

**FACTORS INFLUENCING ADOPTION OF ENVIRONMENTAL MANAGEMENT
ACCOUNTING (EMA) PRACTICES AMONG MANUFACTURING FIRMS IN
NAIROBI, KENYA**

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DECLARATION

This Research Project is my original work and has not been submitted in any other university for academic purposes.

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This Research Project has been submitted for examination with my approval as the university supervisor.

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LIST OF ABBREVIATIONS / ACRONYMS

EMA – Environmental Management Accounting
FCA - Full cost accounting
LCA - Life Cycle Assessment
ABC - Activity Based Costing
NEMA - National Environmental Management Authority
KNCPC - Kenya National Cleaner Production Centre
UNIDO - United Nations Industrial Development Organization
MEMA - Monetary Environmental Management Accounting
MFA - Materials Flow Accounting
GHGs - Greenhouse Gases
UNFCCC - United Nations Framework on Climate
KAM - Kenya Association of Manufacturers
EPI - Environmental Performance Indicator
UNSD - United Nations on sustainable Development (UNSD)
PEMA - Physical Environmental Management Accounting
IMA - Institute of Management Accountants
EPA - Environmental Protection Agency

DEFINITION OF TERMS

Environmental Management Accounting (EMA): The management of environmental and economic performance through the development and implementation of appropriate environment-related accounting systems and practices (IFAC, 1998)

Environmental performance: is all about how well an organization manages the environmental aspects of its activities, products, and services and the impact they have on the environment (ISO 14001)

Environmental Accounting (EA): is a broad term used in different contexts, such as (IFAC, 2005):

Assessment and disclosure of environmental-related financial information in the context of financial Accounting and reporting

Assessment and use of environment-related physical and monetary information in the context of Environmental Management Accounting (EMA)

ABSTRACT

EMA is concerned with the accounting information needs of managers in relation to corporate activities that affect the environment as well as the environment-related impacts on the corporation. It is an area that has developed over decades to try to link to innovative strategies and corporations have also used it as an environmental performance indicator (EPI) to measure environmental performance. The study aimed at contributing towards extant literature by establishing the factors influencing adoption of Environmental Management Accounting (EMA) practices among manufacturing companies in Nairobi, Kenya. The study sought to establish whether the financial value, financial status, staff knowledge and policy guidelines on EMA influence adoption of Environmental management accounting practices among manufacturing firms in Kenya. The study is significant to the managers of corporate entities that operate in the manufacturing sector, Local government and environmental regulatory agencies and the primary stakeholders to a firm. The researcher used a mixed research design approach of both quantitative and qualitative research design. Demographic data of the firms used in the survey was presented in tables. Data was analyzed using descriptive statistics for data based on scales and regression analysis using Statistical Package for Social Sciences (SPSS) software for data relating to contextual variables influence on EMA adoption. Regression of coefficients results in table show that Financial Value and Adoption of EMA are positively and insignificant related. The results further indicate that Financial Status and Adoption of EMA are positively and significant related. It was further established that Staff Knowledge were positively and significantly related to Adoption of EMA. Similarly, results showed that Policy Guidelines and Adoption of EMA are positively and insignificantly related to Adoption of EMA. The study recommended that companies should always encourage EMA practices consistently. This is because continuous adoption of EMA leads to increased financial performance as well thus promoting the company's portfolio image.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Concerns about the preservation of natural resources have intensified over the last decade (Graff, 2010). Adverse environmental effects such as global warming have been inexorably linked to human activity (Dascalu, Caraiani, Lungu, Colceag&Guse, 2010). According to the United Nations Emissions Gap Report, the largest emitters of greenhouse gases (GHGs) are companies that operate in environmentally sensitive industries such as oil and gas extraction, mining, chemical manufacturing etc. (UNEP, 2012). In response to increased depletion of the environment, the Kyoto protocol (which is an international agreement that sets emissions parameters for the member countries) was introduced as an initiative of the United Nations Framework on Climate (UNFCCC), aimed at decreasing the levels of GHGs released into earth's atmosphere (Ratnatunga & Balachandran,2007).

International treaties such as the Kyoto Protocol, statutes and regulations governing environmental management, public opinion and environmental interest groups have placed corporations under pressure to releases into the ecosystem caused by firms, that may adversely affect the natural environment (Environmental Information Regulations Act, 2004). The methods and policies adopted by companies to safeguard the environment and the expenditures and benefits associated with doing so also form part of environmental information (Dascalu, et al., 2010).

Environmental disclosures in financial reports have also been used as a means to communicate with an entity's external stakeholders (Qian & Burritt, 2010). In some cases, certain groups of stakeholders may influence the information disclosed in financial reports. Jalaludin, Sulaiman& Ahmad (2011), similarly found that accountants within their survey of manufacturing entities in Malaysia, were compelled by institutional stakeholders to account for environmental activities. Though reporting of environmental information serves the purpose of ensuring a business remains publicly accountable for its environmental activities, Graff (1997) also proposes that businesses should consider incorporating environmental information into managerial decisions.

It is clear that the role of accounting has extended beyond the conventional recording and reporting of financial information, to managing environmental performance through the use of environmental accounting (EA) (Hopwood, 2009). Managing environmental performance encompasses the means an entity uses to control the environmental effects of its actions, products and services as well as their impact on the ecosystem (ISO 140001). Environmental accounting has two main centres: environmental financial accounting (EFA) which involves the disclosure of environmental concerns in public financial reports; and the environmental management accounting (EMA) that focuses on providing organization management with information to aid in the proficient use of company assets, budgeting, formulation of business strategy and policy etc. (Bennett & James, 2000; IFAC, 2005).

EMA can be understood as the process of identifying, gathering and analysing environmental information to support internal decision making (Schaltegger & Burritt, 2000). The United Nations on sustainable Development (UNSD) states that the adoption of environmental management accounting (EMA) is vital for business to apply cleaner and more productive procedures such as reduction of carbon emissions, efficient use of physical resources such as water, raw materials etc. (UNSD, 2001.) EMA can also be harnessed by firms to make decisions pertaining to product pricing, investment appraisals, calculation of costs associated with environmental projects, among others (UNSD, 2001).

The main goal of EMA is to improve both economic and environmental performance of a corporation by utilizing both financial and non-financial information. IFAC (2005) classifies financial and non-financial information under EMA as physical information and monetary information respectively. Physical information relates to an organization's impact on the natural ecosystem expressed in terms of quantifiable units. For example, carbon emissions are measured in tons. Monetary information refers to the costs incurred by companies to prevent or lessen environmental degradation (Dascalu, et al., 2010; Schaltegger, Burritt, & Peterson, 2003; IFAC, 2005).

Research studies such as those carried out by Burritt & Saka(2006); Masanet-LLodra(2006); Ferreira, Moulang, & Hendro(2010) have shown that there are multiple advantages accruing to organizations that apply EMA. For instance, a positive association was discovered between the

use of EMA and process modernization implying that firms that have implemented EMA are likely to have modified production processes and ultimately lower costs of production (e.g. reduced input expenses resulting from recycling of raw materials) (Masanet-LLodra, 2006; Porter & Esty, 1998). Moreover, Hart & Ahuja (1996) concluded that environmental accounting practices such as EMA have a positive influence on the economic performance of companies. Furthermore, Schaltegger & Burritt (2010) emphasizes that there are two perspectives to EMA. EMA can be seen as an instrument of reducing an entity's negative environmental impact and also as an instrument that aids in reducing costs of environmental protection (Jasch, 2001). For example, EMA provides an entity with a good estimation of environmental costs incurred which will consequently lead to better managerial decision making and ultimately increased profitability (Jalaludin, et al, 2011). The findings of these studies suggest that the adoption of EMA is beneficial. The factors that lead to adoption of EMA practices however, vary. At this juncture, it is important to draw a distinction between proactive and reactive businesses. Entities may apply EMA solely to meet legal requirements and are termed as reactive companies whereas those that seek to manage environmental performance beyond compliance are called proactive companies (Buisse & Verbeke, 2013).

Cooper (1992) and Caraianni, et al., (2008) offer a critical perspective to the entire practice of environmental accountability and assert that negative environmental effects are almost impossible to measure. Hence, regulation or standards created in support of EMA could be considered as symbolic legislation, meaning EMA is ineffective in ensuring good environmental and economic performance. Furthermore, Tinker, Lehman & Neihmark, (1991) share the view that environmental accounting is not capable of contributing towards a sustainable economy. Ideally, a sustainable economy should be able to meet the needs of the present without adversely affecting the capacity of future generations to sustain themselves (Brundtland, 1987). Besides the conflicting views surrounding EMA adoption, the motives of corporate entities that apply EMA are uncertain. There are firms that may adopt EMA because it is required by law. On the other hand, firms may take a more proactive stance and adopt EMA as a strategic management tool to aid in internal decision making (Schot, & Fisher 1993).

In Kenya the use of EMA practices is not an express requirement of the law. Nonetheless, the government has established an environmental regulatory institution known as the National

Environmental Management Authority (NEMA) to implement the laws listed under the Environmental Management and co-ordination Act. NEMA conducts environmental impact assessments on proposed environmental projects, issues licenses such as waste licenses, emissions licenses and effluent licenses to organizations whose activities contribute towards environmental degradation. The Kenyan government also created the Kenya National Cleaner Production Centre (KNPC) in collaboration with the United Nations Industrial Development Organization (UNIDO) to encourage cleaner production processes among business enterprises by emphasizing on material, water & energy efficiency as well as waste minimization. It is apparent that the Kenyan government has recognized the significance of environmental well-being, yet the practice of EMA has not been encouraged directly.

1.2 Statement of the problem

EMA is concerned with the accounting information needs of managers in relation to corporate activities that affect the environment as well as the environment-related impacts on the corporation. It is an area that has developed over decades to try to link to innovative strategies and corporations have also used it as an environmental performance indicator (EPI) to measure environmental performance. (Ferreira, Moulang, & Hendro, 2010; Dunk, 2007; Henri & Journeault, 2008). The adoption of EMA practices may not be financially beneficial. Wagner & Schaltegger, (2001) also share the view that previous studies on the association between economic performance and the use of EMA have been inconclusive.

Research on the main conceptual and practical problems encountered in Environmental Management Accounting and challenges and opportunities for future were concluded with a call for further case based research studies into investment appraisal, costing and performance management aspects of EMA (Burrit R. L., 2004). In addition to the applications of EMA, research carried out by Buysse & Verbeke (2003) suggests that some entities may only use EMA to fulfill legal requirements. Specifically, firms that devote limited resources to environmental problems, use EMA because of regulatory pressure exerted by local public agencies or international covenants. There is no consensus on the scope or procedures of EMA, hence entities aiming to comply with regulatory provisions may opt for simplified cost accounting methods that achieve legal compliance at the lowest possible cost to the company. Contrarily, there are corporations that take a more proactive stance to environmental management and use more

sophisticated management accounting procedures to link the financial and non-financial value of environmental activities beyond legal requirements (Setthasako, 2010).

Delmas & Toffel (2003) also observe that the difference in potential benefits between firms that choose to adopt elaborate methods of environmental management (proactive enterprises) and those that employ simpler techniques to meet legal compliance (reactive entities) is vague. Although Burrit & Saka (2006) did research on Environmental management accounting applications and eco-efficiency they did not focus on a single industry. Burrit & Saka (2006) concluded that the practice of linking eco-efficiency measurements with Environmental Accounting Information was underutilized, diverse and in need of further promotion if EMA is to help Japanese business move production processes and consumption of its products towards sustainability. Buysse & Verbeke (2003) did studies on motives manufacturing firms have for adopting environmental management accounting. However factors influencing the different levels of adoption have not been clearly identified. It was therefore of great significance to focus on the manufacturing firms as most of the environmental problems arises from such industries which release harmful affluent to the environment. The study aimed at establishing the factors that influence the adoption of EMA practices among manufacturing firms in Nairobi, Kenya..

1.3 Research objectives

1.3.1 General objective

To examine the factors influencing adoption of Environmental Management accounting (EMA) practices among manufacturing firms in Nairobi, Kenya.

1.3.2 Specific objectives

1. To investigate the influence of financial value of EMA on adoption of EMA practices among manufacturing firms in Nairobi, Kenya.
2. To determine the influence of financial status of a firm on adoption of EMA practices among Manufacturing firms in Nairobi, Kenya.
3. To establish the influence of staff knowledge of EMA on adoption of EMA practices among manufacturing firms in Nairobi, Kenya.

4. To examine the influence of Policy guidelines on adoption of EMA practices among manufacturing firms in Nairobi, Kenya.

1.4 research questions

1. What is the influence of financial value of EMA on adoption of EMA practices among manufacturing firms in Nairobi, Kenya?
2. Does the financial status influence adoption of EMA practices among manufacturing firm in Nairobi, Kenya?
3. Does staff knowledge on EMA influence adoption of EMA practices among manufacturing firms?
4. Do policy guidelines influence adoption of EMA practices among manufacturing firms Nairobi, in Kenya?

