	27%	33%	27%	27%	27%	33%	33%	33%	
Financial performance ratios												Growth rate (%)
EPS		837	970,7	1 034,40	864,8	588	852,7	(1 054)	-948	(212)	(689)	-197,86%
Solvency Ratio		1,78	1,84	2,03	2,08	2,01	1,84	1	0,83	0,96	1	-5,60%
ROA (%)		5,74	5,49	5,12	3,94	2,16	3,92	(5,8)	(5,27)	2,92	20,49	13,57%
Net profit margin (%)		8,45	8,14	7,81	6,48	3,98	6,11	(6,19)	(4,5)	3,45	18,23	7,99%
Company Assets (R1’000 000)		0,02	0,02	0,02	0,03	0,03	0,03	0,02	0,02	0,02	0,01	-6,70%

Source: the researcher (2024)

Company M adequately reported on environmental management activities. However, the EPS, ROA, net profit margin %, assets and the solvency ratio of this company deviated throughout the period of 2012-2021. The solvency ratio compound growth rate agrees with Kompas et al (2018: 1169) who pointed out that companies that report environmental management activities are likely to have a solvency ratio of below average. The company reported the solvency ratio of above benchmark of 1:1 from 2012-2017 and subsequently report a solvency of below average from 2018-2021. The company started reporting carbon tax in 2019, which does not seem to be causing the decrease in their net profit margin % and ROA since the company started reporting financial loss in 2018.

Although EPS kept decreasing, ROA and net profit recovered from the year 2020. The financial results do not agree with Efobi et al (2018: 2883) who suggested that financial performance declines when companies invest in activities that are related to fossil fuel reduction. Also, company compound growth rates of net profit and ROA agrees with (Mashura 2021: 628; Thompson & Darwish, 2019: 0; Mbedzi 2020: 25-26) who speculated that water efficiency, waste reduction and Greenhouse Gas (GHG) Emissions (Climate change) increases the financial performance. Furthermore, Environmental non-compliance costs only incurred in 2015 of which it had not affected the financial performance of the company. This disagrees with Ramahlo (2016: 45) who speculated that the non-compliance costs negatively impact the financial performance of the companies. The company assets also appear to be declining. (Thompson & Darwish, 2019: 01) pointed out that the waste reduction increases a company's assets although company M reported waste reduction consistently and have a decline in the assets.

4.3 JSE listed food processing companies' level of reporting of environmental management activities or cost items.

Table 4.1 to table 4.13 presented the environmental management activities or cost items that were reported in the annual integrated financial reports by each company for a period of 10 years. Furthermore, the level of the companies' reporting of environmental management activities or cost items is presented in tables 4.14 to 4.16.

The number of times each company reported on a specific environmental management activity or cost item over the ten years is presented in table 4:14. Table 4.15 presents the number of companies that reported on each environmental management activity or cost item over the ten years and table 4.16 presents the environmental management activities or cost items that were reported the most by each JSE listed food processing companies over the ten years. This helps to determine the extent to which these companies reported the environmental management activities or cost items for the period understudy.

4.3.1 The extent of reporting each environmental management activity or cost item by each company over the 10-year period.

Table 4.14 shows the extent to which each company disclosed or reported on each of the fifteen environmental management activities or cost items from 2012 to 2021. The number of years the activity or cost item was reported is expressed as a percentage of 10 years. A company which reported the activity in all the 10 years is assigned 100% and the company which did not report on the activity or cost item is assigned 0%.

Table 4.14 Reporting of each environmental management activity or cost item by each company from 2012 to 2021

Environmental management activities conducted in 10 years (%)	A	B	C	D	E	F	G	H	I	J	K	L	M
Fossil fuel reduction	0	100	100	0	0	0	0	0	40	0	0	0	100
Energy reduction	0	100	100	0	100	100	80	80	100	30	30	20	0
Water efficiency	0	100	100	60	0	100	80	80	100	30	30	100	100
Material and resource efficiency	0	100	100	80	0	0	0	0	0	0	0	100	0
Environmental impact assessment and audits	0	100	0	0	0	100	10	10	0	0	0	0	0
Waste reduction	0	100	10	80	0	100	80	80	100	30	30	100	100
Environmental community projects	0	60	0	0	90	10	0	0	0	0	0	0	0
Environmental management training Programme	0	20	0	0	0	10	0	0	0	0	0	0	0
Level of carbon tax	0	30	30	0	0	0	0	0	0	0	0	0	30
Environmental non-compliance costs (prosecution and fines)	0	10	50	0	0	0	0	0	50	0	0	0	10
Environmental management systems	0	20	100	0	0	100	0	0	0	0	30	0	0
Greenhouse Gas (GHG) Emissions (Climate change)	0	0	100	80	80	100	0	0	100	30	30	100	100
Air quality management	0	0	0	0	0	0	0	0	100	30	0	0	0
Nature conservation	0	0	0	0	0	0	80	0	0	0	0	0	0
Animal protection	0	0	0	0	0	0	0	0	0	30	30	0	0

Table 4.14 determines the percentage of environmental management activities that were reported by each company for a period of 2012-2021. Water efficiency and waste reduction, energy reduction and the Greenhouse Gas (GHG) Emissions (Climate change) were ranked highest among environmental management activities that were reported by each of the selected 13 JSE-listed food processing companies. This implies that the JSE-listed food processing companies are more finding interest in participating in environmental management activities that includes Water efficiency and waste reduction, energy reduction and Greenhouse Gas (GHG) Emissions. Basuki & Irwanda (2018) states that environmental management activities that includes Water efficiency and waste reduction, energy reduction and Greenhouse Gas emissions are prioritised by companies to minimize the environmental degradation and wastages. This is evident from table 4.14 as these environmental management activities appear to be highly reported by the JSE listed food processing companies. Santos (2010: 388); Mashura (2021: 628); Thompson & Darwish (2019: 01) and Mbedzi (2020: 25-26) also conducted a study that believes companies that participate in Water efficiency and waste reduction, energy reduction and the Greenhouse Gas (GHG) Emissions have a possibility of improving their financial performances.

Furthermore, fossil fuel reduction, environmental impact assessment and audits, environmental non-compliance costs and the environmental management systems are fairly reported by the 13 JSE-listed food processing companies. It seems the companies agree with Teixeira (2023) who emphasised that the companies must participate in the environmental management activity that complies with the new ISSB standard. The ISSB standard advocates for companies to comply with environmental. Furthermore, these companies appear to support Efobi et al (2018: 2883) who urges that companies should strive for environmental wellness by participating in fuel reductions and avoids violating the environmental regulations. Even though some of the environmental management activities that are listed in table 4.14 were not presented by some companies, it is vital that some of the companies are reporting them.

Some studies discourage companies from reporting environmental management activities because of the negative financial impact it has on the companies. Studies that point out the negative effect of reporting environmental management activities includes (Lassalla et al 2017:01; Okafor 2018: 050; Ramahlo 2016: 45). It appears that nature reserves, animal protections, air quality management, Environmental community projects, Environmental management training Programs' carbon tax and material efficiency are amongst the environmental management activities that are poorly reported by the JSE-listed food processing companies. (Worimegbe 2021: 1524; Chichan et al 2021) are amongst studies emphasised that some of the environmental management activities require many resources, time and costs which will affect the company's overall performance. However, based on the environmental management activities that are highlighted on table 4.14, it appears that majority of the JSE listed food processing companies are fairly reporting the environmental management activities despite the criticism that was pointed out for reporting them.

4.3.2 Percentage of companies which reported on each environmental management activity.

Table 4.15 presents the percentage of companies that reported on each environmental management activity each year from 2012 to 2021.

Table 4.15 Percentage of companies which reported on each environment management activity over the 10-year period 2012-2021

Environmental management activities	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Average
Fossil fuel reduction	23	23	23	23	23	23	23	23	23	23	23
Energy reduction	46	46	54	62	62	62	62	69	54	54	57
Water efficiency	54	54	69	77	77	77	69	77	62	62	68
Material and resource efficiency	31	31	31	31	31	31	31	31	23	23	29
Environmental impact assessment and audits	15	15	23	15	15	15	15	15	15	15	16
Waste reduction	54	54	62	69	69	69	62	62	54	62	62
Environmental community projects	8	15	15	15	8	12	15	8	15	23	13
Environmental management training Programme	8	0	0	8	0	8	0	0	0	0	2
Level of carbon tax	0	0	0	0	0	0	0	31	23	23	8
Environmental non-compliance costs (prosecution and fines)	0	0	8	15	8	8	15	23	8	8	9

Environmental management systems	23	23	15	23	23	23	15	15	15	15	19
Greenhouse Gas (GHG) Emissions (Climate change)	54	54	62	69	69	69	62	69	54	54	62
Air quality management	8	8	8	8	8	8	8	15	15	15	10
Nature conservation	0	0	8	8	8	8	8	8	8	8	6
Animal protection	0	0	0	8	8	8	0	8	8	8	5

Source: the researcher (2024)

Table 4.15 above shows that the JSE-listed food processing companies reported on environmental management activities for a period of 2012 to 2021 was not consistent. The majority of the environmental management activities were reported for an average of less than 50%. Ramahlo (2016: 45) encouraged the companies to comply with environmental legislation to avoid environmental penalties, it appears that the JSE listed food processing companies agrees with this study as majority of these companies were not liable for environmental non-compliance penalty costs. However, the activities that were reported for more than 50% include energy reductions, water efficiency, waste reduction, and greenhouse gas (emissions). Some companies expressed that they lack resources that enable them to participate in activities such as animal protection and nature conservative Nkukwana (2018).

