

AN EVALUATION OF ENVIRONMENTAL MANAGEMENT ACCOUNTING (EMA) PRACTICES AND BARRIERS TO ITS IMPLEMENTATION: A COMPARATIVE STUDY OF NIGERIA AND SOUTH AFRICA

Oluwamayowa Olalekan Iredele

Department of Accounting, Faculty of Management Sciences
University of Lagos, Akoka, Nigeria.

miredele@yahoo.com

Omowunmi Jumoke Ogunleye

Department of Accounting, Faculty of Management Sciences
University of Lagos, Akoka, Nigeria

Abstract:

This is a comparative study on the level of environmental management accounting practices among listed firms in Nigeria and South Africa. The study specifically examined the level of EMA practices in Nigeria and South Africa and identified barriers limiting the practices. It utilised primary data through the administration of structured questionnaire, and a total of 44 accountants (22 from each country) participated. Data collected were analysed using descriptive statistics involving mean scores. The study found that the level of EMA practices are higher in South Africa (Mean score = 3.4609) than in Nigeria (Mean score = 2.9258). The mean scores showed that institutional barrier (3.4148) was the major factor preventing EMA practices in Nigeria while EMA practices in South Africa was prevented mainly by financial barrier (3.5605). This paper concluded that the government and other stakeholders in Nigeria should participate actively in enforcing environmental management practices through the adoption of EMA by corporate organizations in order to overcome the institutional barriers to EMA practices with which Nigeria is faced. Also, given the long term benefits of EMA practices, the government of South Africa should introduce green tax incentives and other market-based environmental policy instruments as reward for environmental performance by firms. This will help ameliorate the short-term negative effect which EMA practices have on their financial performance.

Keywords: Barriers, Environmental, Accounting, Comparative, Institutional

1. Introduction

There has been a growing pressure on firms from external and internal stakeholders to reduce the environmental impacts resulting from economic activities (Angel, 2003). This pressure is heightened by the adverse environmental effects of continuous consumption of materials, energy and water by companies, resulting in depletion of these resources (Ruth & Eno, 2014). The rising environmental cost of firms is therefore the reason for which stakeholders mount pressure on firms to be ethical and environmentally responsible in their business conduct. As a response to this pressure, firms need to account for and manage the costs associated with their environmental impact. Despite the rising negative effect of firms' activities on the

environment and its associated costs, the conventional accounting systems have failed to provide required information for addressing this challenge. This has led significantly to the emergence of environmental management accounting (EMA) (Gale, 2006 and Jasch, 2006). The main purpose of EMA therefore is to provide management with the necessary information for adequate consideration of environmental costs and performance, with a greater emphasis on the management of environmental costs. EMA helps companies to reveal the actual costs associated with the environmental impact of their activities and to identify cost reduction opportunities. Parker (1997) posits that through the identification, evaluation and distribution of environmental costs, environmental management accounting allows management to identify opportunities for cost savings and calculate actual costs of projects and investments which will ultimately enhance better environmental management. In addition, there is an increasing demand from interested stakeholders with regards to the impact of firms' activities on the environment and the need for these firms to incorporate EMA into their strategic plans.

The United Nations Division on Sustainable Development (UNSD) states that the adoption of EMA is vital for business to apply cleaner and more productive procedures such as the reduction of carbon emissions and the efficient use of physical resources like water (UNSD, 2001). EMA can assist firms in making decisions on product pricing and the calculation of the costs associated with environmental projects among others. Despite the benefits that could accrue from the implementation of EMA, there are empirical evidences that point to the fact that there are various barriers to adopting environmental cost management initiatives. These barriers include a fundamental lack of interest and commitment among stakeholders to adopting EMA, long payback periods as regards environmental investments projects and a general lack of incentives and information on environmental issues (Creighton, 1998). These barriers appear to be interrelated and when combined makes implementation of environmental initiatives difficult.