1.5 The scope of the study

The study sought to establish the factors influencing adoption of Environmental Management Accounting (EMA) practices among manufacturing firms in Nairobi, Kenya. This study only covered the 400 members of Kenya Association Manufacturing (KAM) located within Nairobi.

1.6 significance of the Study

a) Managers of manufacturing firms

The study is beneficial to the managers of firms that operate in the manufacturing sector. Financial implications associated with the adoption of EMA must always be considered even in the light of environmental consideration. In some organizations, environmental costs are not considered material. In such cases, managers are reluctant to embrace EMA and account for environmental costs incurred.

b) Environmental regulatory bodies

Local government and environmental regulatory agencies may also find this study useful. Local governments tend to be influenced by the expectations of society. Consequently, regulations governing EMA practices need to be aligned to expected behavior in society.

c) Primary stakeholders

Research conducted in other contexts, concluded that primary stakeholders to a firm are integral to the success of environmental management strategies. Thus, stakeholders of firms that employ EMA may find the results of this research insightful especially because the link was established between successful adoption of EMA and the level of support given by stakeholders.

CHAPTER TWO

LITERATURE RIVIEW

2.1 Introduction

This chapter presents a review of literature pertaining to the adoption of Environmental Management Accounting (EMA). This chapter gives a brief albeit detailed explanation regarding the concept of EMA and its development in management accounting. It describes the features characterizing the adoption of EMA practices and highlights the possible factors that may influence the adoption of EMA practices as well as establishing the association between environmental and financial performance. It also gives an overview of the theories that may be used to explain adoption of EMA practices with particular emphasis laid on the stewardship theory.

2.2 Theoretical framework

Stewardship theory and Resource based theory will be used to explain the dependent variables of the research.

2.2.1. Stewardship perspective

Though EMA is one of the methods of ensuring firms remain environmentally responsible, financial considerations remain at the focal point (Khalid, Dixon, 2012). Entities that have employed the use of EMA expect it to yield economic benefits such as better financial performance. According to Pandey (2007), the main objectives that companies have, are centered on maximizing shareholder wealth and increasing profitability of the firm. Thus EMA should only be used if it contributes towards maximizing of shareholders wealth. The theory in support of this argument is the stewardship theory. The stewardship theory proposes that managers are not driven by self interest but instead their goals are aligned with those of the shareholders (Davis et al , 2013). The manager is viewed as a “steward” of company assets and aims to achieve the objectives of the organization such as increased profitability, growth in revenue etc. (Donaldson, Davis, 1991). Thus EMA practices would only be adopted if they contributed towards realizing a manufacturing firm’s objectives. EMA practices can only be adopted if they

are beneficial for the manufacturing business in some way. For example, research conducted by Bennett, James (2000); UNDSO (2001); Olson, Jon (2008) similarly conclude that the use of EMA practices may significantly lead to reduction of a company's operational costs, especially if it operates within an environmentally sensitive industry. This study aimed to discover if there is actually a business case for EMA practices.

2.2.2 Resource based theory

The central proposition of the resource-based research is that firms are heterogeneous in terms of the strategic resources they own and control. It is generally suggested that this heterogeneity is an outcome of resource-market imperfections (Barney, 1991), resource immobility (Barney, 1991), and firms' inability to alter their accumulated stock of resources over time (Carroll, 1993). In this vein, each firm can be conceptualized as a unique bundle of tangible and intangible resources and capabilities (Wernerfelt, 1984). Resources, which are the basic unit of analysis for RBV, can be defined as those assets that are tied semi-permanently to the firm (Maijor, Witteloostuijn, 1996; Wernerfelt, 1984). It includes financial, physical, human, commercial, technological, and organizational assets used by firms to develop, manufacture, and deliver products and services to its customers (Barney, 1991).

The kind of resources for instance technical, human, and financial or others available to an organization for completing specific tasks often directly impacts the success of EMA (Ray et al, 2004). According to this perspective, each firm must possess a strength, or small number of strengths, that sets it apart from its competitors over the long term in order to gain competitive advantage. For this reason, the core-competency literature tends to focus on the creation and management of firm-level core-competencies such as personnel practices (Olalla, 1999), employee skills (Coyne et al, 1997), and learning within organizations (Lei et al, 1996).

The most important resource when it comes to Environmental Management Accounting is the competency of workers especially how to discharge the affluent in an environmentally safe and friendly way. Bartolomeo, et al., (2000) emphasize on the importance of understanding environmental costs since they directly affect firm profitability especially for manufacturing corporations since their activities significantly affect the environment. Conventional cost accounting does not separate environmental costs from non-environmental costs and as such,

both may be recorded as general expenses. This means that environmental costs remain hidden from internal management which hinders effective decision making (Bennett, et al., 2004). Using EMA to account for environmental costs can be used by managers in decisions such as product pricing, budgeting, investment appraisal, design of environmental management systems, etc. (UNDSD, 2001). This study therefore sought to find out the influence of staff knowledge on the adoption of Environmental management accounting by firms.

2.3 Conceptual framework

The conceptual framework shows the relationship between the independent variables and the dependent variable. It relates concepts, empirical research, and relevant theories to advance and systematize knowledge about related concepts or issues. Some concepts gain popularity among practitioners; however, research around a concept may be limited and sporadic. For example, Watson (2007) suggests a conceptual framework for social creativity. She observes that social creativity has been studied by many disciplines and at both individual and group levels. However, “the research community does not have a conceptual framework to integrate who the agents are when creativity occurs and what the context is for their creative processes”. Such a framework would help researchers define the concept, map the research terrain or conceptual scope, systematize relations among concepts, and identify gaps in literature. The independent variables are financial value of EMA, the financial well-being of a manufacturing firm, Staff knowledge, and financial guide to EMA while the dependent variable will be the Adoption of environmental Management Accounting practices.

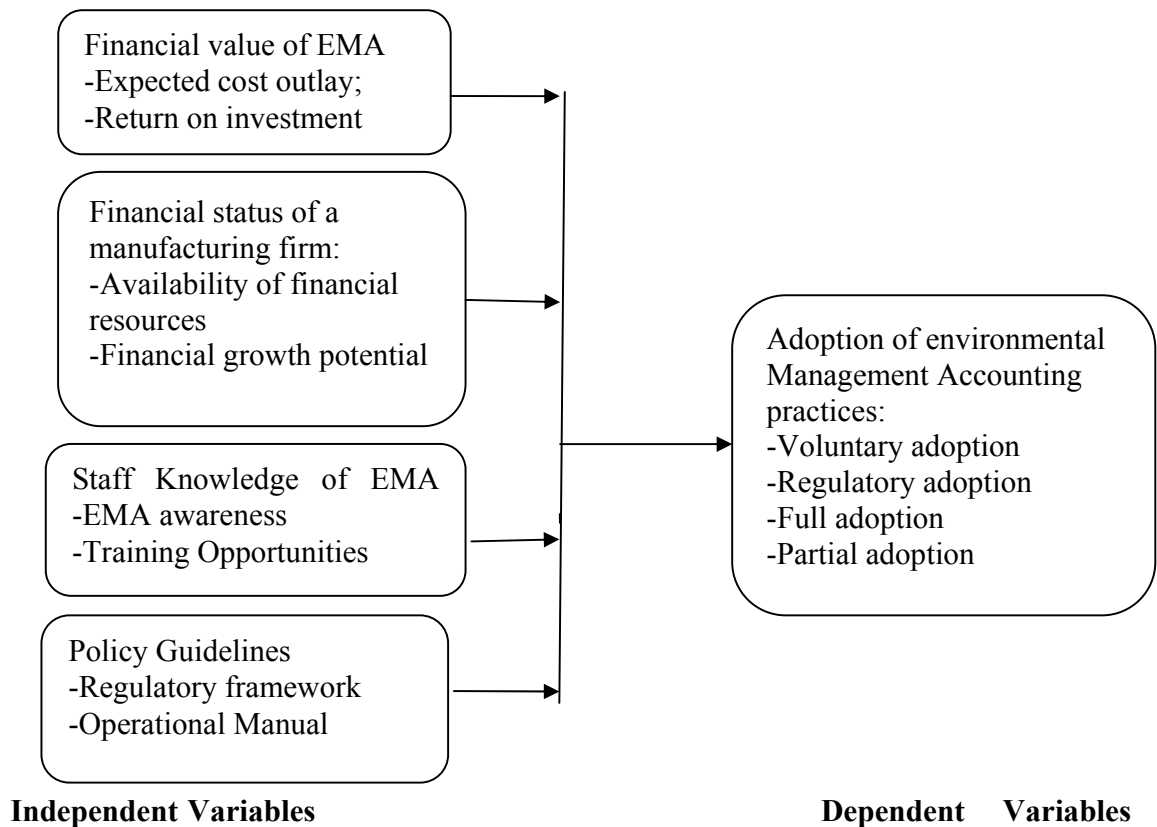


Figure 2.1: Conceptual Framework

2.3.1 Financial value of EMA

In order to understand EMA practices, it is important to consider management accounting practices in general. Managerial accounting is concerned with the delivery of accounting information to management to assist them in making decisions (Drury, 2008). Management accounting practices (MAPs) have been used extensively by businesses that operate within environmentally sensitive sectors i.e. manufacturing firms. Horngren et al., (2009) stated that management accounting assists companies in directing and controlling operational expenditures to attain profitability. Specifically, budgeting and performance assessment approaches are particularly useful in conveying information pertaining to current and expected expenditures and may also highlight the effect seasonal changes may have on company cash flows (Dugdale, 1994). Ittner, Lacker (2002) are also of the opinion that management accounting techniques were specifically designed to meet the information requirements of managers within manufacturing businesses.

In the case of EMA practices, manufacturing firms are more likely to adopt them because of the impact their production activities have on the ecosystem. This is not to say that non-manufacturing entities do not adopt EMA practices. Chang (2013) carried out an exploratory study to discover the level of EMA implementation within higher education institutions (universities) in Taiwan. His findings showed that universities used EMA simply to identify environmental costs. Qian et al (2011) did a similar study, but looked at the levels of implementation in local government institutions. Both studies concluded that the levels of implementation of EMA were very low.

In the case of manufacturing companies or organizations that operate within environmentally sensitive industries, the adoption of EMA is likely to be higher (Khalid, Dixon, 2012). Hart (1997) proposed that the management of natural resources through the application of EMA may result in pollution prevention and may assist corporations in saving energy consumption costs, material costs and waste disposal costs through recycling and cleaner production processes specifically for manufacturing businesses. Hence, an organization is able to produce and deliver

goods and services while simultaneously reducing their ecological impact and resource utilization. This double effect is known as eco-efficiency.

It would seem that manufacturing companies would choose to implement EMA practices beyond regulatory compliance, but this is not always the case. Jalaludin et al (2011) and Khalid, Dixon (2012) both carried out studies to discover the motives manufacturing entities have for using EMA practices. They concluded that regulatory pressure was the main factor influencing EMA adoption. Their findings similarly suggest that manufacturing firms may not see value in applying EMA.

In Kenya, the Environmental Management and Coordination Act of 1999 was created in a bid to protect the environment from negative effects largely caused by manufacturing organizations. Take for example the section of the Act that covers waste management regulations. The Act clearly identifies the different types of waste e.g. solid waste, industrial wastes, biomedical wastes etc. and gives precise provisions as to how such waste is to be disposed and penalties for not doing so. Entities that engage in activities that cause detrimental effects on the ecosystem must obtain licenses from the National Environmental Management Authority (NEMA) which is Kenya's environmental regulatory agency created by the national government. Hence, organizations may solely use EMA simply to achieve the requirements of the act.

Prior literature has attempted to explain the motives surrounding the adoption of management accounting practices (apart from legal compliance) among manufacturing firms (Kamilah, 2012; Tuan, 2010; Chang, 2013; Alleyne, Marshall, 2011; Otley 1980). A distinctive similarity in these studies is the application of the contingency theory in explaining the factors that lead to the implementation of MAPs. Otley (1980) was one of the earlier scholars who used the contingency theory to explain the factors influencing the implementation of MAPs. His assertion was that organizations did not practice management accounting uniformly. Rather, certain influential factors determined the type of methods or techniques used and the extent of usage. For example the size of the firm was found to influence the range of managerial accounting techniques that were used. On the other hand, Liaquat's (2006) research into Indian manufacturing firms revealed that the size of a company did not influence the adoption of specialized management accounting techniques e.g. activity based costing.

Logically though, as entities become larger, the necessity for more detailed accounting information increases (Haldma, Laats, 2002). Management need to have a better grasp of costs being incurred by different product lines, individual departments, etc. to improve their decision making capacity. In such a case, the adoption of advanced management accounting methods would be out of necessity. Hence, larger organizations are likely to use more specialized management accounting techniques. Hoque, James (2000) conducted a survey of Australian manufacturing firms and concluded that larger firms used the balanced scorecard (BSC) for performance assessment. Cadez, Guilding (2008) similarly found a positive correlation between large firms and the application of strategic management accounting (SMA). Conceivably the reasons behind adoption are not out of necessity but rather the capacity to do so.