Furthermore, some of the environmental management activities were largely reported on because some companies believed in initiatives that are linked to reducing the impact to pollution and global warming. For instance, Sofia et al (2022) observed that the majority of companies participated in reduction of waste, energy, water usage, materials, and fossil fuels to play a role in reducing pollution emissions. Hence energy reductions, water efficiency, waste reduction, and greenhouse gas (emissions) appear to be reported by many companies. However, Riyadi et al (2020) also expressed that some companies are motivated by the state of their country's pollution to participate in environmental protection activities. It appears that some of the countries are polluted to a point that companies suffer the consequences in their production. Phelan et al (2022) highlighted that food processing companies are immune to polluted environment. This implies that the companies are mostly motivated and encouraged to participate in the environmental activities that are mostly aimed at reducing pollution. Figure 4.1 clearly shows the environmental management activities that were reported the most and those that were least reported by the JSE-listed food processing companies.

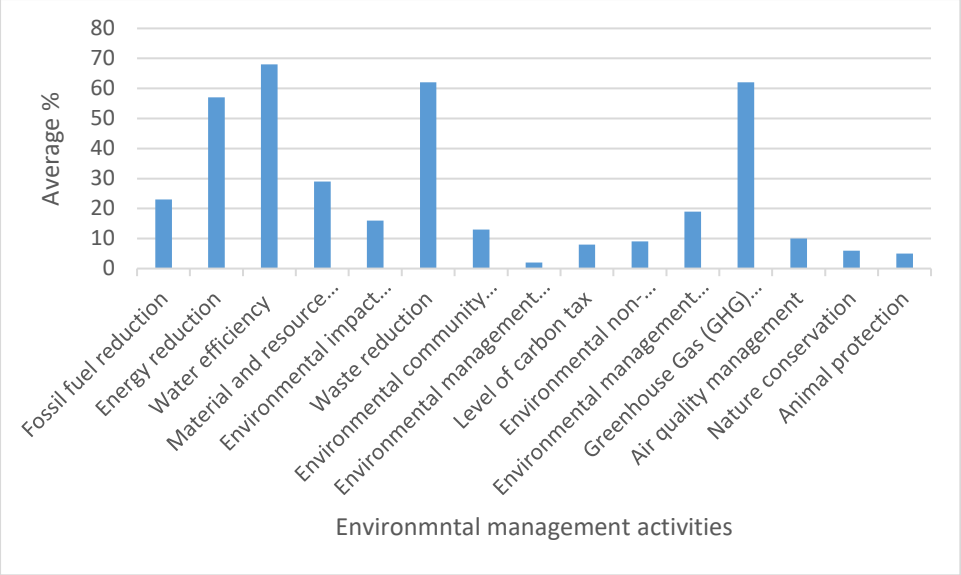

Figure 4.1 Environmental management activities that are reported 2012-2021

Figure 4.1 shows that all the 15 environmental management activities were reported by at least one of the 13 JSE-listed food processing companies. This justifies that these companies did their best to participate in environmental management activities. The following is a summary of the activities that are fairly presented by the 13 JSE listed food processing companies.

- Fossil fuel reduction
- Energy reduction
- Water efficiency
- Material and resource efficiency
- Waste reduction
- Environmental non-compliance fees
- Greenhouse gas (emissions)

The majority of the activities that were fairly reported by the companies were because of the companies' motive participate in reducing pollution. Parvin et al (2020) pointed out that in most countries, companies are encouraged to participate in measures to combat pollution. Nhundu et al (2017) also reflected that South African JSE-listed companies are also playing a role in participating on reduction of energy, resource, waste and fossil fuel in order to promote the reduction of pollution. Environmental non-

compliance fees are mostly incurred because companies violate environmental legislations. Water efficiencies are mostly reported by companies because they believe in reducing energy that is utilised by water pumps (Egbetokun et al 2018). Furthermore, Mangena (014: 225) is convinced that most companies are incurring the environmental penalty because they are not knowledgeable regarding the environmental legislations. Hence most of the companies appears to be reporting the environmental non-legislation fees.

4.3.3 Number of environmental management activities reported by each company over the 10-year period.

Table 4.16 presents the total number of environmental management activities that were reported by each of the13 JSE-listed food processing companies.

Table 4.16 Numbers of environmental management activities reported by each company over the 10-year period

Company	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
A	0	0	0	0	0	0	0	0	0	0
B	7	7	8	8	6	8	7	8	7	8
C	7	7	8	8	8	7	8	9	8	9
D	3	3	4	4	4	4	4	4	0	0
E	1	2	3	3	3	3	3	3	3	3
F	8	6	6	6	6	6	7	7	7	7
G	4	4	4	4	4	4	4	5	0	0
H	0	0	5	4	4	4	4	4	4	4
I	6	6	6	6	5	6	6	6	6	6
J	0	0	0	0	0	0	0	6	6	6
K	0	0	0	6	6	6	0	0	0	0
L	4	4	4	4	4	4	5	5	4	4
M	4	4	4	5	4	4	4	5	5	5
Average	3	3	4	4	4	4	4	5	4	4

Source: the researcher (2024)

Table 4.16 shows the number of environmental management activities that were reported by each of the 13 JSE-listed food processing companies over a period of 10 years. Table 4.16 also presents the average number of environmental management activities that was reported on each of the selected years. The average environmental management activities were calculated by adding all the activities, divided by the 13 (total number of companies). The range of environmental management activities reporting remained 3 to 5 throughout the period 2012-2021. However, companies B, C, and I reported the greater number of the environmental management activities. Though the financial performance of company B and C looks impressive because the company managed to maintain a high net profit margin %, solvency, assets, and EPS as shown in tables 4.2; 4.3 and 4.9. However, the company I reported high environmental management activities while it had a weak financial performance.

Furthermore, companies A, J, and K reported the least number of environmental activities. Though company A and J financial performance looks impressive while company K financial performance appears to be decreasing significantly. The results are further presented using the time series plot in figure 4.2.

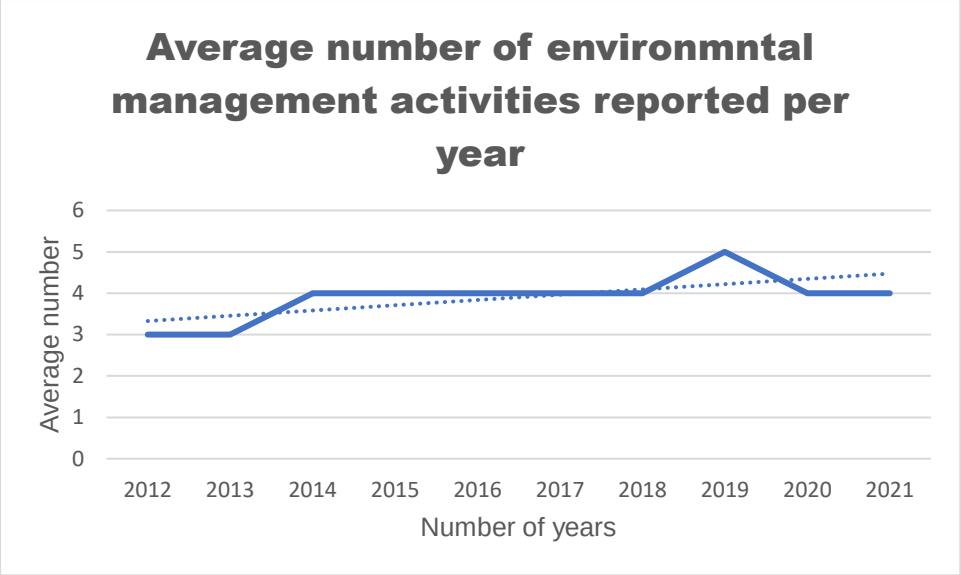

Figure 4.2 Time series plot that presents the average number of environmental activities reported each year

Figure 4.2 shows the average fluctuations of the environmental management activities that were reported by all the 13 JSE-listed food processing companies. The average reporting remained consistent with an average of 3 to 5 reportings for a period of 10 years. The trend line is sloping positively in the time series plot. This implies that the JSE-listed food processing companies improved the reporting of environmental management activities slightly over the 10 years. The years 2012 and 2013 had the least number of environmental reportings because majority of companies did not report the activities during those years. Activities such as environmental non-compliance fees, air quality management and carbon tax were not reported by all the 13 JSE-listed food processing companies during the years 2012 and 2013. The environmental reporting's remained consistent throughout 2014 to 2018. This is because most companies have been reporting new environmental management activities while others have been dropping the reporting's of the activities they had. However, during 2019 there was a peak of environmental management activity reporting's because the companies started reporting activities such as carbon tax.

4.4 Effect of the environmental management activities on the financial performance of JSE listed food processing companies- Objective 3.

This study considered ROA and EPS dependent variables in measuring financial performance. The independent variable for this study was the number of environmental management activities conducted or reported each year and the control variables were total sales, sales growth %, company's age, solvency ratios and the company's assets for each year. The descriptive statistics for the dependent variable, financial performance measurement and the independent variable, environmental management activities are presented in table 4.17. Panel data regression analysis and hierarchical regression analysis was employed to determine the effect of environmental activities on the companies' financial performance.