As part of these barriers, the US National Wildlife Federation's (NWF) Campus for Ecology program and University Leaders for a Sustainable Future (ULSF) as cited in Chang (2007) identified five major factors which hinder environmental sustainability drive among firms. They are; institutional barriers, management barriers, financial barriers, informational barriers, and cultural barriers. A recent study by Mumbi (2014) showed that the level of EMA practices is low because there appears to be lack of standard or generally acceptable framework for its implementation resulting in organisations applying EMA differently. Contextual differences could also explain variations in the level of adoption as it seems that a number organisations lack adequate system for measuring and tracking environmental cost (Schaltegger & Burritt, 2000).

EMA practices in developed countries have improved as a support mechanism to manage environmental issues. This is evidence through a number of contributions to EMA that have been made as revealed in studies such as (Ditz, Ranganathan & Banks, 1995; Bailey & Soyka 1996; Epstein, 1996; Schaltegger, Muller & Hindrichsen, 1996; Tuppen, 1996; Schaltegger & Burritt, 2000; Deegan, 2003; Qian & Burritt, 2009; Chang (2007). Evidences also show that EMA is receiving greater attention due to considerable environmental incidents which creates significant financial consequences for various organisations that need to be managed

(Schaltegger & Burritt, 2000). Firms in the African continent that are burdened with multiple challenges resulting from environmental degradation have underutilised EMA (Nyirenda, Ngwakwe & Ambe, 2013).

Although in South Africa there is a growing awareness of the significance of environmental performance and, firms have begun to integrate environmental management practices into their corporate strategy though at minimal level (Mohr-Swart, 2008; Ambe, 2007; Queen, 2011; Nyirenda *et al.*, 2013). However, in the case of Nigeria, EMA studies are scarce and most studies have focused on the reporting/disclosure of environmental information in firms' annual reports (Owolabi, 2008; Appah, 2011; Uwuigbe, 2011, Iredele & Akinlo, 2015). This has therefore left a gap in literature because none of these studies have examined level of environmental management accounting practices among firms as well as the barriers associated with the practices.

This study undertakes a comparison between Nigeria and South Africa due to the fact that South Africa has been ranked as the largest greenhouse emitter of carbon-dioxide (CO₂) in Africa and is also rated 14th among the world's top 20 greenhouse emitters. However, corporate environmental governance is gaining momentum in South Africa with 49 companies currently listed on the Social Responsibility Index of the Johannesburg Stock Exchange (Mohr-Swart, 2008). These feats achieved so far in South Africa can be a good motivation for other countries in Africa on environmental issues and particularly for an emerging economy like Nigeria where there are rising environmental failures.

At the moment, there is a dearth of literature on the barriers that limit the progress of African nations towards adopting environmental management accounting practices as well as a dearth of studies that provide information on comparative dimension to EMA implementation on the African continent. Hence, to bridge this gap, a study of EMA practices among African nations is necessary in order to ascertain whether the variations in resources and nature of production among various countries could lead to differences in the level of their EMA practices. The objectives of this paper are therefore to undertake a comparative study of the level of EMA practices among listed firms in Nigeria and South Africa and to examine the barriers that limit the adoption of EMA practices by listed firms in these two countries.

The next section of this paper provides a brief review of literature which is followed by a discussion of the research methods and then the data analysis. The final section provides a discussion on the findings and conclusion of the study.

2. Literature Review

2.1 The concept of Environmental Management Accounting (EMA)

Environmental Management Accounting (EMA) practices involves the tracking, tracing and treatment of costs, earnings and savings incurred in relation to the company's environmental-related activities (Burrit, Hahn & Schaltegger, 2002). In a study by Chang (2007), EMA is defined as the generation, analysis and use of monetary (financial) and physical (non-financial) environment related costs in order to improve organisational financial and environmental performance. In general, it is agreed that two types of environmental costs exist – private or internal costs and externalities or societal costs (Deegan, 2003; UNDS, 2001; Schaltegger & Burritt, 2000; USEPA, 1995). Private or internal costs are costs that directly impact on a company's bottom line', while externalities or societal costs

encompasses the costs to individuals, society, and the environment for which a company is not accountable' (USEPA, 1995). Environmental Management Accounting (EMA) deals with the management of environmental costs that directly impacts organisational financial performance which are referred to as private or internal costs.