Technological aspects such as the nature of the production processes may also determine the use of management accounting practices. Drury, Tayles (1994) found that organizations that used advanced technology to manufacture their products were more likely to make extensive use of various kinds of manufacturing accounting techniques. For this particular study, MAPs were used after the introduction of new technological processes of production.

Modern manufacturing technologies have been defined by Baldwin (1995) as software technologies which when adopted aid in improving the efficiency of an entity's manufacturing processes. Advanced technological production procedures used by manufacturing businesses are broadly termed as advanced manufacturing systems (AMS) or advanced manufacturing techniques (AMTs) (Gunawardana, 2006; Baldwin, 1995). The categories of the AMTs are given in Appendix 2 and will be used in this study to measure the levels of manufacturing technology used in manufacturing firms.

In another study conducted by Ferreira, Moulang, Hendro (2010), the application of MAPs (specifically EMA practices) encouraged the development of modern production processes in manufacturing businesses. Their findings indicated that the use of EMA is associated with business process innovation (Ferreira, Moulang, & Hendro, 2010). Their research was carried out in order to determine the relationship between product innovation, process innovation and the use of EMA. Their presupposition was that establishments seeking eco-efficiency are led to develop new products or to improve interior business processes and make them more efficient.

The age of an enterprise may also influence its adoption of management accounting techniques. Al-nimer (2009) carried out an exploratory study of management accounting practices adopted by banks in Jordan. His findings revealed that an entity's age is a significant factor in determining the extent of MAPs adopted by a firm. Conversely, O'Connor, Chow, Wu (2004) took a different stance and suggested that the application of MAPs would decrease with the age of the firm. Their study was based in China and their presumption was that older companies would have well established norms and bureaucratic processes in place. Therefore, mature companies would find it difficult to embrace newer techniques since they would already have well established routines and processes in place. However, their findings indicated otherwise, as age was found to be positively related to the levels of MAPs adopted.

Business strategies employed by manufacturing companies may also determine the level of adoption of EMA practices. Collins et al., (1997) attempted to draw an association between the use of budgetary analysis and firm level strategies. His findings indicated a positive relationship between the use of budgets and companies that employed prospector strategies. Considering Hart's (1995) resource based theory, organizations that take proactive measures to manage environmental performance may use EMA to differentiate themselves from other corporations consequently placing them in a good position to achieve competitive advantage (Ferreira, Moulang, & Hendro, 2010). Environmentally conscious consumers may opt for products that have been produced using greener technology with minimal negative externalities on the environment. Thus, such businesses are at liberty to charge premium prices for their products and at the same time acquire high social standing/approval (Burritt et al, 2002).

In addition, companies that do not employ the use of EMA but use low cost strategies (reactive), could lose out on cost savings that can be achieved through modified processes such as recycling of raw materials to minimize costs arising from waste disposal (Bennett, James, 2000). Ferrari, Parker (2006) find that process innovation contributes considerably to competitive advantage for manufacturing entities. Other potential benefits associated with EMA use are improvements in reputation, attraction of human resources and operational cost reductions (Burritt et al, 2002; Hansen, Mowen, 2005). Based on these studies it seems that a firm's strategy may influence the level of adoption of EMA practices.

2.3.2 Financial Status of a Manufacturing firm

Since EMA practices are used to measure an entity's environmental impacts for informed decision making, it follows that EMA practices can assist an organization in improving its environmental performance. The association between environmental and economic performance remains controversial. In the past, environmental performance has been viewed as a hindrance to the competitiveness of businesses (Wagner, Schaltegger, 2001). Manufacturing entities in particular, face a distinct disadvantage since their activities are likely to lead to high environmental costs. Furthermore, costs for compliance to environmental regulations may further cripple their financial performance.

There are studies that have determined a negative relationship exists between environmental management and economic performance or derived inconclusive results about the nature of the relationship between the two variables (Wagner et al, 2002; Gilley et al, 2000; Qian, 2012). Environmental performance may be measured based on factors such as the quantity of water or energy used, amount of permitted air emissions, the level of toxic substances released into the atmosphere etc. Financial performance can be quantified using measures such as financial ratios, specifically Return on Assets ratio (ROA), Return on Equity (ROE) and profitability ratios (Wagner et al, 2002)

Qian (2012), found that publicly listed companies were responsible for emitting the highest levels of carbon into the atmosphere but at the same time still enjoyed higher financial returns than companies that took proactive measures to cap their emissions. Thus, the relationship between financial and environmental performance was negative. According to Qian (2012) the results of his research show that external stakeholders have not pressurized such organizations to manage their pollution levels.

Nevertheless, prior literature has also attempted to show that a positive relationship exists between environmental performance and financial performance (Mir, Rahaman, 2010). Judge, Douglas (1999) found that corporate entities that incorporated environmental issues into their strategic planning found that doing so had a positive effect on financial performance. Sharma & Vredenburg (1998) also found that proactive environmental practices positively influenced

financial performance. The conclusions of the study can be summarized into two main arguments.

Firstly, manufacturing organizations incur higher environmental costs and as a result they have an incentive to look for production processes that may reduce environmental expenditures. Furthermore, by investing in cleaner modes of production, the firm is able to stay ahead of the competition, that is, to sustain competitive advantage. The capability to innovate and discover new methods and/or technologies for greener production establish an entity's competitiveness in the long run (Porter, Van der Linde, 1995).

Markedly, previous studies have focused on the effect environmental strategies have on financial performance (Cohen et al , 1997; Hart, Ahuja, 1996). The reverse may also be true. Economic performance may also influence environmental management. A business that is financially affluent may be in a better position to allocate more resources towards environmental management and consequently score better in terms of environmental performance.

The association between financial performance and environmental performance can be represented graphically in three distinctive approaches. Firstly, the traditionalist perspective as depicted in Figure 2 shows that there is a negative relationship between environmental and economic performance. Financial performance reduces with increased environmental performance. The argument is that businesses that spend copious amounts of financial resources on environmental management do so at the expense of financial well-being (Wagner & Schaltegger, 2001).

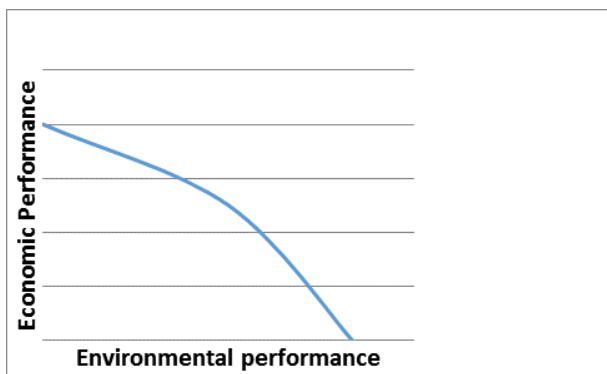


Figure 2.2: The traditionalist view

Source: (Wagner et al, 2001)

Next, figure 3 represents the revisionist view that contradicts the traditionalist outlook and stipulates, a positive relationship between economic and environmental performance. Improved environmental performance results in higher financial returns.

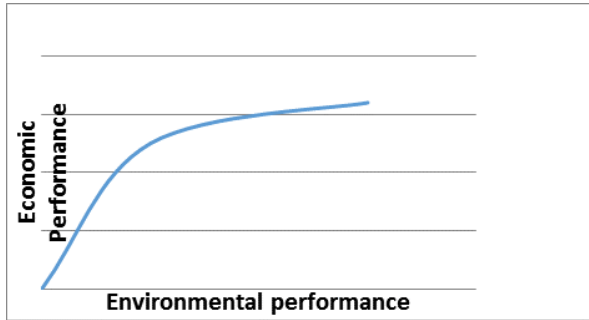


Figure 2.3: The revisionist view

Source: (Wagner et al, 2001)

Finally, the third graph (Figure 4) is a combination of the traditionalist and revisionist views. Economic performance increases with higher environmental performance up to a certain point and then decreases steadily with further increases in environmental performance.

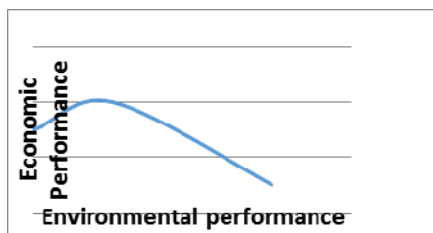


Figure 2.4: Combination of the traditionalist and revisionist perspectives

Source: (Wagner et al, 2001)

Schaltegger, Synnestvedt (2002), state that the best level of environmental performance (i.e. point before the decline in economic performance) would be that recommended by environmental legislation. If their proposition holds true, it means there would be no value in using proactive techniques or methods to improve environmental performance beyond regulations.

2.3.3 Staff Knowledge of EMA

The knowledge of environmental costs is fundamental since the identification and measurement of such costs is at the root of EMA. Before the adoption of EMA practices, businesses failed to consider the environmental effects resulting from their goods and services. Thus, costs incurred to remedy negative environmental impacts (remediation costs) are being incurred presently even though they were caused years ago (Holst, 1996). Expenditures in relation to environmental degradation and preservation, are called environmental costs e.g. costs incurred for the disposal of waste, carbon taxes, investments in green technology etc. (VDI, 2000)

Bartolomeo, et al., (2000) emphasize on the importance of understanding environmental costs since they directly affect firm profitability especially for manufacturing corporations since their activities significantly affect the environment. Conventional cost accounting does not separate environmental costs from non-environmental costs and as such, both may be recorded as general expenses. This means that environmental costs remain hidden from internal management which hinders effective decision making (Bennett, et al., 2004). Using EMA to account for environmental costs can be used by managers in decisions such as product pricing, budgeting, investment appraisal, design of environmental management systems, etc. (UNSD, 2001).

Medley (1997) was one of the earlier researchers to propose ways that EMA could be advantageous to its users. His work focused largely on environmental costs and their potential to create future liabilities for businesses. He recommended the training of accountants in environmental matters and the development of uniform methods for identifying and measuring environmental costs. Hansen, Mowen (2005) are also of the opinion that environmental costs significantly affect businesses since they form a substantial portion of an entity's total operating costs (20 percent or more). Using EMA, such costs can be identified, classified and allocated accordingly to allow for advanced cost analysis and possible cost reductions to occur (Ferreira, Moulang, & Hendro, 2010).

Environmental costs have been classified in different ways in green accounting literature. Caraiani, et al., (2008) divide environmental costs into what they term as positive eco-costs and negative eco-costs. Positive eco-costs are expenditures sustained to prevent degradation of the

ecosystem whereas negative eco-costs are expenses incurred to eliminate the consequences of an entity's environmental influence. Environment-related costs can also be categorized as either internal or external costs where internal costs are environmental costs for which the business is legally responsible for and external costs are environment-related costs that the company is not lawfully accountable for (IFAC, 2005).

IFAC (2005) further break down environmental costs into six main classes of costs namely waste and emission control costs, material costs of product outputs, prevention and environmental management costs, research and development costs etc. These outlays include acquisition costs of natural resources that are converted into products, the costs of curbing waste and emissions, research and development costs incurred to create cleaner processes, less tangible costs such as contingent liabilities arising from future environmental activities and forthcoming regulations among others.

Table 1.2: Environmental costs classification

1. Materials Cost of Product Outputs: <i>e.g. costs of materials (natural resources) converted into finished products-</i>
2. Materials Cost of Non-Product Outputs: <i>e.g. costs of energy, water and other materials that do not get converted into finished products (emissions costs)</i>
3. Waste and Emissions Control Costs: <i>e.g. waste disposal costs and legal compliance costs</i>
4. Prevention and other Environment Management Costs: <i>e.g. costs of cleaner and more efficient production processes</i>
5. Research and Development Costs
6. Less Tangible Costs: <i>e.g. company reputation, future regulations, contingent liabilities such as lawsuits incurred as a result of environmental damage</i>

Source: IFAC (2005)

Material costs of product and non-product outputs are calculated using both monetary environmental accounting (MEMA) and physical environmental accounting methods (PEMA). The remaining costs are accounted for using MEMA.

Alternately, the Institute of Management Accountants (IMA) classifies internal and external in a slightly different manner. The Environmental Protection Agency (EPA) also categorizes environmental costs in the same way though they separately consider the costs incurred by an entity to make it appear environmentally accountable to the environment for the sake of pleasing shareholders (Holst, 1996).

Table 2.2: Internal and external environmental costs categories

Conventional company costs	Less tangible company costs	External costs
e.g. costs of raw materials, energy, water, equipment etc.	e.g. compliance costs, costs from future regulations	e.g. depletion of the ozone layer, environmental degradation resulting from acid rain.