4.4.1 Descriptive statistics of financial performance Measures.

Table 4.17 presents the descriptive statistics of the dependant variables, independent variables, and control variables. The panel data used in this study is presented in appendix 2.

Table 4.17 Summary of descriptive statistics

Variables	min	max	mean	Std dev	skewness	Kurtosis	obs
ROA	-63.88%	46%	10.50%	9.93	1.43	4.84	121
EPS	-R1054	R2332.6	R342.11	480.88	1.92	6.75	121
Environmental management activities	1 years	9 years	5.24 years	1.70	0.25	2.30	101
Total sales	R1.86m	R703.68m	R72.67m	151.56	2.95	10.77	121
Annual Sales growth %	-38.34%	92.90%	8.21%	14.87	1.27	11.80	116
Solvency ratios	0.17	5.1	2.31	1.18	0.13	2.30	119
operating years	1 years	129 years	68.67 years	42.54	-0.09	1.42	129
Company's assets	R9.26m	R18.75m	R13.92m	2.78	-0.36	1.87	121

Source: the researcher (2024)

4.4.1.1 Return on assets %

The ROA determines the percentage of profit of a company over its assets. The negative ROA implies that a company has a negative profit, and a positive ROA implies that a company has a positive profit in relation to its assets. The minimum ROA is negative -63.88% and maximum is positive 46%. The average is 10.50% which means that the majority of the JSE-listed food processing companies had a positive profit in relation to their assets. The standard deviation is 9.93 which is below the mean. This implies that the majority of the data is close to the mean and there is small variability in the dataset. The skewness and kurtosis appear to be relatively high which implies that the data is not normally distributed. Kilmer & Rodríguez (2017) suggest that the data is normal if the skewness is between -1 and +1 and kurtosis is between -2 and +2.

4.4.1.2 Earnings per share

Negative EPS implies that a participant company made a loss from their operations, however, a positive EPS imply that a company managed to make profit from their operations (Bhunia et al, 2011). The minimum EPS is -R1054 and the maximum is R2333. Table 4.17 indicates a mean EPS of R342.11 implying that majority of the companies made profit throughout the 10-year period. Furthermore, EPS has a standard deviation of 519.97 which is dispersed from the mean. The data appears to be positively skewed with positive kurtosis implying the EPS is not normally distributed.

4.4.1.3 Solvency Ratio

The solvency ratio of greater than 1 is considered favorable as it means the company has more assets than liabilities (Bhunia et al, 2011:270-272). While a solvency ratio of less than 1 is considered unfavorable as the company has more liabilities than assets. The output from table 4.17 shows that the minimum solvency ratio ranges from minimum of 0.17 to maximum of 5.1. This implies that there were some companies that had unfavorable solvency of less than 1 and there were other companies that had favorable solvency which was greater than 1. However, the mean solvency ratio is 2.30 of which was greater than 1. This implies that majority of the companies had assets that are greater than their liabilities. This result aligns with Kompas et al (2018: 1169) who justified that the companies that have solvency ratios of greater than 1

means they can meet their long-term obligations as they have more assets than liabilities. The standard deviation of 1.18 appears not to be widely spread to the mean of 2.30. The data appears to be normal because the skewness is 0.13 and kurtosis is 2.30.

4.4.1.4 Sales growth %

Sales growth percentage determines the sales fluctuations from one period to other. The sales growth data presented in table 4.21 shows a minimum of -38.34% and the maximum of 92.91% which means that there were companies that exhibited a decline in sales, and some revealed an incline of sales in the period 2012-2021. The average sales growth is 8.21 which shows that majority of companies reported an increase in sales over the 10-year period. The standard deviation resulted to 14.8788 which is. closely dispersed from the mean of 8.21%. The data also appears to be thick tailed because the kurtosis and skewness is relatively high therefore the sales growth % is not normally distributed.

4.4.1.5 Company assets

The company's size in this study is measured by the logarithm of total assets. Kalash (2020) advocates for the use of natural logarithm of assets as a measure of the size of a company when performing a regression analysis. The results from table 4.17 shows the minimum of R9.27 million and the maximum of R18.75 million which imply that the sizes of the companies differ. The company assets variable had a mean of R13.92 millions. Furthermore, the standard deviation was 2.78 which implies that there is a small variability in the data. The measures of skewness and kurtosis suggests that the data is normally distributed.

4.4.1.6 Environmental management activities

The number of environmental activities that are reported by the JSE-listed food processing companies ranges from 1 to 9 per year and the mean is about 5 activities per company per year. This suggests that most of the companies had been fairly reporting environmental management activities throughout the 10-year period understudy. However, the standard deviation suggests that there is a small variability

in the data. While kurtosis and skewness suggest that the variable is normally distributed.

4.4.1.7 Total sales

The annual sales value of the 13 JSE-listed food processing companies ranges between R1.86 million and R703.68 millions. The ranges differed significantly because the size of the companies was different. The mean is R72.67 million, which is significantly less than the maximum range. This implies that many of the companies had annual sales that were below the average sales. The standard deviation is 151.26, which implies that the data is widely spread. The skewness and kurtosis suggest that the variable is not normally distributed.

4.4.1.8 Company's operating years

The company's operating years range from 1 year to 129 years. There is a company which started operating in 2012 among the companies. The kurtosis and skewness suggest that the variable is normally distributed.

4.4.2 Regression analysis to investigate the effect of environmental activities on firm performance.

The data was checked to determine if it meets the assumption of regression analysis, and the results are presented in the sections below.

4.4.2.1 Normality test (Jarque-Bera test)

Further tests were performed using the Jarque-Bera test to investigate if the variables are normally distributed. Table 4.18 presents the Jarque-bera test for normality for the variables.

Table 4.18 Jarque-bera's normality test

variables	Chi-square	P- Value	Interpretation
ROA	58.91	P < 0.001	Not normal
EPS	146.1	P < 0.001	Not normal
Environmental management activities	3.101	P = 0.2121	Normal

Total sales	475.7	P < 0.001	Not normal
Annual Sales growth %	405.3	P < 0.001	Not normal
Solvency ratios	2.726	P = 0.2558	Normal
Operating years	13.57	P = 0.0011	Not normal
Company's assets (log)	9.061	P = 0.0108	Not normal

Source: researcher (2024)

The Jarque-Bera test normality results show that the environmental management activities and the solvency ratios are normally distributed with a p value that is greater than 0.05. This implies that the null hypothesis should be rejected because the data deviated from the straight line significantly. However, ROA, EPS, total sales, sales growth %, solvency ratios, operating years and the company's assets have a p-value that is below the significant level, which implies that they are not normally distributed. Therefore, the null hypothesis is accepted for the variables that are not normally distributed. Since the dependent variables (ROA and EPS) are not normally distributed, the logarithm is applied to transform the data to further check the normality. The transformed data are presented below:

Table 4.19 Transformed jargue-bera test for normality

variables	Chi-square	P- Value	Interpretation
ROA	11.34	P > 0.05	normal
EPS	16.7	P > 0.05	normal

Source: researcher (2024)

However, with an attempt to apply logarithm to EPS and total sales, the variables become normal. However, the study employed the robust fixed effects regression model and the hierarchical regression models to determine the relationship between the environmental management activities and the ROA and EPS.

4.4.2.2 The heteroscedasticity (white test) of dependent variables

Table 4.20 below presents the heteroscedasticity test of dependent variables.

Table 4.20 The heteroscedasticity (Wald test)

Performance measure	Chi-square	P- Value	interpretation
ROA	6900000	P < 0.001	heteroscedastic
EPS	40498.30	P < 0.001	heteroscedastic

Source: the researcher (2024)

Based on Wald heteroscedasticity test, null hypothesis is accepted when the p-value is greater than significant level of 0.05. This implies that the residuals are homoscedastic. The alternative hypothesis is accepted when the p-value is below the significant level of 0.05. This implies that the residuals are heteroscedastic. Table 4.20 shows that the dependant variables are heteroscedastic because the p-value is below the significant level. None of the variables has residuals that are homoscedastic.

4.4.2.3. White's tests of multicollinearity

Table 4.21 below presents the multicollinearity of the independent variables and the control variables that are used in this study.

Table 4.21 Multicollinearity test

Variables	**VIF**	**1/VIF**
Number of environmental management activities	2.70	0.37
Total sales (log)	1.86	0.53
Company's assets (log)	1.84	0.54
Solvency ratio	1.44	0.69
company age	1.34	0.74
sales growth %	1.02	0.98
Mean VIF	**1.70**	

Source: researcher (2024)

Table 4.21 shows an average multicollinearity of 1.70 which is appropriate for the independent variables that were used in this study. Sarumpaet (2005) suggested that the mean of VIF should be less than 5, which implies that the there was no multicollinearity between the independent variables. The mean VIF between the number of environmental activities, company's assets, total assets, sales growth, and the company's age is less than 5 which implies that all the independent variables not correlated and are eligible to be used in this study.

4.4.2.4 Covariance of the independent and dependent variables

The 4.22 below presents the covariance matrix of dependent variables and the independent variables.