2.2 Theoretical Framework

It has become imperative for firms to become environmentally responsible and to be ethical in their business conduct. This is necessitated by the growing pressure from stakeholders to reduce the environmental impacts resulting from firms' activities on the environment. Thus, this study is based on the stakeholder's theory.

Stakeholder theory involves identifying organisational stakeholders that have some 'right' to information, and ranking or prioritising their interests. (Gray, 2001). The theory enables identification of those societal interest groups to whom the business might be considered accountable, and therefore to whom an adequate account of its activities would be deemed necessary (Woodward & Woodward, 2001). The theory attempts to articulate a fundamental question as to which groups require management attention, and which are not? (Mitchell *et al*, 1997). According to Ullmann (1985), the more critical stakeholder resources are to the success and viability of the organisation, the more likely the organisation will satisfy their demands. Therefore since companies are accountable for stewardship over the resources entrusted to them by these stakeholders, the activities of the corporation adjusted to gain that approval (Chan, 1996). Reducing the negative effects of firms' activities on the environment is the responsibility of firms and it is therefore an important requirement for gaining the approval of their stakeholders, thus, the need to implement EMA.

2.3 Prior Empirical Studies on Environmental Management Accounting

EMA has been extensively discussed in literature in the last 15 years. USEPA and Tellus Institute (USA) are among the first organisations that adopted EMA and applied it in several industrial organisations to demonstrate its benefits (USEPA, 1995; White, Becker & Goldstein, 1991, 1992). There are a number of studies that discussed the benefits of EMA and recommended it to firms. Many of these studies originated from the US, and a few from the UK (Bennett, James, & Lane, 1996, Gray, Bebbington, & Walters, 1993). An increasing number of governments from Denmark, Netherlands, Germany, Austria, Australia, China and Japan have been involved in promoting EMA to industries in their countries (UNSD, 2001). Angel (2003) in Sweden considered factors that determine the need for EMA in industries. It adopted a case study approach and concluded that EMA has many components and there are a number of ways to apply each component. Similarly, a study by Jasch (2003) in Austria as published by the Expert Working Group defined some principles and procedures for EMA, with a focus on techniques for quantifying environmental expenditures or costs, as a basis for better controlling and benchmarking purposes. A study in the US by Delmas & Toffel (2003) examined why some firms adopt environmental management practices that go beyond regulatory compliance while other firms only comply with regulations. It built a model that links institutional pressures to organisational characteristics to explain the adoption of environmental management practices at the plant level. Chang (2007) conducted a study in Australia and examined current accounting practices for managing environmental costs within universities and factors that influenced their adoption. The result showed that there

was a general low level of EMA utilisation within the sampled universities and this was partly due to a poor knowledge of the extent of environmental costs being incurred.

Schaltegger, Bennett, Burritt, & Jasch (2008) also examined environmental management accounting as a support tool for cleaner production. The study demonstrated the potential of EMA in aiding Cleaner Production (CP) as benefit to businesses. Qian & Burritt (2009) in Australia examined the institutional view of the development of environmental management accounting by considering the possible development of EMA in relation to three pillars: regulatory, normative and cognitive institutions. This led to an understanding of the development of EMA in four institutional contexts involving; direct regulatory pressures, social environmental movements, professional structure and inter-professional communication, and environmental mimicry in specific organisational fields.

Few authors in developing countries have also examined EMA practices. Jalaludin, Sulaiman & Ahmad (2011) in Malaysia conducted a study on understanding environmental management accounting (EMA) adoption by utilising a new institutional sociology perspective. Also the relationship between institutional pressure and environmental management accounting (EMA) adoption was examined. Recognising the important role of accountants in managing environmental issues in organisations, the study highlighted the influence of education and training as determinants of EMA adoption. Altohami (2013) investigated factors influencing EMA adoption in oil and manufacturing firms in Libya. Specifically, it investigated the influence of the dominant factors in the organisational, environmental and technological contexts on firms' intentions to adopt EMA. The results revealed that organisational, environmental and technological variables significantly influenced firms' intention to adopt EMA.