Modified from IMA (1996)

Particularly, the internal costs comprise of conventional and less tangible company costs. Both classifications are similar but the categorization given by IFAC is more comprehensive and provides a detailed description of environmental costs. The varying taxonomies of environmental costs are expected since EMA is not governed by international standards. EMA practices are an extension of management accounting that is similarly not regulated by uniform guidelines or standards. For the purpose of this study, the classification used by IFAC will be used for classifying external costs.

2.3.4 Policy guidelines

Integrating environmental-related information into conventional systems of management accounting requires specific tools and techniques (Debnath et al, 2012). Broadly, EMA practices support three main managerial decisions: costing decisions, investment decisions and decisions pertaining to environmental performance evaluation (Holst, 1996). Traditional management

accounting methods such as absorption costing, variance analysis, and life cycle costing can be modified to include environmental considerations.

EMA practices are not practiced evenly across manufacturing businesses but previous studies have identified similar methods used by businesses that have adopted EMA practices. Firstly for costing analysis, life cycle assessment (LCA) has been used to identify the environmental effects associated with the production of goods across their entire life cycles (Chang, 2007; Olson, Jon, 2008; Wabuyi, 2009). Hence there is consensus that lifecycle costing is one of the main methods that is used in EMA. Activity Based Costing (ABC) is another technique used to separate environmental costs from general operational costs. Essentially, ABC is used to identify and assign environmental costs to cost centers. The allocation of environmental costs is based on the activities that caused the costs, hence internal management is able to understand the specific product lines and/or production processes that incur the highest amounts of environmental expenditures (Ratnatunga & Balachandran, 2008; Holst, 1996; Schaltegger, Hahn & Burritt, 2000).

Notably, both LCA and ABC fall under the domain of monetary environmental management accounting (MEMA). To address the physical accounting aspects of EMA, materials flow accounting (MFA) is used to analyze the flows of materials and energy moving through the production system of a manufacturing organization (Jasch, 2003; Burritt et al., 2000; Chang, 2007; Abiola, Ashamu, 2007). MFA quantifies environmental impacts such as CO₂ emissions, into physical units such as tons, kilograms, etc.

EMA practices can also be used to make investment decisions. Essentially, total cost assessment or total cost accounting (TCA) incorporates environmental costs into investment appraisals. In this way, organizations are able to consider potential environmental costs that may be incurred by accepting a particular investment proposal (EPA, 1995; Medley, 1997; IMA, 1995). Finally, EMA at its highest level of adoption can be used as a tool for performance measurement. Strategic management tools such as the balanced scorecard can be custom made to consider goals such as environmental management. The balanced scorecard transforms business objectives into actions. Thus, an environmental balanced scorecard (EBS) or sustainability balanced scorecard (SBSC) can be used to measure an entity's environmental performance (Alewine & Stone, 2013).

Yet, like environmental costs, prior studies have classified the methods used in EMA in different ways (Burritt et al, 2002, IMA, 1996; IFAC, 2005; Khalid, Dixon, 2012; Debnath et al, 2012). For instance, Schaltegger, et al., (2002) identify the methods used in relation to the information content required and its associated time frame. Take for example, absorption costing which forms part of environmental cost accounting (ECA), is a short term decision that utilizes past routine information. The Institute of Management Accountants (IMA) offer an in depth description and explanation of the methods that can be applied in EMA based on costing, investment and performance evaluation decisions. The methods are outlined in Table 4.

Table 2.3: Summary of the tools and techniques of EMA

Stage 1: Costing Analysis	<ul style="list-style-type: none"> i) Identification of environmental costs: <ul style="list-style-type: none"> a) Materials Cost of product outputs b) Materials Cost of Non-Product outputs c) Waste and emissions control costs d) Prevention and other environment management costs e) Research and development costs f) Less tangible costs
	<ul style="list-style-type: none"> ii) Life Cycle Assessment (LCA) or Life Cycle Costing <ul style="list-style-type: none"> a) Goal setting b) Inventory analysis c) Impact Assessment d) Improvement Assessment iii) Environmental Target Costing
	<ul style="list-style-type: none"> iv) Activity Based Costing (ABC)- involves allocation of costs into 4 main areas: <ul style="list-style-type: none"> a) Volume of emissions/waste b) Toxicity of emission/waste treated c) Environmental impact added (Volume*input per unit of volume) d) Relative costs of treating different kinds of emissions
	<ul style="list-style-type: none"> v) Full Environmental Cost Accounting: <ul style="list-style-type: none"> a) Market price method b) Hedonic pricing method c) Travel cost method d) Contingent valuation method

	<ul style="list-style-type: none"> vi) Materials Flow Accounting <ul style="list-style-type: none"> a) Preliminary estimation of wastage costs b) Quantification of volume of waste and energy streams and emissions (e.g. CO₂ emissions) c) Evaluation of cleaner production processes vii) Post assessment of environmental costing decisions
Stage 2: Investment Analysis	<ul style="list-style-type: none"> i) Total Cost Assessment (TCA) <ul style="list-style-type: none"> a) Identify costs and benefits of a proposed capital investment b) Allocation of costs to a specific product c) Apply costs across a specified time frame d) Financial indicators (N.P.V, IRR) ii) Environmental risk and uncertainty analysis <ul style="list-style-type: none"> a) Monte Carlo Simulation b) Decision trees c) Environmental long term financial planning d) Environmental budgeting
Stage 3: Performance Evaluation	<ul style="list-style-type: none"> i) Individual incentives (for employees) ii) Balanced scorecard (Environmental Balanced Scorecard) iii) Environmental assessment programs

Source: Modified from IMA (1996)

The extent or level of adoption of EMA practices can be measured based on the decisions it supports and the associated tools and techniques that fall under each decision.

2.3.5 Adoption of environmental Management Accounting (EMA) practices

Though the use of EMA among manufacturing entities is not standardized, there are certain aspects that characterize the adoption of EMA practices. Firstly, organizations that use EMA must be able to identify and measure environmental costs (Debnath, Bose, & Dhalla, 2012). Studies describe EMA as environmental cost accounting (ECA). Thus, for an organization to claim it has adopted EMA, it must separate environmental costs from general overheads or

operational costs (Holst, 1996; Schaltegger, Hahn, Burritt, 2000; Khalid, Dixon, 2012; UNDSO, 2001). Hence the first characteristic of adoption of EMA is the identification and categorization of environmental expenditures.

According to Chang (2007), conventional management accounting techniques are inadequately designed to assimilate environmental-related information such as environmental costs into accounting systems. However, organizations that have adopted EMA practices still use common management accounting techniques such as full cost accounting (FCA), life cycle assessment (LCA) and activity based costing (ABC) to measure both current and potential environmental costs. LCA for example, was originally designed to determine the actual costs of a product throughout its life cycle. In the same way, LCA can be used to establish specific environmental externalities associated with producing a product (during its entire life) such as water effluents, air emissions etc. This information can then be utilized by management to reduce the deteriorating effects such production has on the environment.

Prior studies suggest that EMA practices are not homogeneously applied within the manufacturing industry (Buysse & Verbeke, 2003; Jalaludin, Maliah, & Ahmad, 2011). The levels or degree of implementation of EMA depend on the firm's orientation towards environmental issues and its environmental strategies. The resource based theory put forward by Hart (1995) explains this disparity in levels of adoption, by drawing a distinction between businesses that have proactive environmental management strategies and those that take a reactive stance towards environmental management. Businesses that are reactive are said to use an end of pipe approach to solve environmental problems. Such entities assign limited resources to environmental activities and as such their levels of adoption are low. Notably, research conducted by Setthasako (2010) and Qian, Burritt(2010) concluded that reactive firms only used EMA to fulfill legal environmental requirements.

Conversely, proactive organizations are associated with higher levels of adoption since their approach is aimed at ensuring sustainability of the business (Buysse, Verbeke, 2013). Managers in proactive organizations will look beyond simple accounting for environmental costs and will seek to find ways to permanently minimize those costs, e.g. through investment in cleaner production technologies. The Institute of Management Accountants takes a different approach in

explaining the levels of adoption. Their proposition is that the implementation of EMA can be understood from the point of view of the decisions it addresses at the managerial level as shown in the table below.

Table 2.5: The levels of adoption of EMA practices

Level of adoption	Decision type
Stage 1: Low levels of adoption of EMA practices	Costing decisions
Stage 2: Moderate levels of adoption of EMA practices	Investment decisions
Stage 3: High levels of adoption of EMA practices	Performance evaluation decisions

Source: IMA (1996)

Stage 1: firms only apply EMA to manage regulatory compliance. Essentially, their application of EMA is to identify and monitor environmental costs that may arise out of failure to conform to environmental laws.

Stage 2: Businesses acknowledge that using resources more efficiently can lead to competitive advantage and may focus on pollution prevention processes that target the core causes of pollution. The main aim of Stage 2 companies is the management of environmental costs thus they will use EMA for both costing and investment decisions.

Stage 3 organizations view environmental performance as a key contributor towards economic growth and sustainability of their business. Hence EMA is used as a tool to measure environmental performance in addition to costing decisions and investment decisions.

2.4 Empirical review

Multiple studies on environmental accounting have been done in order to establish the responsibility the accounting profession has in supporting global efforts to conserve the earth's ecosystem (Bennett, James, 2000; Bartolomeo et al , 2000; Debnath, Bose et al, 2012) Notably, determining the association between ecological problems and the practice of accounting is complex, specifically because environmental impacts or effects are difficult to measure and control (Mauders, Burritt, 1991). Yet, it is apparent that companies must develop deeper comprehension of the costs and benefits arising from an entity's interaction with the environment (Bartolomeo, 2000)

Consider the going concern assumption of accounting that assumes a business will be in operation in the foreseeable future (IAS 1, 2011). Orthodox accounting methods are unable to provide for potential environmental calamities and their consequent effects on a corporation's capacity to remain in operation as a going concern (Baumol, 1993) The Deepwater Horizon oil spill(or the British Petroleum oil spill) of 2010 for instance, is taken to be the largest accidental oil spill ever to occur in the petroleum sector covering 68,000 square miles of sea (Deepwater Horizon Marine Casualty Investigation Report, 2011).The cost of cleaning up the spill amounted to \$40.9 billion and BP reported a \$5 billion dollar loss during 2010. Though this incidence was an extreme case, companies must be able to use accounting methods to estimate the potential contingencies that may arise from their interaction with the natural ecosystem.

Information relating to the environment can serve both an ex-post and an ex-ante function. When accounting methods are used to identify and provide measures to lessen contingent or future costs that may arise from externalities such as oil spills, emissions of toxic gases into the atmosphere, etc., then such information serves an ex-ante role. On the other hand, if accounting procedures are used to measure the costs incurred as a result of negative environmental activities caused by the entity, then such information is ex-post e.g. carbon taxes incurred as a direct result of air pollution (Mauders, K, et al, 2000).

The origin of environmental accounting (EA) can be traced back to the 1970s following elevated public consciousness regarding the state of the environment (Hecht, 2000). It became clear that financial reports did not provide detailed information related to an organization's interaction with

its surrounding environment. Initially, EA leaned towards public disclosure of environmental information suggesting a bias to financial accounting (Christmann, 2000). Perhaps the reason for the focus on financial reporting was because organizations were anxious to prove their credibility to investors based on environmental-related information disclosed in the financial statements (Medley, 1997).

Management accounting techniques, originally tailored to meet the needs of internal management, failed to incorporate environmental issues embedded within the organization. Thus, EMA was developed out of corporate EA to address the managerial accounting aspects surrounding environmental performance (Debnath, et al, 2012). EMA could now be used by managers of corporations to isolate environmental expenses concealed in accounting systems to achieve cost reductions and ultimately attain an edge over other businesses (Setthasako, 2010). Presently, there is no international agreement or uniform standard that outlines the scope or definition of EMA (Setthasako, 2010). Nevertheless, the United Nations Division for Sustainable Development (UNSD) has published a document providing guidelines for EMA application for national governments interested in environmental accountability (UNSD, 2001). The International Federation of Accountants (IFAC) has also published an international guidance document on EMA outlining the uses and benefits related to the adoption of EMA practices (IFAC, 2005). IFAC (2005) defines EMA as the collection and analysis of two types of information for decision making: Physical information involving the usage of energy, water and materials. Next, monetary information relating environmentally related expenditures and earnings (IFAC, 2005). The latter is accounted for using what is known as monetary environmental management accounting (MEMA) while the former uses physical environmental management accounting (PEMA).

2.5 Critique of existing literature

In opposition of supporters of the stewardship theory, another school of thought known as the criticalists give a different perspective regarding environmental responsibility. Tinker (1991) and Cooper (1992) are of the opinion that any form of EA is a ploy created by supporters of capitalism as a means to ensure an entity seems credible in the public domain. The argument put forward by criticalists is that viewing the environment through the lens of the corporate world

cannot possibly provide a sustainable solution for harboring environmental risks, specifically because doing so is not their main goal. For most businesses, environmental considerations seem to come as an “afterthought” and even entities that use environmental tools to manage environmental performance only do so because it is financially beneficial.