Table 4.22 Covariance matrix

	ROA	EPS	EMA	TS (log)	TA (log)	SR	SG	CA
ROA	1.0000							
EPS	0.2697*	1.0000						
EMA	0.4768***	-0.1971*	1.0000					
TS	-0.2136*	0.0381	-0.5650*	1.0000				
TA	0.0934	-0.4546*	0.6100*	0.0120	1.0000			
SR	-0.1664	0.1234	-0.5045*	0.2493	* -0.3371*	1.0000		
SG	0.0589	-0.0221	-0.0039	-0.0149	0.0963	-0.0655	1.0000	
CA	0.0757	0.2913*	-0.2378*	0.1266	0.3657*	0.0752	0.0156	1.0000

P ≤0.05 *, p≤0.001 **, p≤0.0001***

Source: researcher (2024)

Key:

	Variable description
ROA	Return on assets
SR	Solvency ratios
EPS	Earnings per share
EMA	Environmental management activities
SG	Sales growth %
TA	Company's total assets
TS	Total sales
CA	Company's operating age

The correlation between variables was perfectly linear if the correlation coefficient (r) is 1, very strong and positive if the correlation coefficient (r) is between 0.80 and 1, strong and positive if it is between 0,60 and 0.80, moderate if it is between 0.40 and 0.60, weak if it is between 0.20 and 0.40 and very weak if is between 0 and 0.20 (Manrique & Martí-Ballester, 2017).

The ROA appears to have significant positive correlation with EMA. The level of significance is very high. This implies that the ROA variates in positive direction with EMA. Thus, this agrees with study that is conducted by Santos (2010:388) who expressed that the environmental costs are significantly influenced by the company's returns. However, the ROA also have a negative correlation with total sales which is significant. This implies that ROA and total sales of the JSE listed food processing

companies variates significantly in opposite direction. All other variables do not significantly correlate with ROA.

Furthermore, EPS also appear to correlate positively with EMA and company's age. This implies that the EMA and company's operating age variates positively with the EPS of JSE listed food processing companies. However, the EPS appears negatively correlate with the company's assets. This does not align with a study conducted by Efobi et al (2018: 2883) who expressed that the companies' assets are positively correlated with profits and the returns. Though the company's assets have a negative significant relationship.

The EMA shows a negative correlation with total sales, solvency ratios and the company's age. The correlation is significant. However other variables did not show to be significantly correlated with EMA. This implies that the EMA variates with opposite direction with total sales, solvency ratios and the company's age. This does not align with Mbedzi (2020: 25-26) who pointed out that the company's assets vary positively with the environmental costs. Solvency ratio does not appear to have significant correlation with any variable. As well as sales growth and the company's assets does not seem to be significantly having a relationship with any variables. The total assets appear to positively correlate with solvency ratio; thus, it correlates negatively with the company's age. This implies that the total assets significantly variate positively with solvency ratio and consequently variates negatively with the company's age of the JSE-listed food processing companies.

It appears that majority of the dependant variables have negative correlation with the environmental management activities and the control variables. This result aligns with results shown by Kalash (2020:108) who conducted a study in Turkey and used the regression model to determine that the reporting environmental information, revealed that it did not have a relationship on the financial performance of companies. However, another quantitative study that was conducted in Nigeria revealed conflicting outcomes shows a negative relationship between environmental costs and the financial

performance, while other statistical tests expressed the positive relationship between the environmental costs and the financial performance (Onwubiko, 2017: 68). Thus, it appears that majority of the studies reveal that the environmental related disclosures and activities do not have association with the financial performance of the companies. However, the studies that are published seem to have not addressed the relationship between the environmental related information and the financial performances on companies that are in the food industry. This study is distinct because it provides results that are based on companies that are in food processing.

4.4.2.5 Regression test using robust fixed effect models.

The F-test is used to determine the possibility that the two variances in the test are similar or equal. Bhunia et al (2011: 273) note that the R-squared indicates the goodness of fit of a regression model. Furthermore, the fixed effects models are used to determine a relationship between variables using the coefficients, standard error, p-value of the coeffect and the confidence intervals. Negative coefficients exist when the results show no relationship between the variables while the positive coefficient occurs when results exist along a relationship between variables (Sarumpaet, 2005: 95). The results are statistically significant when the p-value is less than 0.05 thus the null hypothesis is rejected. However, the results are insignificant when the p-value is greater than 0.05, thus the null hypothesis is accepted. The output from STATA version 18 is presented from table 4.19.to table 4.25 below.

4.4.2.5. Effect of environmental management activities on Return on Asset (ROA)

Table 4.23 presents STATA output from running a regression analysis involving environmental management activities as independent variable, solvency ratios, sales growth %, company's total assets, total sales, and the company's number of years of operation as control variables. The dependent variable was ROA. The data for ROA used in regression analysis was the transformed data which is normally distributed. The control variables were included to determine their influence on environmental management activities and ROA.

Table 4.23 Effect of Environmental management activities on ROA

Fixed-effects (within) regression	Number of obs = 119
Group variable: companyid	Number of groups = 12
R-squared:	Obs per group:
Within = 0.3503	min = 3
Between = 0.1043	avg = 8.3
Overall = 0.0911	max = 10
	F(6,11) = 12.64
corr(u_i, Xb) = -0.9855	Prob > F = 0.0002

		Robust				
ROA (LN)	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	.6498551	1.042846	0.62	0.546	-1.645433	2.945143
Total sales (LN)	8.5507	9.988755	0.86	0.410	-13.4344	30.5358
Company's assets (LN)	-16.69818	2.927511	-5.70	0.000	-23.14159	-10.25477
Solvency ratio	1.094484	1.770154	0.62	0.549	-2.8016	4.990567
company age	.0102376	.0449207	0.23	0.824	-.0886321	.1091073
Sales growth	-.1122746	.5282811	-0.21	0.836	-1.275013	1.050464
_cons	212.9907	48.3001	4.41	0.001	106.6829	319.2985
sigma_u	50.70096					
sigma_e	5.7387779					
rho .98735037 (fraction of variance due to u_i)						

Source: the researcher (2024)

$$ROA_{it} = \beta_0 + \beta_1(EMA_{it}) + \beta_2(SG_{it}) + \beta_3(TA_{it}) + \beta_4(TS_{it}) + \beta_5(CA_{it}) + \epsilon_{it}$$

Where:

β_0 =The model intercept

β_1= slope coefficient

ϵ_{it} = estimated error

ROA= Return on assets

SR= solvency ratio

SG= Sales growth percentage

TA= company size (measured by total assets)

TS= total sales

EMA= environmental management activities

CA= Company's age

As shown in Table 4.23, the results show F- statistic (12.64) and ($p < 0.001$) implying that the model is statistically significant. The R^2 is 0.35, an indication that model explains 35% of the relationship between the ROA and all the variables in the model. However, only the company's assets and the constant are statistically significant. The environmental management activities variable and other control variables are statistically insignificant. Thus, the test fails to support the existence of a cause effect relationship between the variable of concern, number of environmental activities and ROA.

The model from the analysis is presented as follows:

$$ROA = 212.9907 - 2.927511CA + eit$$

The fixed effect panel data regression analysis did not confirm that environmental management activities influence the ROA of JSE listed food processing companies. The results do not agree with Khan et al (20121) who found that environmental activities have influence on the financial performance of companies. White & Lang (2012) pointed out that companies that participate in environmental activities tends to earn public trust which increases the value of the company. This study also does not align with this because the results shows that returns from the assets does not associate with the number of environmental management activities that the company participate in. However, the study aligns with the study of Kalash (2020: 108) used who used the ordinary linear regression and determined that environmental activities negatively correlate with the return on assets. Molina-Azorı´n et al (2009: 1090) highlighted a study that used Wilcoxon signed-rank test to determine that the return on assets has a significant negative relationship with the environmental activities. Furthermore, the results also do not align with Taygashinova & Akhmetova (2018) who highlighted that the environmental costs are correlated with company's profit. Sarumpaet (2005) also believes that the environmental activities increase companies' public image which results in positive correlation to company's profit. However,

Chichan et al (2021) pointed out that the practice of good ethical values has possibility to influence the profit and the survival of the company.

4.4.2.6 The environmental management activities on the EPS

The table below shows a relationship between the environmental management activities, control variables considered in this study and the EPS. The variable for the EPS is the one transformed so that it is normally distributed.

$$ROA_{it} = \beta_0 + \beta_1(EMA_{it}) + \beta_2(SG_{it}) + \beta_3(TA_{it}) + \beta_4(TS_{it}) + \beta_5(CA_{it}) + \epsilon_{it}$$

Where:

β_0 =The model intercept

β_1= slope coefficient

ϵ_{it} = estimated error

EPS= Earnings per share

SR= solvency ratio

SG= Sales growth percentage

TA= company size (measured by total assets)

TS= total sales

EMA= environmental management activities

CA= Company's age

Table 4.24 Environmental management activities and EPS

Fixed effects (within) regression	Number of obs = 119
Group variable: companyid	Number of groups = 12
R-squared:	Obs per group:
Within = 0.2244	min = 3
Between = 0.1884	avg = 8.3
Overall = 0.1588	max = 10
	F(6,11) = 2.34
corr(u_i, Xb) = -0.9830	Prob > F = 0.01051

		Robust				
EPS (LN)	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	-.0259404	.1294863	-0.20	0.845	-.3109379	.259057
Total sales (LN)	3.113122	1.018844	3.06	0.011	.8706607	5.355584
Company's assets (LN)	-.7121476	.4241252	-1.68	0.121	-1.645641	.2213456
Solvency ratio	.1627156	.2155043	0.76	0.466	-.3116063	.6370374
company age	-.1191909	.050112	-2.38	0.037	-.2294865	-.0088952
Sales growth	13.36127	5.549349	2.41	0.035	1.147239	25.57531
constant	13.36127	5,549349	2.41	0.035	1.17239	25.57531
sigma_u	6.554194 4					
sigma_e	.5910076 6					
rho .99193451 (fraction of variance due to u_i)						