Mokhtar, Zulkifli & Jusoh (2014) in Malaysia adopted social issue life cycle theory to explore EMA and Environmental reporting practices using social issue life cycle theory as an interpretive lens, the paper proposed a theoretical framework to investigate the relationship between the extent of EMA implementation and ER practices. Jamil, Mohamed, Muhammad, & Ali (2015) in a study conducted also in Malaysia investigated factors and barriers influencing the practice of environmental management accounting. The institutional theory was employed and data was collected via questionnaire. The results indicated that most firms practice physical EMA and also have a budget allocation for environmental activities.

From the discussion above, more studies on EMA practices have been conducted in the developed countries than developing countries. Specifically in Nigeria, the practice and research of environmental accounting over the past decade has focused mainly on environmental reporting and disclosures (Owolabi, 2008, Appah, 2011; Uwuigbe, 2011; Oba, Fodio & Soje, 2012; Duke & Kankpang, 2013, Iredele & Akinlo, 2015). Aside the emphasis on environmental reporting and disclosures, only few studies in Nigeria are similar to the current study even though they differ significantly in focus. For instance, Owolabi (2006) examined externalities with a focus on the oil and gas industry in Nigeria. Enahoro (2009) conducted a study that combined both internal and external environmental costs together for manufacturing and oil and gas firms in Nigeria. Abiola & Ashamu (2012) conducted a study on EMA by adopting a case study of a single company, NNPC and investigated how it

manages, accounts for and reports its environmental risk performance without consideration of any monetary or physical costs in particular.

Studies conducted in South Africa (DeVilliers & Vorster, 1997; DeVilliers, 1999; DeVilliers & Barnard, 2000) have focused on issues such as green reporting while the implementation of environmental management accounting (EMA) has begun, though it is still at infancy stage (Ambe, 2007). However, there is a growing awareness of the significant financial implications of environmental performance which has led to a gradual emergence of research on environmental management accounting practices as evidenced in studies such as Ambe (2011); Queen (2011) and Nyirenda, Ngwakwe & Ambe (2013). All these studies focused either on a case study of a single firm or a single sector. It is therefore noteworthy to conduct a study that cuts across several firms and sectors as well as provide a comparative perspective on the level of EMA practices and barriers to implementation in Nigeria and South Africa.

3. Research Methods

This is an exploratory study utilising primary data obtained from accountants of sampled firms through the aid of structured questionnaire. The population for the study consist of 170 and 269 non-financial companies listed on the Nigerian and Johannesburg Stock Exchanges respectively as at 31st December 2015. A sample of 50 companies (25 from each country) were purposively selected across seven (7) industry classifications of the economy namely; breweries, building materials, food & beverages, healthcare, industrial goods, oil and gas, and chemical and paints (List of companies in Appendix I, Tables I and II), based on the nature of their activities and how they impact the environment. Out of the 50 copies of questionnaire administered to participating accountants in each country, 22 copies were retrieved from firms in Nigeria (response rate of 88%) and were found useable while all the 25 copies of the questionnaire in South Africa were returned (response rate 100%) and found useable. A higher response rate was recorded among firms in South Africa because the lead researcher personally visited many of the companies alongside a data collection consulting firm. Companies that could not provide immediate response during the visit mailed the information to the firm after the lead researcher had returned to Nigeria. However, only data from 44 copies of the questionnaire (22 from each country) were used in the study to aid effective comparison. This was after each of the copies of the questionnaire was screened for completeness of relevant information.. Data obtained were analysed using descriptive statistics.

3.1 Measurement of variables

Most studies on EMA (Jalaludin *et al.*, 2011; Jamil *et al.*, 2015) have adopted the technique in EMA framework as proposed by Burritt *et al.*, (2002). This is based on a checklist of techniques for applying EMA such as activity based costing, lifecycle costing, environmental capital budgeting, in which respondents were asked to measure on a scale of 1 (none at all) to 5 (very much) the understanding of these techniques. Also adopting Burritt *et al.*, (2002) EMA framework, Mumbi (2014) based the level of EMA practices on the number of techniques used in a particular firm compared to the total number of techniques used in the study. This study in addition to adopting Burritt *et al.*, (2002) EMA framework as used in Mumbi (2014) constructed three additional parameters for measuring EMA practices

(Appendix II, Table I). The purpose of this construction is because no prior study has utilized these parameters in measuring EMA practices.