Gray & Bebbington (2000) also share the view that businesses are ill equipped to solve environmental problems because their goals are not oriented towards the protection of the environment. They further stress that including environmental issues into conventional accounting practice may be ineffective in reducing negative environmental externalities. The area of contention stems from the probability that a business may choose to pursue its own objectives at the expense of the natural ecosystem. The arguments put forward by the criticalists seem far removed from the context within which businesses operate. Though businesses must take responsibility for the impact their activities have on the environment, they must still be able to remain competitive. Thus, an entity is likely to consider the costs and financial benefits associated with adopting actions that may lead to improved environmental performance.

2.6 Research gaps

Various scholars have discussed about environmental Management Accounting and how it can be linked to the competitiveness of an organization. However such research has only talked of the competitiveness an organization can get through engaging in environmental management accounting practices. This research focused on measuring the relative advantage of EMA in relation to financial performance established factors influencing adoption of EMA by various manufacturing organizations and above all the motives manufacturing firms have in applying EMA.

2.7 Summary

The adoption of EMA practices has been discussed at length by various researchers. Their studies show that entities can no longer operate without considering the negative externalities of their actions. EMA has been used as a strategic management tool that assists management of corporations in measuring the costs associated with adverse environmental activities. However,

in Kenya the practice has not been standardized by the accounting profession and the methods and techniques of EMA vary across companies. The study aimed at contributing towards existing literature by discovering the factors that influence the varying levels of adoption and to determine if an association exists between the levels of adoption of EMA and the financial performance of manufacturing companies in Kenya.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter will address the procedures that will be undertaken by the researcher in obtaining and analyzing data. The methodology describes the strategy the researcher will use to fulfill the research objectives (Creswell, 2009). The chapter is organized into the following sections; research design, target population, sample size and sampling technique, data collection method and procedure Validity of instruments and data analysis and presentation.

3.1 Research design

Hakim (2000) uses the analogy of an architect designing a building to the process a researcher undergoes when developing the research design best tailored to his or her study. Burns & Grove (2003) use a similar anecdote and suggest that the research design is a blueprint for carrying out research and involves retaining control over elements that may affect the validity of the findings. The researcher will use a mix of descriptive and explanatory research design. The study had both elements of quantitative and qualitative research designs. Due to the time constraints of the researcher, the study was conducted on a cross sectional basis, that is, observations was made at a singular point in time (Saunders et al, 2009).

3.2 Target population

EMA practices have been practiced extensively by manufacturing enterprises (Chang, 2013; Setthasakko, 2010; Khalid, Dixon, 2012). Management accounting practices were originally used by manufacturing companies to improve the efficiency of manufacturing processes and as a tool to aid internal management in making costing, budgeting and investment decisions (Drury, 2007). Prior studies into the adoption of management accounting practices in general, is largely based on manufacturing entities (Alleyne, Weekes-marshall, 2011; Klassenet et al, 2009; Tartu, 2002; Ma, Tayles, 2009). Nonetheless, this is not to say research on management accounting practices must be based exclusively on manufacturing entities, several scholars have also conducted research on the use of management accounting in other sectors (Al-nimer, 2009;

Chang, 2013; Qian et al, 2011). For purposes of this study though, the adoption practices of manufacturing firms was considered.

In Kenya, there is an association of manufacturers known as the Kenya Association of Manufacturers (KAM) that represents the collective interests of manufacturing businesses operating locally. For this study, the population was the members of the Kenya Association of Manufacturers since the organization offers a reliable source of information pertaining to individual member corporations. The total number of manufacturing entities that are members of the KAM located in Nairobi are 400 and thus these members formed the population for the research. A population refers to the entire group of individuals being considered as potential respondents (McBurney & White, 2007). The individual respondents will be made up management accountants since they are responsible for applying EMA practices and are familiar with the methods involved. The managers of manufacturing companies were also respondents since they can give their insights into other factors that may influence the adoption of EMA practices.

3.3 Sample size and sampling technique

Sampling is the process of choosing a representative portion of a population (the sample) for the purpose of predicting the characteristics of the entire population (Cooper, Schindler, 2003). The researcher used purposive sampling to select 40 firms out of the 400 firms which are members of KAM located in Nairobi (10%) best suited to offering deeper insights into the influencing factors surrounding EMA adoption among manufacturing companies. Mugenda and Mugenda (2003) indicated that a sample size of 10% of the population is sufficient sample size for the cross sectional study. Purposive sampling was used to address the qualitative aspects of the research and as such was used to identify potential respondents for the interviewing process.

$n = \text{sample size}$

Therefore, $n = 10/100 * 400$

$n = 40$

3.4 Data collection method and procedure

The data collected comprised of primary data that is both quantitative and qualitative. A mixed methods approach was used meaning both quantitative and qualitative methods of data collection was combined (Saunders et al, 2009). Curran, Blackburn (2001) states that employing multiple methods to gather data offers deeper insights into the area being researched. The results obtained were triangulated. Triangulation refers to the use of wide-ranging data collection methods within one study with the aim of increasing its validity (Yin, 2003).

Bryman (2006) suggests when research is cross sectional and a mixed methods approach is being used, quantitative data should be gathered using semi-structured questionnaires. Qualitative data on the other hand is best collected using semi-structured interviews when carrying out the qualitative section of the study (Bryman, 2006). Thus this study used semi-structured questionnaires to get information from the management accountants and to gather managerial perceptions about other factors that influence the adoption of EMA.

3.5 Validity

The researcher visited company websites and company journals to increase construct validity. To ensure the internal validity of the questionnaire, a pilot test was conducted on the manufacturing companies to gauge the understandability of the questionnaire.

The research focused on a single industry (that is manufacturing industry) analysis to increase internal validity. Ittner et al., (2003) suggested that a single industry analysis has substantially higher internal validity than a cross sectional analysis. Williams and Seaman (2001) found out that determinants of management accounting changes cannot be generalized across manufacturing, industrial and service industries hence the choice for a single industry.

External validity was enhanced through comparison of the findings with those of other researchers and theories of management accounting developed before.

3.6 Data analysis and Presentation

According to Zikmund et al. (2010), data analysis refers to the application of reasoning to understand the data that has been gathered with the aim of determining consistent patterns and summarizing the relevant details revealed in the investigation. According to Hyndman (2008), data processing involves translating the answers on a questionnaire into a form that can be manipulated to produce statistics. This involves coding, editing, data entry, and monitoring the whole data processing procedure. To determine the patterns revealed in the data collected regarding the selected variables, data analysis was guided by the aims and objectives of the research and the measurement of the data collected.

After quantitative data was obtained through questionnaires, it was prepared in readiness for analysis by editing, handling blank responses, coding, categorizing and keyed into statistical package for social sciences (SPSS) 20 computer software for analysis. The choice of SPSS to other statistical software is that it is user friendly.

Descriptive Statistics was used in transforming the raw data into a form that can easily be understood and interpreted. The first form of analysis involved computation of averages, frequency distributions and percentage distributions (Adejimi, Oyediran and Ogunsanmi , 2011). Descriptive statistics such as, mean and frequencies was used to perform data analysis. Descriptive statistics was used to derive conclusions and generalizations regarding the population. The mean scores was used to rate the factors financial value of EMA , financial status ,staff knowledge and policy guidelines in order of their importance. Standard deviation of each of the factors was calculated to measure the variability of the responses.

The study used Pearson Correlation Coefficient to test the relationship between individual independent and the dependent variable.

Correlation coefficient values ranging between -1 and 1 measures the degree to which two variables are linearly related with the higher magnitude indicating higher degree of association between two variables. Adejimi, Oyediran and Ogunsanmi (2011) observed that a correlation coefficient of magnitude 0.3–0.5 shows a medium linear dependence between two variables while 0.5 to 1.0 shows a strong linear dependence. According to Castillo (2009), critical values

for the correlation coefficient, using 122 degrees of freedom a critical value for correlation coefficient is 0.178 at 0.05 error margin.

Descriptive statistics was used and consisted of frequency distributions, measures of central tendency (arithmetic mean, median, and mode) and regression model was used to test the hypothesis (Smith, Thorge and Love, 1999).

The regression model helps to explain the magnitude and direction of relationship between the variables of the study through the use of coefficients like the beta coefficient and the level of significance.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu$$

Where: Y= adoption of EMA

x_1= financial value

x_2= financial status

x_3= staff knowledge

x_4= Policy guidelines

β_0 =Intercept, β_1 =Coefficient, β_2 =Coefficient, ϵ = Error term

In the model, β_0 = the constant term while the coefficient $\beta_i = 1 \dots 4$ will be used to measure the sensitivity of the dependent variable (Y) to unit change in the predictor variables X1, X2, X3 and X4. μ is the error term which captures the unexplained variations in the model. The sign of the regression coefficient will indicate whether the relationship is positive or negative. The strength of the relationship will be measured by the reported p values. A p value of less than 0.05 will indicate that a relationship is strong or significant.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

This chapter comprises of data analysis, findings and interpretation. Results are presented in tables and diagrams. The analyzed data was arranged under themes that reflect the research objectives.

4.1 Response Rate

The number of questionnaires that were administered was 40. A total of 36 questionnaires were properly filled and returned. This represented an overall successful response rate of 85% as shown on Table 4.1. According to Mugenda and Mugenda (2003) and also Kothari (2004) a response rate of 50% is adequate for a descriptive study. Babbie (2004) also asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good. Based on these assertions from renowned scholars 80 % response rate is adequate for the study.

Table 4.1: Response Rate

Response	Frequency	Percent
Returned	36	85%
Unreturned	4	15%
Total	40	100%

4.2 Reliability

The cronbach alpha was calculated in a bid to measure the reliability of the questionnaire. This was done by subjecting the 4 questionnaires to 4 management accountants that were randomly selected. All the variables were reliable since their cronbach alpha was above 0.7 which was used as a cut-off of reliability for the study. Table 4.2 shows the reliability results.

Table 4.2: Reliability

Variable	No of Items	Respondents	α =Alpha	Comment
Financial value of EMA	4	4	0.743	Reliable
Financial Status of the manufacturing company	4	4	0.932	Reliable
Staff Knowledge of EMA	4	4	0.894	Reliable
Policy guidelines	4	4	0.762	Reliable
Adoption of Environmental Management Accounting (EMA) practices	4	4	0.749	Reliable

4.3 Background information

4.3.1 Classification of the Company

The respondents were asked specify on the type of company classification. Majority of the respondents 64.7% indicated that theirs was a medium company while 20.6% indicated that it was small while finally 14.7% indicated that it was a large company.

Table: 4.3 Classification of the Company

	Frequency	Percent
Small	7	20.6
Medium	22	64.7
Large	5	14.7
Total	34	100

4.3.2 Subsector of the Manufacturing Industry

The respondents were asked to identify the subsector of the Manufacturing Industry of their company. Majority of the respondents 20.6% indicated that it was Plastics & Rubber industry, 11.8% indicated that it was Food, Beverages & industry. Majority of the respondents 2.9 % indicated that it was Textiles & Garments industry while Majority of the respondents 11.8% indicated that it was Metal & Allied industry, 8.8% of the respondents indicated that it was Paper and Paperboard, 5.9% indicated that it was Timber & Products,14.7% indicated that it was

Building & Construction 5.9% indicated that it was Pharmaceutical & Medical equipment while further a majority of the respondents 2.9% indicated that it was Electrical & Electronics. Finally, Majority of the respondents 14.7% indicated that it was Chemical & Allied.

Table: 4.4 Subsector of the Manufacturing Industry

	Frequency	Percent
Food, Beverages & Tobacco	4	11.8
Textiles & Garments	1	2.9
Metal & Allied	4	11.8
Paper and Paperboard	3	8.8
Timber & Products	2	5.9
Building & Construction	5	14.7
Plastics & Rubber	7	20.6
Pharmaceutical & Medical equipment	2	5.9
Electrical & Electronics	1	2.9
Chemical & Allied	5	14.7
Total	34	100

4.3.3 Does your company use EMA?

The respondents were asked to indicate if their company used **EMA**. Majority of the respondents 85% indicated that the company did not use EMA while a majority of 15% indicated that the company had not adopted EMA.