Source: the researcher (2024)

The results shown in table 4.24 reveal a degree of freedom of (F test = 2.34) which is significant with p value = 0.0000. However, the F value is too low meaning the explanatory power is low. The coefficient of determination is moderately low (R^2 = 0.22). The coefficient of determination implies that model predicts the 22% relationship between the environmental activities and the EPS of JSE-listed food processing companies. The model shows that only total sale, company age, sales growth and the constant are significant are statistically significant in predicting the company's EPS. This regression analysis also fails to statistically confirm existence of a cause-effect relationship between environmental management activities and firms' EPS. The model resulting from the analysis is presented below:

eps = 13.36127 + 3.113122 - 1191909
2.927511CA+ *eit*

The results are contrary to that by Onwubiko (2017) who expressed that environmental activities costs have significant impact on the EPS. Manrique & Martí-Ballester used Tobin's Q model to determine that the environmental cost is highly correlated with the returns to EPS. The Sustainability theory suggests that shareholders' interest in participating in environmental activities lies with the positive returns that the company generates (Egbetokun et al 2019). However, Sarumpaet (2005) argues that environmental activity correlates positively with company's size rather than the returns. However, the results from this study do not support Sarumpaet (2005) argument. This study also does not align with study that was conducted by Kompas et al (2018) who used the Computable general equilibrium (CGE) models to determine that the companies that are investing in environmental activities are more likely to have profitability.

4.4.2.7 Hierarchical regression Analysis

A hierarchical regression model was employed to further investigate the effect of environmental management activities on both ROA and EPS. The test was done to see if the results would be consistent with the results obtained in the fixed effect regression analysis. Richardson et al (2015) encouraged the use of hierarchical regression analysis for a complex dataset which is not explained by the statistical models to determine the unique contribution of different dependent variables to each independent variable. The hierarchical models are presented below:

4.4.2.7.1 Hierarchical regression test on ROA and environmental management activities

The environmental management activities independent variable was run in the analysis first and then the other variables included one at a time to see the effect on the model in terms of r-squared and statistical significance of the resulting model and model fitness. The models' hierarchical regression analyses are presented in table 4.25-4.30

Table 4.25 Model 1

Fixed effects (within) regression		Number of obs = 119				
Group variable: companyid		Number of groups = 12				
R-squared:		Obs per group:				
Within = 0.0053		min = 3				
Between = 0.3559		avg = 8.3				
Overall = 0.2274		max = 10				
		F(1,11) = 0.71				
corr(u_i, Xb) = -0.7077		Prob > F = 0.4177				
		Robust				
ROA	Coefficient	std. err.	T	P>|t|	[95% conf. interval]	
EMA	-.9355694	1.110974	-0.84	0.418	-3.380807	= 1.509668
_cons	16.51166	5.821505	2.84	0.016	3.69861	= 29.3247
sigma_u	9.0724424					
sigma_e	6.8536973					
rho.63666226 (fraction of variance due to u_i)						

The robust fixed effect model has been refined to determine the suitability of the model to assess the relationship between ROA and environmental activities. The model appears insignificant with a p-value of 0.4177 with a R^2= 0.0053. Environmental management activities variable is also insignificant.

The second model consisted of environmental activities and total sales as independent variables and ROA dependent variables. The results are present in table 4.26.

Table 4.26 Model 2

Fixed effects (within) regression		Number of obs = 119				
Group variable: companyid		Number of groups = 12				
R-squared:		Obs per group:				
Within = 0.0588		min = 3				
Between = 0.0193		avg = 8.3				
Overall = 0.0397		max = 10				
		F(2,11) = 0.78				
corr(u_i, Xb) = -0.6475		Prob > F = 0.4816				
		Robust				
ROA	Coefficient	std. err.	T	P>|t|	[95% conf. interval]	

EMA	-.3431303	1.129828	-0.30	0.767	-2.829865 = 2.143605	
Total sales (LN)	-7.30987	8.81803	-0.83	0.425	-26.71822 = 12.09848	
_cons	35.43663	23.73756	1.49	0.164	-16.80938 = 87.68264	
sigma_u	11.130271					
sigma_e	6.7057001					
rho.73368915 (fraction of variance due to u_i)						

The model is insignificant with a p-value of 0.4816 and the dependent variables environment activities and total sales are also insignificant with p- values above 0.005. The same process of adding variables was done until all the variables were added and the results are shown in table 4.27, table 4.28, table 4.29, table 4.30.

Table 4.27 Model 3

Fixed-effects (within) regression			Number of obs = 119			
Group variable: companyid			Number of groups = 12			
R-squared:			Obs per group:			
Within = 0.2625			min = 3			
Between = 0.1001			avg = 8.3			
Overall = 0.0775			max = 10			
			F(3,11) = 3.46			
corr(u_i, Xb) = -0.9800			Prob > F = 0.0546			
		Robust				
ROA	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	.0676242	1.127529	0.06	0.953	-2.414051 = 2.549299	
Total sales (LN)	6.360641	5.458167	1.17	0.269	-5.652702 = 18.37399	
Company's assets (LN)	-13.51845	4.930335	-2.74	0.019	-24.37004 = -2.666853	
_cons	174.4443	60.58626	2.88	0.015	41.09486 = 307.7938	
sigma_u	42.211105					
sigma_e	5.9704971					
rho.98038607 (fraction of variance due to u_i)						

The third model is insignificant because the p-value= 0.0546 is greater than the significant level of 0.05.

Table 4.28 Model 4

Fixed-effects (within) regression	Number of obs = 119
Group variable: companyid	Number of groups = 12
R-squared:	Obs per group:

Within = 0.2739			min = 3			
Between = 0.1058			avg = 8.3			
Overall = 0.0823			max = 10			
			F(4,11) = 3.36			
corr(u_i, Xb) = -0.9810			Prob > F = 0.0498			
		Robust				
ROA	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	.1211217	1.150583	0.11	0.918	-2.411293 = 2.653537	
Total sales (LN)	6.93367	5.705807	1.22	0.250	-5.624728 = 19.49207	
Company's assets (LN)	-13.59319	4.985034	-2.73	0.020	-24.56518 = -2.621207	
Solvency ratio	1.400502	1.484373	0.94	0.366	-1.86658 = 4.667585	
_cons	170.0804	60.49435	2.81	0.017	36.93321 = 303.2276	
sigma_u	43.29647					
sigma_e	5.9594138					
rho.98140692 (fraction of variance due to u_i)						

Source: the researcher (2024)

Although model 4 is significant, the independent variable of concern, the environmental management activities are insignificant.

Table 4.29 Model 5

Fixed-effects (within) regression			Number of obs = 119			
Group variable: companyid			Number of groups = 12			
R-squared:			Obs per group:			
Within = 0.2758			min = 3			
Between = 0.1142			avg = 8.3			
Overall = 0.0963			max = 10			
			F(5,11) = 2.69			
corr(u_i, Xb) = -0.9797			Prob > F = 0.0798			
		Robust				
ROA	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	.3377173	1.060375	0.32	0.756	-1.996153 = 2.671588	
Total sales (LN)	8.349112	7.867171	1.06	0.311	-8.966414 = 25.66464	
Company's assets (LN)	-13.40038	4.893662	-2.74	0.019	-24.17126 = -2.6295	
Solvency ratio	1.356781	1.518582	0.89	0.391	-1.985596 = 4.699158	
company age	-.1784494	.3769188	-0.47	0.645	-1.008042 = .6511434	
_cons	175.2749	62.06526	2.82	0.017	38.67017 = 311.8796	
sigma_u	42.304551					
sigma_e	5.9875074					
rho.98036168 (fraction of variance due to u_i						

Source: the researcher (2024)

The above model (model 5) is insignificant and environmental management activities variable is also insignificant.

Table 4.30 Model 6

Fixed-effects (within) regression	Number of obs = 119
Group variable: companyid	Number of groups = 12
R-squared:	Obs per group:
Within = 0.3503	min = 3
Between = 0.1043	avg = 8.3
Overall = 0.0911	max = 10
	F(6,11) = 12.64
corr(u_i, Xb) = -0.9855	Prob > F = 0.0002

		Robust				
ROA	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	.6498551	1.042846	0.62	0.546	-1.645433 = 2.945143	
Total sales (LN)	8.5507	9.988755	0.86	0.410	-13.4344 = 30.5358	
Company's assets (LN)	-16.69818	2.927511	-5.70	0.000	-23.14159 = -10.25477	
Solvency ratio	1.094484	1.770154	0.62	0.549	-2.8016 = 4.990567	
company age	-.1122746	.5282811	-0.21	0.836	-1.275013 = 1.050464	
Sales growth	.0102376	.0449207	0.23	0.824	-.0886321 = .1091073	
_cons	212.9907	48.3001	4.41	0.001	106.6829 = 319.2985	
sigma_u	50.70096					
sigma_e	5.7387779					
rho.98735037 (fraction of variance dueto u_i)						

Source: the researcher (2024)

Although model 6 was statistically significant, the independent variable understudy was insignificant. The results of the hierarchical regression are consistent with the results of the panel data fixed effect regression analysis. Therefore, the tests conducted in this study did not confirm the existence of a cause-effect relationship between environmental management activities and ROA.

4.4.2.7.2 Model 2 Environmental management activities and EPS

The same hierarchical regression analysis procedure was conducted for the environmental management activities, control variables and EPS. Tables 4.31 to table 4.36 present the results.