First is on the level of occurrence of environmental costs within the firms which is termed *OCCURRENCE*. Since EMA focuses on internal environmental costs, inability to identify these costs will make it extremely difficult to minimise, control and manage them. Bartolomeo, Bennett, Bouma, Heydkamp, James & Wolters (2000) suggested that environmental managers and experts be engaged in the accounting process to ensure that identification of environmental costs occurs. Measurements of variables for this parameter are adopted from (Enahoro, 2009. See appendix II). A checklist was used in the questionnaire to gather data on this parameter by measuring on a scale of 1 (No occurrence) to 5 (Very high).

Second is on how the environmental costs are accounted for and generated which is classified as *GENERATION*. Particularly, (UNSD, 2001; Chang, 2007) defined EMA as the generation, analysis and use of monetary (financial) and physical (non-financial) environment related information in order to improve organizational financial and environmental performance. Measurements of variables for this parameter are adopted from (Enahoro, 2009. See appendix II). A checklist was used in the questionnaire to gather data on this parameter by measuring on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree).

Third is based on sustainable business practices within the firms which are termed *SUSTAINABLE*. They are measures put in place to run their businesses in a sustainable manner. This practice helps firms to identify ways of reducing or avoiding environmental costs while at the same time improving environmental quality (USEPA, 1995). Measurements of variables for this parameter are adopted from (Mumbi, 2014. See appendix II). A checklist was used in the questionnaire to gather data on this parameter by measuring on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree).

To ensure the relevance of the research instrument in measuring EMA practices, construct validity was obtained through expert opinions. Internal validity was ensured through the use of widely accepted variables for measuring the variables. Cronbach's Alpha estimates for all the parameters used to measure EMA were computed to ensure reliability which yielded as follows:

EMA PARAMETER	Number of item	Cronbach's Alpha		Details
		NG DATA	SA DATA	
Occurrence	18	0.955	0.865	Appendix ii
Generation	4	0.734	0.699	Appendix ii
Sustainable	5	0.641	0.810	Appendix ii
Technique	10	-	-	Appendix ii

Table 1: Reliability test result for EMA parameters
 Source: Field Survey (2016)

Cronbach's Alpha was not computed for parameter TECHNIQUE because a checklist of 10 items containing acceptable EMA techniques were developed and a particular method was assigned 1 if it is used. Firms were scored all over 10 based on the number of techniques in practice within the organisation. Unlike other parameters that were measured on ordinal scale. Measurement of variables for barriers to EMA practices (Attitudinal barriers, informational barriers, institutional barriers, financial barriers, and management barriers) were derived by adopting the information as listed in (Chang, 2007 and Jamil *et al.*, 2015), (Appendix III). A checklist was used in the questionnaire to gather data on this parameter by measuring on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). Interpretation of mean score for the study was benchmarked on the average of the minimum and maximum values. A mean score higher than the benchmark is indicative of a high level of commitment to EMA practices.

4. Analysis and Findings

Respondent's Profile

Table 2 shows the respondents' profile. Almost all the participating accountants in Nigeria fall within the position of Management Accountant (n = 10, 45.5%) and Financial Accountant (n =10, 50%) respectively. Respondents in South Africa cut across all the title of positions indicated in the questionnaire.

	<i>Category</i>	<i>Nigeria</i>		<i>South Africa</i>	
		<i>Freq.</i>	<i>%</i>	<i>Freq.</i>	<i>%</i>
Title of Position	Management Accountant	10	45.5	7	31.8
	Financial Accountant	11	50.0	4	18.2
	Finance Officer	1	4.5	6	27.3
	Cost Accountant	0	0.0	2	9.0
	Others	0	0.0	3	13.6
	Total	22	100	22	100
Duration on Job	Less than 1 year	2	9.1	1	4.5
	1-5 years	5	22.7	6	27.3
	6- 10 years	10	45.5	13	59.1
	Over 10 years	5	22.7	2	9.1
	Total	22	100	22	
Highest Educational Level	Graduate	8	36.4	5	22.7
	Postgraduate	14	63.6	17	77.3
	Total	22	100	22	100

Table 2: Presentation of Respondents profile

Source: Field Survey (2016)

The duration on the job reveals the number of years of experience of the respondents. More experienced respondents participated in the study as majority of the respondents have experience from 6-10 years and over 10 years, for Nigeria (n = 15, 67.12%), and (n = 15, 68.2%) for South Africa. Also, more respondents with postgraduate qualifications participated in the study (n=14, 63.6%) and South Africa (n=17, 77.3%).