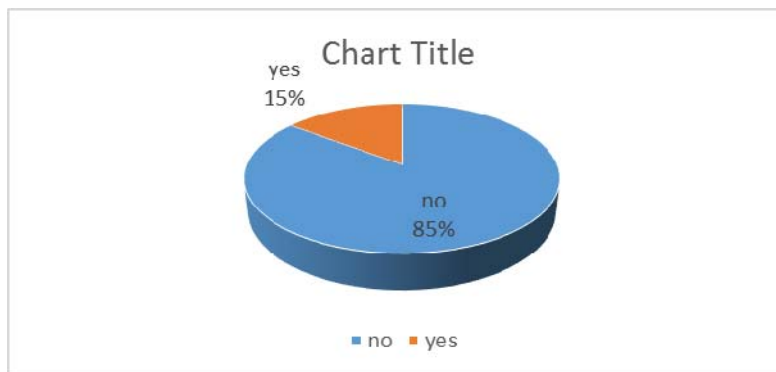


Figure 4.3 Company EMA Usage

The study sought to establish the the influence of financial value of EMA in adoption of environmental management accounting (EMA) practices among manufacturing firms in Kenya. The responses were rated on a likert scale and the results presented in Table 4.5 below. A majority of 70.6 % of the respondents disagreed on the statement that adoption of EMA led to reduction in operational costs in adoption of environmental management accounting (EMA) practices among manufacturing firms in Kenya, 91.1% disagreed on the statement that adoption of EMA led to improved company reputation, 73.6% of the respondents disagreed that adoption of EMA led to Business process innovation while 73.5% disagreed that adoption of EMA led to enhanced product pricing decisions. On a five-point scale, the average mean of the responses was 1.8 which means that majority of the respondents were disagreeing to the statements in the questionnaire; however, the answers were varied as shown by a standard deviation of 1.0.

This results are not consistent with those of the U.S. Environmental Protection Agency (1995, p. 18), “An important function of environmental accounting is to bring environmental costs to the attention of corporate stakeholders who may be able and motivated to identify ways of reducing or avoiding those costs while, at the same time, improving environmental quality.” It has long been recognized that businesses affect the environment by their use of raw materials, intermediate products, and energy, as well as by their production of products and wastes. The consumption of materials and utilities, and the generation of wastes, represent significant costs that are paid for directly by the company.

Table: 4.5 Financial value of EMA

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
Adoption of EMA leads to reduction in operational costs	38.2%	32.4 %	17.6 %	8.8 %	2.9%	2.1	1.1

Adoption of EMA leads to improved company reputation	52.9%	38.2 %	8.8 %	0.0 %	0.0%	1.6	0.7
Adoption of EMA leads to Business process innovation	41.2%	32.4 %	20.6 %	2.9 %	2.9%	1.9	1.0
Adoption of EMA leads to enhanced product pricing decisions	52.9%	20.6 %	20.6 %	2.9 %	2.9%	1.8	1.1
Average						1.8	1.0

4.4 Section C: Financial Status of the Manufacturing Company

4.4.1 What was the company's financial performance for the last financial year?

The respondents were asked to comment on the company's financial performance for the last financial year. Majority of the respondents 70.6% indicated that the company had made a loss while a majority of 20.6% indicated that the company had made profit while finally 8.8% the respondents were neutral on the company's financial performance for the last financial year.

Table: 4.6 Company's Financial Performance for The Last Financial Year

	Frequency	Percent
loss	24	70.6
neutral	3	8.8
profit	7	20.6
Total	34	100

4.4.2 How was the financial performance of your company for last five (5) year

The respondents were asked to describe the financial performance of their company for the last five (5) year. Majority of the respondents 50% indicated that the financial performance of their

company was improving while a majority of 38.2 %indicated that the financial performance of their company was declining while 11.8% indicated that it was stable.

Table: 4.7 Company’s Financial Performance for The Last (5) Years

Company’s Financial Performance	Frequency	Percent
Declining	13	38.2
Improving	17	50
Stable	4	11.8
Total	34	100

The study sought to establish the influence of the financial status of the manufacturing company on environmental management accounting (EMA) practices among manufacturing firms in Kenya. The responses were rated on a likert scale and the results presented in Table 4.8 below. A majority of 50% of the respondents disagreed that adoption of EMA had improved the profitability of their company, 76.5% of the respondents disagreed that financial loss in their company would not deter them from using EMA, while 73.5% of the respondents agreed that their company easily afforded the cost of EMA ,while 82.4% agreed that their company usually allocated resources to run EMA in annual budgets. On a five point scale, the average mean of the responses was 1.54 which means that majority of the respondents were agreeing to the statements in the questionnaire; however, the answers were varied as shown by a standard deviation of 1.01.

These findings agree with those of (Wagner et al, 2002; Gilley et al, 2000; Qian, 2012) who found out that a negative relationship exists between environmental management and economic performance or derived inconclusive results about the nature of the relationship between the two

variables. Environmental performance may be measured based on factors such as the quantity of water or energy used, amount of permitted air emissions, the level of toxic substances released into the atmosphere etc. Financial performance can be quantified using measures such as financial ratios, specifically Return on Assets ratio (ROA), Return on Equity (ROE) and profitability ratios (Wagner et al, 2002)

Table: 4.8: Financial Status of the manufacturing company

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
Adoption of EMA has improved the profitability of our company	14.7%	35.3%	38.2%	5.9%	5.9%	2.53	1.02
A financial loss in our company will not deter us from using EMA	44.1%	32.4%	8.8%	14.7%	0.0%	1.94	1.07
Our company easily affords the cost of EMA	38.2%	35.3%	11.8%	11.8%	2.9%	2.06	1.13
Our company usually allocates resources to run EMA in annual budgets	50.0%	32.4%	14.7%	2.9%	0.0%	1.71	0.84
Average						1.54	1.01

4.5 Staff Knowledge

4.5.1 Is the knowledge of EMA fundamental to each employee in the organization?

The respondents were asked to identify if the knowledge of EMA to each employee in the organization was fundamental. Majority of the respondent 75% agreed that knowledge of EMA was fundamental to each employee in the organization while 25% disagreed.

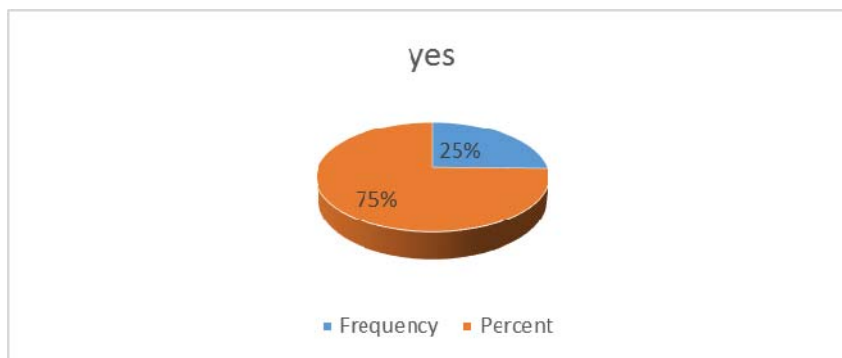


Figure 4.4 Knowledge of EMA Fundamentality

The respondents were also asked to identify the process in which fundamental knowledge of EMA was attained in their organization. A majority of 41.2% of the respondents attained it through both internal and external training, while 32.4% of the respondents attained it through internal training while 26.5% was through external training.

Table: 4.9: EMA fundamental knowledge acquisition

EMA Fundamental Knowledge Acquisition	Frequency	Percent
Internal Training	11	32.4
External Training	9	26.5
Both Internal And External Training	14	41.2
Total	34	100

The study sought to establish the influence of staff knowledge of EMA on environmental management accounting (EMA) practices among manufacturing firms in Kenya. The responses were rated on a likert scale and the results presented in Table 4.10 below. A majority of 85.3% of the respondents disagreed that knowledge of EMA was important in product pricing, 76.5% of the respondents disagreed that knowledge of EMA was important in investment appraisals, 73.5% of the respondents disagreed that the knowledge of EMA was important in Budgeting, while finally 82.4% of the respondents agreed that the knowledge of EMA was important in Design of management systems. On a fivepoint scale, the average mean of the responses was 1.8 which means that majority of the respondents were agreeing to the statements in the questionnaire; however, the answers were varied as shown by a standard deviation of 0.9. These findings agree with those of IFAC (2005) who explain further break down environmental costs into six main classes of costs namely waste and emission control costs, material costs of product outputs, prevention and environmental management costs, research and development costs etc. These outlays include acquisition costs of natural resources that are converted into products, the costs of curbing waste and emissions, research and development costs incurred to create cleaner processes, less tangible costs such as contingent liabilities arising from future environmental activities and forthcoming regulations among others.

Table: 4.10: Staff Knowledge

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Deviation
The knowledge of EMA is important in product pricing	50.0%	35.3%	14.7%	0.0%	0.0%	1.7	0.7
The knowledge of EMA is important in investment appraisals	35.3%	32.4%	29.4%	2.9%	0.0%	2.0	0.9
The knowledge of EMA is important in Budgeting	52.9%	38.2%	5.9%	2.9%	0.0%	1.6	0.7
The knowledge of EMA is important in Design of management systems	38.2%	26.5%	26.5%	5.9%	2.9%	2.1	1.1
Average						1.8	0.9

4.6 Section E: Policy Guidelines

4.6.1 Are there any challenges your company has experienced when adopting EMA practices?

The respondents were asked to identify any challenges their company had experienced when adopting EMA practices. Majority of the respondent 62% agreed that their company had experienced challenges when adopting EMA practices while 38% disagreed.

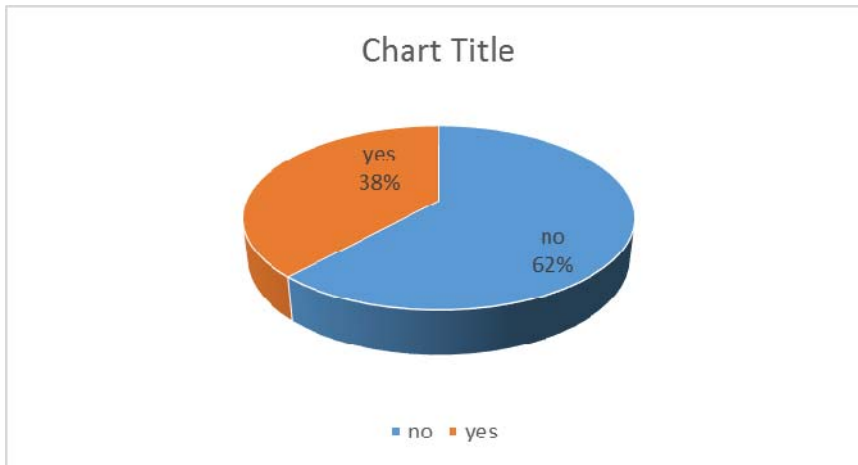


Figure 4.5 Challenges Company Experienced when Adopting EMA Practices

4.6.2 Do you think the adoption of EMA should be made compulsory for all manufacturing companies?

The respondents were asked to respond to the query that adoption of EMA should be made compulsory for all manufacturing companies. Majority of the respondent 62% agreed that adoption of EMA should be made compulsory for all manufacturing companies while 32% disagreed.

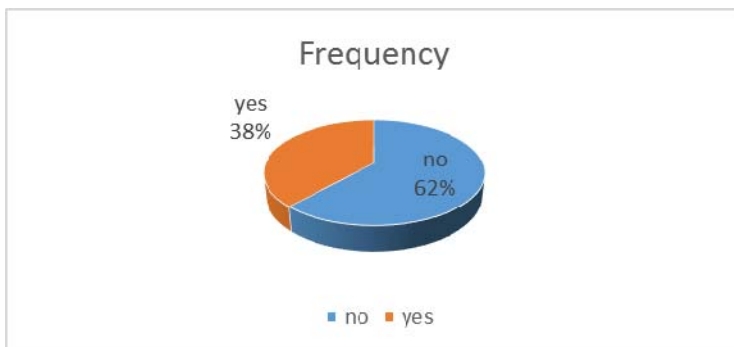


Figure 4.6 EMA Compulsory Policy

The study sought to establish the influence of policy guidelines on environmental management accounting (EMA) practices among manufacturing firms in Kenya. The responses were rated on a likert scale and the results presented in Table 4.11 below. A majority of 76.5% of the respondents disagreed that their company had written manuals on the adoption and implementation of EMA , 82.3% of the respondents disagreed that adoption of EMA in their

company had full support of top management , 73.6% of the respondents agreed that all their employee had been given awareness on the EMA while finally 79.4 % of the respondents agreed that the adoption of EMA in their company was based on the best practices which were consistently applied. On a five point scale, the average mean of the responses was 1.9 which means that majority of the respondents were agreeing to the statements in the questionnaire; however the answers were varied as shown by a standard deviation of 0.9.

These findings agree with those of Chang, 2007; Olson, jon,(2008); Wabuyi, (2009). EMA practices are not practiced evenly across manufacturing businesses but previous studies have identified similar methods used by businesses that have adopted EMA practices. Firstly, for costing analysis, life cycle assessment (LCA) has been used to identify the environmental effects associated with the production of goods across their entire life cycles.