Table 4.31 Model 1

Fixed-effects (within) regression			Number of obs = 119			
Group variable: companyid			Number of groups = 12			
R-squared:			Obs per group:			
Within = 0.0032			min = 3			
Between = 0.0281			avg = 7.7			
Overall = 0.0281			max = 10			
			F(1,11) = 0.34			
corr(u_i, Xb) = 0.1204			Prob > F = 0.5732			
		Robust				
EPS(LN)	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	-.0731811	.1260349	-0.58	0.573	-.350582 = .2042198	
_cons	5.101519	.663053	7.69	0.000	3.642149 = 6.560889	
sigma_u	2.2656547					
sigma_e	.69913262					
rho.91305792 (fraction of variance due to u_i)						

Source: the researcher (2024)

The model seeks to assess the association between EPS and environmental management activities. However, the model is insignificant with a p-value of 0.5731. and the R^2=0.0032 was very low.

Table 4.32 Model 2

Fixed-effects (within) regression			Number of obs = 119			
Group variable: companyid			Number of groups = 12			
R-squared:			Obs per group:			
Within = 0.1575			min = 3			
Between = 0.0056			avg = 7.6			
Overall = 0.0093			max = 10			
			F(2,11) = 1.56			
corr(u_i, Xb) = -0.5521			Prob > F = 0.2531			
		Robust				
EPS(LN)	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	-.1942536	.1724149	-1.13	0.284	-.5737363 = .1852292	
Total sales (LN)	1.25128	.7950561	1.57	0.144	-.4986269 = 3.001187	
_cons	1.969084	2.359833	0.83	0.422	-3.224874 = 7.163042	
sigma_u	2.7804209					
sigma_e	.65103917					
rho.94802291 (fraction of variance due to u_i)						

Source: the researcher (2024)

The second model seeks to explain the association between EPS and the environmental management activities and the total sales. The model is insignificant and the R^2=0.1575 appears to be low. The constant coefficient is also insignificant.

Table 4.33 Model 3

Fixed-effects (within) regression				Number of obs = 119		
Group variable: companyid				Number of groups = 12		
R-squared:				Obs per group:		
Within = 0.2622				min = 3		
Between = 0.0279				avg = 7.6		
Overall = 0.0283				max = 10		
				F(3,11) = 2.32		
corr(u_i, Xb) = -0.8709				Prob > F = 0.1322		
		Robust				
EPS(LN)	Coefficient	std. err.	t	P>|t|	[95% conf. interval]	
EMA	-.1379519	.152263	-0.91	0.384	-.4730806 = .1971768	
Total sales (LN)	2.329962	.8792151	2.65	0.023	.3948226 = 4.265101	
Company's assets (LN)	-.9990409	.4773228	-2.09	0.060	-2.049621 = .0515395	
_cons	11.643	5.266992	2.21	0.049	.0504268 = 23.23557	
sigma_u	4.8786427					
sigma_e	.61348296					
rho.98443342 (fraction of variance due to u_i)						

Source: the researcher (2024)

The third model seeks to gradually add the solvency ratio to the association between the EPS and environmental management activities, total sales, and company's assets. Thus, the model is insignificant with a p-value of 0.1322 and the R^2=0.2622 appears to have improved.

Table 4.34 Model 4

Fixed-effects (within) regression				Number of obs = 119		
Group variable: companyid				Number of groups = 12		
R-squared:				Obs per group:		
Within = 0.2714				min = 3		
Between = 0.0238				avg = 7.6		
Overall = 0.0245				max = 10		
				F(4,11) = 45.27		
corr(u_i, Xb) = -0.8750				Prob > F = 0.0000		
		Robust				

EPS(LN)	Coefficient	std. err.	t	P>|t|	[95% conf. interval]
EMA	-.1379519	.152263	-0.91	0.384	-.4730806 = .1971768
Total sales (LN)	2.329962	.8792151	2.65	0.023	.3948226 = 4.265101
Company's assets (LN)	-.9990409	.4773228	-2.09	0.060	-2.049621 = .0515395
solvency ratio	.1359916	.2501559	0.54	0.598	-.4145977 = .686581
_cons	11.643	5.266992	2.21	0.049	.0504268 = 23.23557
sigma_u	4.8786427				
sigma_e	.61348296				
rho.98443342 (fraction of variance due to u_i)					

Source: the researcher (2024)

Model 4 is significant but environmental management activities variable is insignificant.

Table 4.35 Model 5

Fixed-effects (within) regression	Number of obs = 119
Group variable: companyid	Number of groups = 12
R-squared:	Obs per group:
Within = 0.3328	min = 3
Between = 0.0052	avg = 7.6
Overall = 0.0113	max = 10
	F(5,11) = 19.12
corr(u_i, Xb) = -0.9177	Prob > F = 0.0000

		Robust				
EPS(LN)	Coefficient	std. err.	T	P>|t|	[95% conf. interval]	
EMA	-.0259404	.1294863	-0.20	0.845	-.3109379 = .259057	
Total sales (LN)	3.113122	1.018844	3.06	0.011	.8706607 = 5.355584	
Company's assets (LN)	-.7121476	.4241252	-1.68	0.121	-1.645641 = .2213456	
Solvency ratio	.1627156	.2155043	0.76	0.466	-.3116063 = .6370374	
company age	-.1191909	.050112	-2.38	0.037	-.2294865 = -.0088952	
_cons	13.36127	5.549349	2.41	0.035	1.147239 = 25.57531	
sigma_u	6.5541944					
sigma_e	.59100766					
rho.99193451 (fraction of variance due to u_i)						

Source: the researcher (2024)

Model 5 is significant but environmental management activities variable is insignificant.

Table 4.36 Model 6

Fixed-effects (within) regression	Number of obs = 119
Group variable: company id	Number of groups = 12
R-squared:	Obs per group:

Within = 0.3328			min = 3			
Between = 0.0052			avg = 7.6			
Overall = 0.0113			max = 10			
			F(5,11) = 19.12			
corr(u_i, Xb) = -0.9177			Prob > F = 0.0000			
		Robust				
EPS(LN)	Coefficient	std. err.	T	P>|t|	[95% conf. interval]	
EMA	-.0399058	.1384335	-0.29	0.779	-.3445958 = .2647842	
Total sales (LN)	3.101965	1.330173	2.33	0.040	.1742742 = 6.029656	
Company's assets (LN)	-.5504006	.3897968	-1.41	0.186	-1.408337 = .3075363	
Solvency ratio	.1812982	.2248529	0.81	0.437	-.3135998 = .6761962	
company age	-.1267711	.068526	-1.85	0.091	-.2775958 = .0240536	
Sales growth	-.0001384	.0061171	-0.02	0.982	-.0136021 = .0133254	
_cons	11.78428	5.848103	2.02	0.069	-1.087313 = 24.65587	
sigma_u	6.7040896					
sigma_e	.59527871					
rho.99217741 (fraction of variance due to u_i)						

Source: the researcher (2024)

Model 5 is significant but environmental activities variable is insignificant. Thus, the hierarchical regression analysis tests also fail to support the hypothesis that environmental management activities have an effect on the performance of JSE-listed food processing companies in South Africa.

4.5 Chapter summary

Descriptive statistics and inferential statistics were used in this chapter to analyse the data. Table 4.1.1 - 4.1.13 were presented in this chapter with the aim of presenting the environmental management activities that the 13 food processing companies selected. One company did not disclose information related to its environmental information for the 10 years understudy. Table 4.15 presents the most common environmental activities that had been reported by the JSE-listed food processing companies.

Robust fixed effect regression and hierarchical regression analysis were used to determine the relationship between the environmental activities and the ROA and financial performance (ROA and EPS) of JSE listed food processing companies.

However total sales, company's assets, solvency ratio, sales growth % and the company's ages were used as a control variable in this study. The following chapter gives the summary of the entire study, conclusion based on the statistical analysis used and the recommendation for future studies.

CHAPTER 5

Summary, Conclusion, and recommendations

5.1 Introduction

The previous chapter presented and showed how data on environmental management activities by companies involved on food processing and listed on the JSE was analysed. Descriptive statistics and inferential statistics were used to achieve the purpose of the study. This chapter presents an overview of the study, summary of major findings, conclusion, and recommendations.

5.2 Overview of the study

Chapter 1 identified a research gap pertaining to the need for investigating the impact of environmental management activities of JSE-listed food processing companies on their financial performance. Some companies in South Africa incur environmental costs to satisfy the country's environmental legislative requirements. Hence, the research question to determine the impact that the environmental management activities have on the financial performance of JSE-listed food processing companies arose. Hypotheses were set out as framework for determining the relationship between the environmental costs and the financial performance of the JSE-listed food processing companies.

Chapter 2 reviewed studies focusing on addressing the phenomena environmental management activities and the financial performance of companies. In the chapter, the researcher also discussed environmental management activities that had been reported by prior studies. Some of the environmental management activities identified

in literature are environmental impact assessments, efficiency of energy, water reduction, raw materials, waste reduction, carbon emission reduction, and air quality management. The theories underpinned this study were also identified and the conceptual framework formulated. Thus, this study is guided by the open system theory, stakeholder theory, ecological modernization theory and the sustainability theory. The environmental legislations have been identified and discussed in chapter 2.