4.1 Level of EMA Practices

The result in Table 3 is a descriptive statistics of the EMA scores in Nigeria and South Africa.

Country	N	Minimum	Maximum	Mean	Std. Deviation	Std. Error Mean
NG	22	1.67	3.82	2.9258	.54845	.11693
SA	22	2.39	3.92	3.4609	.38982	.08311

Table 3: Group statistics for level of EMA Practices in Nigerian and South Africa firms

Source: Authors' Computation (2016)

The values are the aggregate of occurrence, generation, technique and sustainable scores as listed (Appendix II). The result shows that the level of EMA practices in South Africa is higher than Nigeria given their mean scores. While Nigeria has a mean score of 2.9258, South Africa showed 3.4609. This is further revealed as the mean score for South African firms is almost as high as the maximum value for firms in Nigeria. In addition, the mean scores for Nigeria is higher than the benchmark ($2.925 > 2.745$), and the same result holds for South Africa ($3.460 > 3.155$). Based on these, we assert that there is a level of commitment to EMA practices in both countries with South Africa showing a higher level of commitment. There deviation from the mean is low as the standard deviation for Nigeria and South Africa showed a value of 0.54845 and 0.38982 respectively. This is an indication of little or no amount of variation in the data set for both countries.

4.2 Barriers associated with EMA Practices

This study analyses the problems identified which constitutes barriers to EMA practices. Adapting from Chang (2007) and Jamil *et al.*, (2015), these problems include when the accounting functions of a firm does not give priority to environmental costs, when firms have difficulties in collecting environmental costs or difficulties in allocating environmental costs, when management provides little or no incentives for managing environmental costs. All these and more constitute barriers to the implementation of EMA or not. These barriers according to Chang (2007) and Jamil *et al.*, (2015) have been classified into five categories; attitudinal barriers (ATT), financial barriers (FIN), informational barriers (INF), institutional barriers (INS), and management barriers (MGT); though they are potential factors, they are barriers that prevented organisations from practicing EMA practices. The result in Table 4 showed the descriptive statistics of the barriers and Table 1 (Appendix III) showed the frequency and mean distribution of individual barriers.

BARRIERS	NG				SA			
	Mean	Std. Dev	Min	Max	Mean	Std. Dev	Min	Max
ATT	3.1190	1.08288	1.00	5.00	2.9545	0.82965	1.50	4.00
FIN	3.1190	0.89929	0.00	4.67	3.5606	0.41641	2.67	4.33
INF	3.2063	0.92181	1.67	5.00	2.9394	0.52085	1.67	3.67
INS	3.4148	1.05660	1.00	5.00	3.0758	0.59479	1.67	4.00
MGT	3.3849	1.13421	1.25	5.00	3.3902	0.70024	2.00	4.33
	N = 22				N = 22			

Table 4: Overall descriptive statistics of barriers associated with EMA practices among firms in Nigeria and South Africa.

Source: Authors' Computation (2016)

The Table shows that institutional barriers have a mean score of (3.4148), and it constitutes the highest factor that prevents firms in Nigeria from practicing EMA. As presented in appendix III, Table 1, this includes lack of institutional pressure (3.19), lack of stakeholder power (3.13) and lack of shareholder power (3.24). The pressure could come from government; it could also be mimetic or normative pressures. This is followed by management barriers (3.3849), which come in form of few incentives being provided by management for managing environmental costs (3.52), lack of environmental responsibility and accountability by management (3.40), lack of integration of the environment into strategic planning (3.21), and lack of management support for environmental issues (3.33). Informational barriers came third with (3.2063), and this entails difficulties in collecting environmental costs (3.10), difficulty in allocating environmental costs (3.43), and the perception of the insignificance of environmental costs in overheads (3.10). This finding is consistent with Johnson (1993), Setthasakko (2010) and Jamil *et al.*, (2015) that indicated the lack of guidance on EMA, lack of information framework leading to the difficulties in effectively collecting, identifying and evaluating environmental-related data, especially in pollution prevention, waste management decisions and performance evaluation.