Table: 4.11: Policy Guidelines

STATEMENTS	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
Our company has written manuals on the adoption and implementation of EMA	50.0%	26.5%	14.7%	5.9%	2.9%	1.9	1.1
The adoption of EMA in our company has full support of top management	38.2%	44.1%	11.8%	0.0%	5.9%	1.9	1.0
All our employee are have been given awareness on the EMA practices in the company	47.1%	26.5%	17.6%	8.8%	0.0%	1.9	1.0
The adoption of EMA in our company is based on the best practices which are consistently applied	41.2%	38.2%	14.7%	5.9%	0.0%	1.9	0.9

4.7 Adoption of Environmental Management Accounting Practices.

4.7.1 Length Company Has Been Using (EMA) Practices

The respondents were asked to indicate the length company had been using (EMA) practices. Majority of the respondent 50% indicated that their company had been using (EMA) Practices for less than five years, 35.3% indicated that their company had been using (EMA) Practices for 10-20 Years while 11.8 % indicated that their company had been using (EMA) Practices for 4 years finally 2.9% indicated that their company had been using (EMA) Practices for one year.

Length Company Has Been Using (EMA) Practices.

Table: 4.12: Length Company Has Been Using (EMA) Practices

Length Company Has Been Using (EMA) Practices	Frequency	Percent
Less Than Five Years	17	50
10-20 Years	12	35.3
5-10 Years	4	11.8
Over 30 Years	1	2.9
Total	34	100

4.7.2 Adoption of Environmental Management Accounting (EMA) practices

Expenditures in relation to environmental degradation and preservation are called environmental costs. Below is a list of the various classes of environmental costs. The respondents were kindly asked to indicate those that were separately accounted for by their company. They were to tick where appropriate. Majority of the respondents 88.2 % indicated that it was External-services costs, majority of the respondents 64.7 % indicated that it was environmental-license class, majority of the respondents 44.1%% indicated that it auxiliary-materials costs, majority of the respondents 44.1% indicated that it was Maintenance costs, majority of the respondents 82.4%indicated that it was Waste-disposal costs majority of the respondents 14.7% indicated that it was Waste-prevention costs, majority of the respondents 58.8%indicated that it was Raw-materials cost, majority of the respondents 58.8% indicated that it was Fines-and-penalties costs, Majority of the respondents 55.9%% indicated that it was Research-expenditures costs. Finally, Majority of the respondents 5.9indicated that it was Others.

Table: 4.13: Adoption of Environmental Management Accounting (EMA) practices

Adoption of Environmental Management Accounting (EMA) practices	No	Yes
External-Services	88.2%	11.8%
Environmental-License	64.7%	35.3%
Auxiliary-Materials	50.0%	50.0%
Maintenance	44.1%	55.9%
Waste-Disposal	82.4%	17.6%
Waste-Prevention	64.7%	35.3%
Raw-Materials	58.8%	41.2%
Fines-And-Penalties	29.4%	70.6%
Research-Expenditures	55.9%	44.1%
Others	5.9%	94.1%

The respondents were requested to indicate by ticking the extent to which they agreed with the following statements. The responses were rated on a likert scale and the results presented in Table 4;13 below. A majority of 85.3 % of the respondents disagreed on the comment that their company voluntarily decided to adopt EMA, 82.4% disagreed that he government should not intervene in the adoption of EMA, 61.8% of the respondents agreed that their company had

adopted EMA in all aspects of its operations while finally 79.5 % agreed that their company had a clear policy on implementation of EMA. On a five-point scale, the average mean of the responses was 1.9 which means that majority of the respondents were agreeing to the statements in the questionnaire; however, the answers were varied as shown by a standard deviation of 1.0. These findings agree with those Chang (2007), conventional management accounting techniques are inadequately designed to assimilate environmental-related information such as environmental costs into accounting systems. However, organizations that have adopted EMA practices still use common management accounting techniques such as full cost accounting (FCA), life cycle assessment (LCA) and activity based costing (ABC) to measure both current and potential environmental costs. LCA for example, was originally designed to determine the actual costs of a product throughout its life cycle. In the same way, LCA can be used to establish specific environmental externalities associated with producing a product (during its entire life) such as water effluents, air emissions etc. This information can then be utilized by management to reduce the deteriorating effects such production has on the environment

Table: 4.14: Adoption of Environmental Management Accounting (EMA) practices

Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly agree	Mean	Std. Dev
Our company voluntarily decided to adopt EMA	58.8%	26.5%	11.8%	2.9%	0.0%	1.6	0.8
I think the government should not intervene in the adoption of EMA	47.1%	35.3%	11.8%	2.9%	2.9%	1.8	1.0
Our company has adopted EMA in all aspects of its operations	32.4%	29.4%	23.5%	14.7%	0.0%	2.2	1.1
Our company has a clear policy on implementation of EMA	47.1%	32.4%	5.9%	11.8%	2.9%	1.9	1.1
Average						1.9	1.0

4.7 Inferential Statistics

Inferential analysis was conducted to generate correlation results, model of fitness, and analysis of the variance and regression coefficients.

4.5.1 Correlation Analysis

The Table 4.15 presents the results of the correlation analysis. The results show that Financial Value and Adoption of EMA are positively and significant related ($r=0.354$, $p=0.04$). The results further indicate that Financial Status and Adoption of EMA are positively and significant related

($r=0.256$, $p=0.019$). It was further established that Staff Knowledge were positively and significantly related to Adoption of EMA ($r=0.378$, $p=.000$). Similarly, results showed that Policy Guidelines and positively and significantly related to Adoption of EMA ($r=0.243$, $p=.026$).

These findings are consistent with those Research studies such as those carried out by Burritt & Saka(2006); Masanet-LLodra(2006); Ferreira, Moulang, & Hendro(2010) have shown that there are multiple advantages accruing to organizations that apply EMA. For instance, a positive association was discovered between the use of EMA and process modernization implying that firms that have implemented EMA are likely to have modified production processes and ultimately lower costs of production (e.g. reduced input expenses resulting from recycling of raw materials) (Masanet-LLodra, 2006; Porter & Esty, 1998).Moreover, Hart & Ahuja (1996) concluded that environmental accounting practices such as EMA have a positive influence on the economic performance of companies.

Table 4.15: Correlation Analysis

Variable		Financial Value	Financial Status	Staff Knowledge	Policy Guidelines	Adoption Of EMA
Financial Value	Pearson Correlation	1	.516**	0.307	.376*	.354*
	Sig. (2-tailed)		0.002	0.077	0.029	0.04
Financial Status	Pearson Correlation	.516**	1	.584**	.844**	.805**
	Sig. (2-tailed)	0.002		0	0	0.00
Staff Knowledge	Pearson Correlation	0.307	.584**	1	.671**	.610**
	Sig. (2-tailed)	0.077	0		0	0.00
Policy Guidelines	Pearson Correlation	.376*	.844**	.671**	1	.772**
	Sig. (2-tailed)	0.029	0	0		0.00
Adoption of EMA	Pearson Correlation	.354*	.805**	.610**	.772**	1
	Sig. (2-tailed)	0.04	0	0	0	

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

4.5.2 Regression Analysis

The results presented in table 4.16 present the fitness of model used of the regression model in explaining the study phenomena. Financial value financial status, staff knowledge and policy guidelines were found to be satisfactory variables in explaining organization performance. This is supported by coefficient of determination also known as the R square of 69.3%. This means financial value financial status, staff knowledge and policy guidelines explains 69.3%. of the

variations in the dependent variable which is Adoption of EMA. This results further means that the model applied to link the relationship of the variables was satisfactory.

Table 4.16: Model Fitness

Indicator	Coefficient
R	0.832
R Square	0.693
Adjusted R Square	0.650
Std. Error of the Estimate	0.440

In statistics significance testing the p-value indicates the level of relation of the independent variable to the dependent variable. If the significance number found is less than the critical value also known as the probability value (p) which is statistically set at 0.05, then the conclusion would be that the model is significant in explaining the relationship; else the model would be regarded as non-significant.

Table 4.17 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant. Further, the results imply that the independent variables are good predictors of performance. This was supported by an F statistic of 16.346 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level.

Table 4.17: Analysis of Variance

	Sum of Squares	df	Mean Square	F	Sig.
Regression	12.664	4	3.166	16.346	0.000
Residual	5.617	29	0.194		
Total	18.281	33			

Regression of coefficients results in table 4.18 shows that show that Financial Value and Adoption of EMA are positively and insignificant related ($r=0.079$., $p=0.583$). The results further

indicate that Financial Status and Adoption of EMA are positively and significant related ($r=0.652$ $p=0.011$). It was further established that Staff Knowledge were positively and significantly related to Adoption of EMA ($r=0.203$, $p=0.027$). Similarly, results showed that Policy Guidelines and positively and insignificantly related to Adoption of EMA ($r=0.192$, $p=0.33$)

Table 4.18: Regression of Coefficient

	B	Std. Error	Beta	t	Sig.
(Constant)	-0.053	0.323		-0.163	0.871
Financial Value	0.079	0.142	-0.067	-0.556	0.583
Financial Status	0.652	0.239	0.57	2.721	0.011
Staff Knowledge	0.203	0.182	0.156	2.118	0.027
Policy Guidelines	0.192	0.193	0.211	0.99	0.33

The specific model was;

$$\text{Adoption of Environmental Management Accounting} = -0.053 + 0.079x_1 + 0.652x_2 + 0.203x_3 + 0.192x_4$$

Where;

X1 = Financial Value

X2 = Financial Status

X3 = Staff Knowledge

X4= Policy Guidelines

4.6 Discussion of the findings

4.6.1 Financial Value

Regression of coefficients results in table 4.18 shows that Financial Value and Adoption of EMA are positively and insignificant related ($r=0.079$, $p=0.583$). Some of the empirical studies supporting our findings include (Bennett, James, 2000).Ferrari, Parker (2006) who found that process innovation contributes considerably to competitive advantage for manufacturing entities. Other potential benefits associated with EMA use are improvements in reputation, attraction of human resources and operational cost reductions (Based on these studies it seems that a firm's strategy may influence the level of adoption of EMA practices. companies that do not employ the use of EMA but use low cost strategies (reactive), could lose out on cost savings that can be achieved through modified processes such as recycling of raw materials to minimize costs arising from waste disposal (Burritt et al, 2002; Hansen, Mowen, 2005).

4.6.2 Financial Status

The regression results revealed that the results further indicate that Financial Status and Adoption of EMA are positively and significant related ($r=0.652$ $p=0.011$). This means that a unitary increase in the Financial Status leads to an increase in Adoption of EMA by 0.652 times. Some of the empirical studies supporting our findings include. (Porter, Van der Linde, 1995)who argue out that nevertheless, prior literature has also attempted to show that a positive relationship exists between environmental performance and financial performance (Mir, Rahaman, 2010). Judge, Douglas (1999) found that corporate entities that incorporated environmental issues into their strategic planning found that doing so had a positive effect on financial performance. Sharma & Vrendenburg (1998) also found that proactive environmental practices positively influenced financial performance. The conclusions of the study can be summarized into two main arguments.

Firstly, manufacturing organizations incur higher environmental costs and as a result they have an incentive to look for production processes that may reduce environmental expenditures. Furthermore, by investing in cleaner modes of production, the firm is able to stay ahead of the competition, that is, to sustain competitive advantage. The capability to innovate and discover

new methods and/or technologies for greener production establish an entity's competitiveness in the long run.

4.6.3 Staff Knowledge

The regression results revealed that It was further established that Staff Knowledge were positively and significantly related to Adoption of EMA ($r=0.203$, $p=0.027$) This means that a unitary increase in the Staff Knowledge leads to an increase in Adoption of EMA by 0.203 times. Some of the empirical studies supporting our findings include (Bartolomeo, et al., (2000) emphasize on the importance of understanding environmental costs since they directly affect firm profitability especially for manufacturing corporations since their activities significantly affect the environment. Conventional cost accounting does not separate environmental costs from non-environmental costs and as such, both may be recorded as general expenses. This means that environmental costs remain hidden from internal management which hinders effective decision making (Bennett, et al., 2004). Using EMA to account for environmental costs can be used by managers in decisions such as product pricing, budgeting, investment appraisal, design of environmental management systems, etc. (UNSD, 2001).

4.6.4 Policy Guidelines

The regression results revealed, that policy Guidelines and positively and insignificantly related to Adoption of EMA ($r=0.243$, $p=0.33$) Some of the empirical studies supporting our findings include cycles (Chang, 2007; Olson, Jon, 2008; Wabuyi, 2009) who argue that EMA practices are not practiced evenly across manufacturing businesses but previous studies have identified similar methods used by businesses that have adopted EMA practices. Firstly, for costing analysis, life cycle assessment (LCA) has been used to identify the environmental effects associated with the production of goods across their entire life Hence there is consensus that lifecycle costing is one of the main methods that is used in EMA. Activity Based Costing (ABC) is another technique used to separate environmental costs from general operational costs. Essentially, ABC is used to identify and assign environmental costs to cost centers. The allocation of environmental costs is based on the activities that caused the costs, hence internal management is able to understand the specific product lines and/or production processes that

incur the highest amounts of environmental expenditures (Ratnatunga & Balachandran, 2008; Holst, 1996; Schaltegger, Hahn & Burritt, 2000).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter addresses the summary of the findings, the conclusions and the recommendations. This is done in line with the objectives of the study.

5.2 Summary of Findings

This section provides a summary of the findings from the analysis. This is done in line with the objectives of the study.