Chapter 3 presents the methodology for the study. A quantitative approach was adopted. Data was collected from integrated financial statements of JSE-listed food processing companies. The integrated financial statements were obtained from the websites of the companies. Using the information from these companies had a relatively low ethical risk as it was provided by the companies for public use. The collected data was analyses using STATA version 18 in chapter 4. Descriptive statistics and panel data regression analysis were employed to address the research objectives. The robust fixed effects model has been used to determine the objectives three. Discussion of the findings of the results is presented in chapter 4. The focus of this chapter is the presentation of the summary findings, conclusion, and recommendations for future studies.

5.3 Summary of findings

Based on the results shown in this study (see Tables 4.1 – 4.13), majority of the JSE-listed food processing companies seems to fairly conduct and report environmental management activities in their financial statements. Indeed, some of the companies seem to have interest in ensuring sustainable production through looking after the environment, particularly information that is required by the ISSB standard. The environmental management activities that are reported by the 13 JSE-listed food processing companies includes: Fossil fuel reduction Energy reduction, Water efficiency, Material and resource efficiency, Environmental impact assessment and audits, Waste reduction, Environmental community projects, Environmental management training Programme, Level of carbon tax, Environmental non-compliance costs (prosecution and fines), Environmental management systems,

Greenhouse Gas (GHG) Emissions (Climate change), Air quality management, Nature conservation and Animal protection. However, the following environmental management activities were mostly reported by the JSE-listed food processing companies.

- Water efficiency
- Waste reduction
- Greenhouse gas emissions
- Energy reduction
- Non-compliance with environmental legislations

Furthermore, environmental management systems, carbon tax, environmental non-compliance fees, environmental training, environmental community projects, nature reserves, air quality management and animal protection appears to be least reported by the 13 JSE listed food processing companies. Some of these environmental management activities have not been reported consistently throughout period 2012-2021. However, the companies have not disclosed reasons for discontinuing to report some of the environmental management activities during the period of 2012-2023. Thus, there are some of the environmental management activities that some companies begin reporting them during the period of 2012-2021.

Consequently, company B, C, F, I, K and T reported more environmental management activities that were >6. Furthermore, these companies also reported the activities that were greater than the average that was estimated to range from 3-4 environmental management activities during the period 2012-2021. Company D, G, H, L and M appears to fairly report the environmental management activities. An average of 3-4 environmental management activities throughout the years 2012-2021. Company A did not publish the integrated financial reports for the years 2012-2021. However, the study cannot conclude that the company did not report any environmental management activities. Company E and J Reported least environmental management activities which were below the average of 3-4 throughout the years 2012-2021. This

finding clearly shows that majority of the JSE-listed food processing companies fairly report the environmental management activities.

The regression tests revealed that the environmental management activities had no significant relationships with either ROA and EPS of the JSE-listed food processing companies. Thus, the H_0 was accepted and the H_1 was rejected. The fixed effect model has revealed that the environmental management activities have no significant relationship with the control variables that are sets out in this study. The control variables included net profit, total sales, solvency ratio, company's age and company's assets. Moreover, the hierarchical regression test has also been employed and presented in table 4.31-4.36 which shows that none of the environmental management activities had a significant positive relationship with the financial performance of the JSE-listed food processing companies. This substantiated the acceptance of H_0 and the rejection of H_1 in this study. Thus, the study expresses that there was no significant evidence to justify that the environmental management activities have an impact on the ROA and EPS of the food processing companies.

5.4 Conclusion

The study has identified that most of the food processing companies are reporting the environmental management activities. The majority of companies reported similar activities that included Water efficiency**,** Waste reductio, Greenhouse gas emissions, Energy reduction and the Non-compliance with environmental legislations. However, some of these companies were not consistent with reporting the environmental management activities. However, some of these JSE-listed food processing companies need to work more on their environmental reporting so that they can comply with the new ISSB reporting standards. Furthermore, most of the companies had a financial performance that did not fluctuate based on the environmental activities that they undertook.

The robust fixed effect regression model did not confirm existence of a relationship between the environmental activities and the environmental activities. This comes after rigorous test has been done, including the transformation of data and the

hierarchical regression model has been employed. Therefore, the study suggests that there were no statistically significant results that confirm that the environmental management activities have impact on the financial performance.

5.5 Recommendation

The study recommends that future studies may be conducted to determine the environmental management activities that are reported by SMMEs food processing companies. Furthermore, Future studies can also employ a qualitative research approach to get detailed in-depth information on environmental management activities conducted by the companies through interviewing the companies' senior management. The current study relied on only those activities reported in the annual financial statements and this is the major weakness of this study because some companies may not have a good system of recording and reporting environmental management activities.

Future studies should also attempt to use the MEMA than focus on the PEMA as the case in the current study. Furthermore, there is a literature that suggest that it is important for companies to report environmental performance, however this study did not provide the statistical results that justifies the importance of reporting the environmental management activities. However, shareholders of the companies should encourage companies to participate in environmental projects as literature has expressed that the company may gain a good public image. And government can also play a role in encouraging companies to report the environmental activities with motive to enforce companies to comply with environmental legislations. Future studies may also focus on investigating the environmental impact assessment of the companies.

In conclusion, the study urges the JSE-listed food processing companies to participate in environmental management activities with a purpose to take part in protecting the environment. The study has shown that there was no significant evidence environmental management activities affect the financial performance of companies. However, the major benefit that the study pointed out is that the companies that report

the environmental management activities gain public trust. Lastly, the study urges the government to strengthen the environmental legislation to encourage the companies to participate in the environmental legislation.

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APPENDICES

Appendix 1

	Years	ROA	EPS	Company's operating age	Environmental management activities	Solvency Ratio	Total sales	Sales growth %	Net profit margin	Company size (total assets)
COMPANY A	2021	7,27	10,10	34	0	1,46	180,20	-8,29	5,66	18,76
	2020	6,49	7,97	33	0	1,39	196,49	10,95	4,13	18,64
	2019	4,78	5,81	32	0	1,27	177,11	13,69	3,35	18,64
	2018	1,20	1,06	31	0	1,30	155,78	-5,87	0,70	18,32
	2017	1,49	1,29	30	0	1,28	165,50	16,30	0,80	18,30
	2016	2,30	1,56	29	0	1,36	142,31	1,14	1,12	18,05
	2015	2,71	1,36	28	0	1,30	140,71	14,46	1,37	18,08
	2014	-9,75	-4,41	27	0	1,38	122,94	-9,99	-4,43	17,84
	2013	2,86	1,99	26	0	1,46	136,59	28,08	1,31	17,95
	2012	7,52	3,59	25	0	1,65	106,64	20,79	3,43	17,10
COMPANY B	2021	9,70	1,23	30	8,00	2,13	15,87	13,88	2,99	15,87
	2020	12,40	1,44	29	7,00	2,28	13,93	3,31	4,03	15,81
	2019	14,20	1,66	28	8,00	2,55	13,49	3,90	4,81	15,65
	2018	33,80	3,69	27	7,00	2,53	12,98	5,08	11,05	15,64
	2017	21,00	1,95	26	8,00	2,31	12,35	3,32	6,11	15,50
	2016	11,30	0,95	25	6,00	1,91	11,95	6,11	3,12	15,42
	2015	24,10	2,01	24	8,00	1,97	11,27	17,33	6,92	15,39
	2014	11,90	0,88	23	8,00	1,80	9,60	12,51	3,55	15,29
	2013	7,00	0,64	22	7,00	1,76	8,53	4,58	2,89	15,18
	2012	13,80	0,87	21	7,00	1,82	8,16	12,91	4,08	15,09
COMPANY C	2021	27,60	498,90	77	9,00	2,84	13,27	0,45	2,04	16,00
	2020	24,80	591,60	76	8,00	2,06	13,21	0,45	1,91	16,09
	2019	26,90	488,70	75	9,00	1,86	13,15	-2,14	1,62	16,10
	2018	28,70	513,10	74	8,00	2,14	13,44	1,92	1,40	16,08

	2017	28,00	479,00	73	7,00	2,10	13,19	8,17	1,49	16,04
	2016	27,90	460,70	72	8,00	1,99	12,19	8,40	1,59	16,02
	2015	28,30	417,70	71	8,00	1,96	11,24	9,52	1,42	15,90
	2014	27,60	419,30	70	8,00	2,46	10,27	11,38	1,28	15,78
	2013	27,40	340,10	69	7,00	2,27	9,22	11,23	1,40	15,70
	2012	29,40	316,70	68	7,00	2,86	8,29	10,64	1,42	15,53
COMPANY D	2021	7,63	3,61	123	0	3,88	60,51	-31,46	9,92	11,27
	2020	15,32	7,51	122	0	3,41	88,28	15,13	14,14	11,31
	2019	13,51	6,12	121	4,00	2,52	76,68	21,79	13,17	11,22
	2018	14,58	4,59	120	4,00	3,74	62,96	31,54	12,05	10,86
	2017	8,53	2,20	119	4,00	4,24	47,86	11,52	7,60	10,66
	2016	3,05	1,34	118	4,00	4,14	42,92	43,44	2,83	10,59
	2015	0,27	0,06	117	4,00	5,10	29,92	10,04	0,33	10,51
	2014	2,45	0,59	116	4,00	4,22	27,19	-38,34	3,56	10,58
	2013	14,65	3,68	115	3,00	4,57	44,10	14,88	13,78	10,63
	2012	11,19	2,65	114	3,00	4,26	38,39	7,72	11,39	10,57
COMPANY E	2021	2,80	152,20	108	3,00	2,64	635,58	-9,68	6,74	14,38
	2020	1,60	57,20	107	3,00	2,47	703,68	5,71	3,37	14,40
	2019	3,00	167,60	106	3,00	2,70	665,69	26,38	6,11	14,34
	2018	-0,30	-49,70	105	3,00	2,92	526,72	-20,67	-0,61	14,27
	2017	8,50	424,70	104	3,00	3,63	663,95	22,34	14,49	14,19
	2016	6,20	366,90	103	3,00	4,55	542,71	3,16	11,38	14,10
	2015	5,00	323,90	102	3,00	3,39	526,09	19,83	8,20	13,92
	2014	28,30	1 609,60	101	3,00	3,91	439,02	21,16	46,17	13,84
	2013	17,40	760,80	100	2,00	3,63	362,35	5,79	25,92	13,60
	2012	16,00	631,90	99	1,00	3,22	342,51	14,82	23,99	13,50
COMPANY F	2021	13,00	570,70	103	7,00	0,21	7,63	-8,12	9,41	16,24
	2020	14,00	650,90	102	7,00	0,18	8,31	8,64	9,82	16,35
	2019	14,00	528,30	101	7,00	0,17	7,65	-0,13	8,48	16,24
	2018	15,00	734,60	100	7,00	0,20	7,66	-0,64	11,52	16,19
	2017	13,00	401,30	99	6,00	0,24	7,71	-6,52	6,22	16,12