5.2.1 Influence of Financial Value on Adoption of Environmental Management Accounting (EMA) Practices Among Manufacturing Firms in Kenya.

The findings from the regression results revealed that Financial Value has a positive and insignificant effect on the Adoption of Environmental Management Accounting (EMA) Practices Among Manufacturing Firms in Kenya. This is also supported by the majority of respondents who responded that in their opinion Financial Value Influences Adoption of Environmental Management Accounting (EMA) Practices among Manufacturing Firms in Kenya.

5.2.2 Influence of Financial Status of on Adoption of Environmental Management Accounting (EMA) Practices Among Manufacturing Firms in Kenya

The study found out that Financial Status has a positive and significant effect on Adoption of Environmental Management Accounting (EMA) Practices among Manufacturing Firms in Kenya. This means that an improvement in Financial Status by one unit leads to an increase Adoption of Environmental Management Accounting (EMA) Practices among Manufacturing Firms in Kenya.

This means that adoption of EMA improves the profitability of company, a financial loss in company will not deter a company from using EMA, the company easily affords the cost of EMA and company usually allocate resources to run EMA in annual budgets.

5.2.3 Influence of Staff Knowledge on Adoption of Environmental Management Accounting (EMA) Practices among Manufacturing Firms in Kenya

The regression model indicated that Staff Knowledge has a positive and significant effect on Adoption of Environmental Management Accounting (EMA) Practices. This is also supported by majority of the respondents who agreed with most of the statements in the questionnaire.

This means that an improvement in Staff Knowledge by one unit leads to an increase Adoption of Environmental Management Accounting (EMA) Practices Among Manufacturing Firms in Kenya.

This implies that the knowledge of EMA is important in product pricing knowledge of EMA is important in investment appraisals, knowledge of EMA is important in Budgeting, and finally knowledge of EMA is important in Design of management systems.

5.2.4 Influence of Policy guidelines on Adoption of Environmental Management Accounting (EMA) Practices among Manufacturing Firms in Kenya

The regression results revealed that Policy guidelines have a positive and insignificant effect on adoption of Environmental Management Accounting (EMA) Practices. Our company has written manuals on the adoption and implementation of EMA This implies that adoption of EMA in company has full support of top management, employee have been given awareness on the EMA practices in the company and adoption of EMA in a company is based on the best practices which are consistently applied.

5.3 Conclusions

The objective of this research was to examine factors influencing adoption of environmental management accounting (EMA) practices among manufacturing firms in Kenya.

Based on the findings above the study concluded the findings from the regression results revealed that Financial Value has a positive and insignificant effect on the Adoption of Environmental Management Accounting (EMA) Practices Among Manufacturing Firms in Kenya. The study found out that Financial Status has a positive and significant effect on Adoption of Environmental Management Accounting (EMA) Practices among Manufacturing Firms in Kenya. The regression model indicated that Staff Knowledge has a positive and

significant effect on Adoption of Environmental Management Accounting (EMA) Practices. The regression results revealed that Policy guidelines have a positive and insignificant effect on adoption of Environmental Management Accounting (EMA) Practices. The regression results revealed that Policy guidelines have a positive and insignificant effect on adoption of Environmental Management Accounting (EMA) Practices.

5.4 Recommendations

The recommendations were presented based on objectives

5.4.1 Financial value

Based on the findings and conclusion, the study recommends that though financial value can have a positive effect, it does not need to increase beyond a certain limit since it can sometimes come with a disadvantage. For instance, companies might increase EMA practices but that does not necessarily mean that financial value will as per the unitary increase. That means increase in financial value should be up to the optimum and those resources be diverted to other sectors of the company.

5.4.2 Financial Status

A company should always encourage EMA practices consistently. This is because continuous adoption of EMA leads to increased financial status thus promoting the company's portfolio image.

5.4.3 Staff Knowledge

This study shows that there is a significant relationship between Staff Knowledge and Adoption of Environmental Management Accounting (EMA) Practices. The study recommends that and company n should witness an improvement in staff training both internal and external to raise the knowledge levels of EMA practices

The study further suggests that Using EMA to account for environmental costs can be used by managers in decisions such as product pricing, budgeting, investment appraisal, design of environmental management systems, etc.

5.4.4 Policy guidelines

This study shows that there is a significant relationship between Policy guidelines and Adoption of Environmental Management Accounting (EMA) Practices. The study recommends for a change in policy direction and possibly adapt to Activity Based Costing (ABC) which is a r technique used to separate environmental costs from general operational costs. ABC will be used to identify and assign environmental costs to cost centers. The allocation of environmental costs is based on the activities that caused the costs; hence internal management is able to understand the specific product lines and/or production processes that incur the highest amounts of environmental expenditures

5.5 Areas for further Research

The study sought to find the influence of financial value, financial status, staff knowledge and policy guidelines on Adoption of Environmental Management Accounting (EMA) Practices. This called for the analysis of manufacturing companies, thus area for further studies could consider the same study to be conducted on government corporations such as Kenya power or national oil whose activities would really need for Adoption of Environmental Management Accounting (EMA) Practices.

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APPENDICES

Appendix 1 - Classes of environmental costs

Category

- | | |
|--|---------------------------------------|
| 1. Materials costs of product outputs | Raw and auxiliary materials |
| | Packaging materials |
| | Water |
| 2. Materials costs of non-product outputs | Raw and auxiliary materials |
| | Packaging materials |
| | Operating materials |
| | Water |
| | Energy |
| 3. Waste and emissions control costs | Equipment depreciation |
| | Operating materials |
| | Water and Energy |
| | Fees, taxes and permits/licenses |
| | Insurance |
| 4. Preventive and other environmental management costs | Equipment depreciation |
| | Operating materials |
| | External services (e.g. consultation) |

5. Research and Development costs

Research on potential toxicity of raw materials used, production processes, etc.

Research on the development of energy efficient products

6. Less tangible costs

Clean up costs

Legal costs

Non-compliance fines

Property damage

Personal injury

Modified from IFAC (2005)

Appendix 2 - Subsectors within Kenya's manufacturing industry

	Food, Beverages & Tobacco		Building & Construction
	Textiles & Garments		Plastics & Rubber
	Metal & Allied		Pharmaceutical & Medical equipment
	Leather products & Footwear		Motor vehicle assembly
	Paper and Paperboard		Electrical & Electronics
	Timber & Products		Chemical & Allied

Appendix 3- Classification of Kenyan manufacturing companies based on size

Class	Number of employees
A	5-19
B	20-49
C	50-99
D	100-199
E	200-499
F	Over 500

Source: Kenya Directory of Manufactures Industries, 3rd Ed. 1997.

Appendix 4: Introduction letter

William Lekimankusi Ntalamia

P.O Box 104859 – 00101

Nairobi, Kenya

Dear respondent

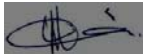
RE: ACADEMIC RESEARCH

I am a student at Jomo Kenyatta University of Agriculture and Technology pursuing a Master degree in Business Administration (Finance Option). As a partial fulfilment for the requirement of the degree of Master of Business Administration (Finance Option), I am to undertake an academic research on the **Factors influencing adoption of Environmental Management Accounting (EMA) practices among manufacturing firms Located in Nairobi, Kenya.**

Please respond to questions in this questionnaire with honesty. All answers will be used for academic purpose only any information obtained will be treated confidential. Thanks in advance.

N/B: EMA is concerned with the accounting information needs of managers in relation to corporate activities that affect the environment as well as the environment-related impacts on the corporation. It is an area that has developed over decades to try to link to innovative strategies and corporations have also used it as an environmental performance indicator (EPI) to measure environmental performance.

Yours faithfully,



William Lekimankusi Ntalamia

Appendix 5: Questionnaire

Section A: Background information

1. In which year did your company commence operations?
2. How can you classify your company in the manufacturing sector in term of size?
 - Small
 - Medium
 - Large

3. What subsector of the manufacturing industry does your company belong to? Tick where appropriate.

Food, Beverages & Tobacco	
Building & Construction	
<input type="checkbox"/>	Textiles & Garments
<input type="checkbox"/>	Plastics & Rubber
<input type="checkbox"/>	Metal & Allied
<input type="checkbox"/>	Pharmaceutical & Medical equipment
<input type="checkbox"/>	Leather products & Footwear
<input type="checkbox"/>	Motor vehicle assembly
<input type="checkbox"/>	Paper and Paperboard
<input type="checkbox"/>	Electrical & Electronics
<input type="checkbox"/>	Timber & Products
<input type="checkbox"/>	Chemical & Allied

4. Does your company use Environmental Management Accounting (EMA)?
 - Yes
 - No

Section B: Financial value of EMA

5. Indicate by ticking the extent to which you agree with the following statements.
Use the following likert scale; Strongly Agree=5, Agree=4, Neutral=3, Disagree=3, Strongly Disagree-1

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Adoption of EMA leads to reduction in operational costs					
Adoption of EMA leads to improved company reputation					
Adoption of EMA leads to Business process innovation					
Adoption of EMA leads to enhanced product pricing decisions					

Section C: Financial Status of the manufacturing company

6. What was the company's financial performance for the last financial year?

- Profit
- Loss
- Neutral

7. How was the financial performance of your company for last five (5) year?

- Stable
- Improving
- Declining

8. Indicate by ticking the extent to which you agree with the following statements.

Use the following likert scale; Strongly Agree=5, Agree=4, Neutral=3, Disagree=3, Strongly Disagree-1

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
-------------------	-------	---------	----------	----------------------

Adoption of EMA has improved
the profitability of our company

A financial loss in our company
will not deter us from using
EMA

Our company easily affords the
cost of EMA

Our company usually allocates
resources to run EMA in annual
budgets

Section D: Staff Knowledge of EMA

9. Is the knowledge of EMA fundamental to each employee in the organization?

- Yes
- No

10. If yes above, kindly indicate by ticking how this is attained in your organization.

- Internal training
- External training
- Both Internal and External training

11. Kindly indicate by ticking the extent to which you agree with the following statements.

Use the following likert scale; Strongly Agree=5, Agree=4, Neutral=3, Disagree=3, Strongly Disagree-1

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<hr/>					
The knowledge of EMA is important in product pricing					
The knowledge of EMA is important in investment appraisals					
The knowledge of EMA is important in Budgeting					
The knowledge of EMA is important in Design of management systems					

Section E: Policy guidelines

12. Are there any challenges your company has experienced when adopting EMA practices?

- Yes
- No

13. Do you think the adoption of EMA should be made compulsory for all manufacturing companies?

- Yes
- No

14. Kindly indicate by ticking the extent to which you agree with the following statements.

Use the following likert scale; Strongly Agree=5, Agree=4, Neutral=3, Disagree=3, Strongly Disagree-1

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
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Our company has written manuals on the adoption and implementation of EMA

The adoption of EMA in our company has full support of top management

All our employee are have been given awareness on the EMA practices in the company

The adoption of EMA in our company is based on the best practices which are consistently applied

Section F: Adoption of Environmental Management Accounting (EMA) practices

15. How long has your company been using EMA?

- | | |
|--|--------------------------------------|
| <input type="checkbox"/> Less than 5 years | <input type="checkbox"/> 10-20 years |
| <input type="checkbox"/> 5-10 years | <input type="checkbox"/> Over 30 y |

16. How would you classify your company in terms of environmental management?

- Environmentally proactive
- Environmentally reactive

Tick all that apply

17. Expenditures in relation to environmental degradation and preservation are called environmental costs. Below is a list of the various classes of environmental costs. Kindly indicate those that are separately accounted for by your company (Tick all that apply).

- | | |
|--|---|
| <input type="checkbox"/> External services (consultancy) for environmental management | <input type="checkbox"/> Fines and penalties (incurred as a result of failing to meet environmental regulations) |
| <input type="checkbox"/> Environmental licenses e.g. waste license, emissions license etc. | <input type="checkbox"/> Research expenditures related to reducing environmental costs (e.g. research on toxicity of materials used in production, cleaner technologies etc.) |
| <input type="checkbox"/> Auxiliary materials cost | <input type="checkbox"/> Others(Specify) |
| <input type="checkbox"/> Maintenance of operating materials cost etc | |
| <input type="checkbox"/> Waste disposal costs | |
| <input type="checkbox"/> Waste prevention costs | |
| <input type="checkbox"/> Raw materials cost | |

18. Kindly indicate by ticking the extent to which you agree with the following statements
Use the following likert scale; Strongly Agree=5, Agree=4, Neutral=3, Disagree=3, Strongly Disagree-1

	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
Our company voluntarily decided to adopt EMA					
I think the government should not intervene in the adoption of EMA					
Our company has adopted EMA in all aspects of its operations					
Our company has a clear policy on implementation of EMA					

Appendix 6: Budget

Item to be budgeted for	Cost (KES)
Stationaries	8000
Type setting	4000
Printing	7500
Internet	5000
Transport	5500
Research assistants	12000
Miscellaneous	8000
Total	50000