	2016	20,00	785,80	98	6,00	0,55	8,24	33,64	11,62	15,18
	2015	29,00	587,70	97	6,00	0,59	6,17	22,42	10,41	15,20
	2014	46,00	555,70	96	6,00	0,27	5,04	7,19	12,08	14,91
	2013	41,00	489,50	95	6,00	0,30	4,70	1,15	11,15	14,87
	2012	45,00	443,30	94	8,00	0,30	4,65	27,09	9,98	14,74
COMPANY G	2021	0	0	23	0	0	0	0	0	0
	2020	0	0	22	0	0	0	0	0	0
	2019	0	479,00	21	5,00	0	0	0	0	0
	2018	7,41	574,60	20	4,00	2,37	20,15	2,95	5,34	9,58
	2017	5,62	390,30	19	4,00	2,63	19,58	-4,97	3,71	9,47
	2016	12,49	912,10	18	4,00	2,39	20,60	9,88	8,20	9,51
	2015	9,30	612,80	17	4,00	2,35	18,75	5,93	6,04	9,41
	2014	7,48	526,50	16	4,00	2,07	17,70	8,54	5,46	9,47
	2013	4,26	275,00	16	4,00	2,52	16,31	-12,38	3,07	9,37
	2012	5,70	335,60	15	4,00	2,40	18,61	10,42	3,25	9,27
COMPANY H	2021	3,80	53,90	9	4,00	3,55	5,40	6,01	1,96	14,84
	2020	5,86	80,10	8	4,00	3,48	5,10	15,33	3,04	14,79
	2019	7,52	92,60	7	4,00	3,71	4,42	7,18	4,28	14,74
	2018	14,40	164,30	6	4,00	3,81	4,12	1,73	8,79	14,74
	2017	5,66	55,70	5	4,00	4,00	4,05	3,55	3,15	14,63
	2016	4,03	39,00	4	4,00	3,38	3,91	12,82	2,33	14,63
	2015	6,10	54,00	3	4,00	3,67	3,47	-2,60	3,66	14,55
	2014	-0,41	-4,00	2	5,00	3,50	3,56	2,23	-0,24	14,53
	2013	-14,67	-123,00	1	0	1,06	3,48	-	-8,23	14,49
	2012	0	0	-	0	0	0	0	0	0
COMPANY I	2021	4,44	111,80	61	6,00	1,91	31,69	13,97	3,14	16,92
	2020	-4,26	-103,00	60	6,00	1,78	27,80	7,40	-3,45	16,93
	2019	-0,90	-12,70	59	6,00	3,65	25,89	5,54	-0,71	16,83
	2018	4,18	106,60	58	6,00	3,25	24,53	-1,69	3,58	16,86
	2017	2,44	59,70	57	6,00	4,19	24,95	-0,30	1,91	16,79
	2016	0,90	65,40	56	5,00	1,99	25,03	6,82	0,73	16,82

	2015	4,38	102,40	55	6,00	2,06	23,43	20,14	3,68	16,80
	2014	-1,39	46,70	54	6,00	1,90	19,50	92,91	-1,42	16,81
	2013	0,04	4,50	53	6,00	1,68	10,11	-25,99	0,07	16,67
	2012	-63,88	88,30	52	6,00	2,26	13,66	-	-24,30	15,46
COMPANY J	2021	4,23	82,60	125	6,00	2,16	5,95	1,46	3,64	15,45
	2020	4,41	82,70	124	6,00	2,14	5,86	8,33	3,69	15,40
	2019	4,57	82,70	123	6,00	2,11	5,41	8,49	3,98	15,37
	2018	3,37	61,10	122	0	4,29	4,99	8,63	3,09	15,34
	2017	5,71	95,90	121	0	2,19	4,59	10,79	5,11	15,23
	2016	9,43	132,10	120	0	1,68	4,15	37,16	7,08	14,95
	2015	6,85	77,10	119	0	1,70	3,02	23,66	5,62	14,72
	2014	4,91	47,90	118	0	1,19	2,44	31,47	3,37	14,33
	2013	2,59	0	117	0	1,15	1,86	-	2,05	14,21
	2012	0	0	116	0	0	0	0	0	0
COMPANY K	2021	0	0	29	0	0	0	0	0	0
	2020	0	0	28	0	0	0	0	0	0
	2019	0	0	27	0	0	0	0	0	0
	2018	0	0	26	0	0	0	0	0	14,21
	2017	-2,60	-47,70	25	6,00	0,54	21,64	25,31	-1,10	14,19
	2016	12,40	108,30	24	6,00	0,48	17,27	4,73	6,90	14,00
	2015	12,60	101,90	23	6,00	0,58	16,49	18,50	6,70	13,89
	2014	8,30	58,50	22	0	0,58	13,91	9,72	4,90	13,89
	2013	10,00	66,20	21	0	0	12,68	0	63,00	15,45
	2012	8,14	57,44	20	0	0	0	0	0	10,04
COMPANY L	2021	7,89	1 142,30	100	4,00	3,20	30,95	3,89	5,82	10,00
	2020	6,81	612,20	99	4,00	3,76	29,80	1,93	5,01	10,01
	2019	17,54	2 332,60	98	5,00	3,35	29,23	3,06	13,31	10,08
	2018	10,16	1 431,30	97	5,00	3,70	28,36	-9,37	8,57	10,08
	2017	12,65	1 914,90	96	4,00	3,56	31,30	2,32	9,69	10,11
	2016	13,33	2 034,40	95	4,00	2,89	30,59	-3,07	10,69	10,12
	2015	3,79	1 068,10	94	4,00	2,24	31,56	4,94	2,99	10,12

	2014	7,50	1 261,60	93	4,00	2,28	30,07	11,37	6,20	10,10
	2013	10,51	1 608,00	92	4,00	4,55	27,00	19,08	9,51	9,77
	2012	15,59	1 707,00	91	4,00	3,82	22,68	11,00	11,99	9,49
COMPANY M	2021	20,49	- 689,00	129	5,00	1,00	14,92	- 3,02	18,23	9,81
	2020	2,92	- 212,00	128	5,00	0,96	15,38	- 12,65	3,45	9,62
	2019	- 5,27	- 948,00	127	5,00	0,83	17,61	0,59	- 4,50	9,84
	2018	- 5,80	- 1 054,00	126	4,00	1,00	17,51	- 2,29	- 6,19	10,24
	2017	3,92	852,70	125	4,00	1,84	17,92	7,43	6,11	10,33
	2016	2,16	588,00	124	4,00	2,01	16,68	3,23	3,98	10,19
	2015	3,94	864,80	123	5,00	2,08	16,16	2,79	6,48	10,09
	2014	5,12	1 034,40	122	4,00	2,03	15,72	9,34	7,81	10,08
	2013	5,49	970,70	121	4,00	1,84	14,37	18,97	8,14	9,97
	2012	5,74	837,00	120	4,00	1,78	12,08	24,79	8,45	7,79

Source: the researcher (2024)

Ethical clearance

UNISA university of south africa

College of Accounting Sciences_RERC

NHREC Registration # : (if applicable)
Ref #: 2530
Name: Mr Thabang Frans Lebeya
Student #: 61931365
Staff #:

Date: 09/01/2024

Dear: Mr Thabang Frans Lebeya

Decision: Ethics Approval from 6 December 2023 to 5 December 2026

Researcher: Mr Thabang Frans Lebeya

South Africa, Mbombela

Mbombela

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Supervisor: Dr isaac mabhungu isaac.mabhungu@gmail.com

Co-Supervisor:

Co-Researcher(s):

Email address:

The effect of environmental management activities on the financial performance of JSE listed food processing companies

Qualification: Master of Philosophy in Accounting Sciences

Thank you for the application for research ethics clearance by the College of Accounting Sciences_RERC for the above mentioned research study Ethics approval is granted for three years.

The **negligible risk application** was **reviewed** by College of Accounting Sciences_RERC on 6 December 2023 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.

The proposed research may now commence with the provisions that:

1. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the College of Accounting Sciences_RERC .
3. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
4. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.

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