The least barriers are attitudinal and financial barriers with equal mean of 3.1190 each. Attitudinal barrier can be in form of low priority of accounting for environmental costs and reluctance to change while financial barriers come in form of considerations for the cost implications of EMA, efficiency or financial consideration as to whether cost of implementation outweighs the benefits and vice versa, resources constraints, and magnitude of environmental costs.

South African firms are prevented mostly by financial barriers as indicated by the mean score (3.5606). Further analysis revealed that this financial barriers come as a result of consideration for the cost implication of EMA implementation (4.00), knowing the huge fund required to incorporate EMA into business process and systems. Also, in the light of the many competing projects calling for attention, resources constraints with mean (3.95) play a major barrier to EMA adoption, especially when the other projects appear to enhance short term profitability. Efficiency with mean score (2.95) as to whether the benefit of implementation outweighs the cost also is a major barrier. The implication is that South African firms have largely overcome other barriers. This result supports the position of the

study by Jamil *et al.*, (2015) that finds financial barriers as a challenge to EMA practices by Malaysian manufacturing SMEs. This is followed by management barriers (3.3902), institutional barriers (3.0758), attitudinal barriers (2.9545), and lastly by informational barriers (2.9394).

The deviation from the mean for all the variables of sampled firms in South Africa is low since the values of the standard deviation are close to zero. This is an indication of little or no amount of variation in the data set. Although the standard deviation of three of the variables for sampled firms in Nigeria is slightly above zero, these do not show a significant deviation from the mean which is an indication of little or no amount of variation in the data set.

5. Discussion and Conclusion

The result of the study indicated that the major limitation to EMA practices among sampled firms in Nigeria is institutional barriers. This barrier exists because of weakness of institutional forces such as government, shareholders and all other stakeholders in promoting environmental conscious society. Although this barrier exist among sampled firms in South Africa but not a strong barrier as such since it was not the leading barrier. This connotes that environmental issues are regulated to a reasonable measure in the Republic of South Africa.

Also high among the problems associated with EMA practices among sampled firms in Nigeria are management barriers. This connotes the failures of management in providing incentives and leadership support for implementing environmental management practices. The failure also includes lack of integration of the environment into strategic planning. This barrier is also a significant limitation to the implementation of EMA in South Africa being the second barrier limiting the practice among sampled firms. Sampled firms in Nigeria are also bedeviled by informational barriers which imply inherent difficulties in collecting and allocating environmental costs due to dearth of advanced manufacturing technologies. This is evident in the low level of application of relevant EMA techniques and methods. South Africa is known for its well-developed infrastructure and advanced manufacturing technologies and so the firms do not find difficulty in collecting and allocating environmental cost information. The major limitation to implementation of EMA practices among sampled firms in South Africa is financial barrier. The high point and foundation of this barrier is on whether the cost of implementing EMA outweighs its benefit. This is because since EMA represents increased costs and investments, with negative effect on the firms' bottom-line, studies and practical cases of its implementations have shown that it does not lead to financial performance.

In conclusion, this study recommends that institutional forces comprising the government, company's shareholders, environmental groups and other stakeholders should participate actively in enforcing environmental management practices through the adoption of EMA by corporate organisations. This is important in overcoming the institutional barriers to EMA practices with which Nigeria is faced. This factor played a vital role in accounting for the higher level of EMA practices among firms in South Africa. Similarly, Husain & Gunasekara (2002) and Jami *et al* (2015) also found that this factor has a strong pressure on firms to become environmentally responsible. They assert that coercive pressures when exerted by government and other stakeholders can compel organisations to make changes and adopt certain attributes to gain legitimacy for their operation. But without this pressure,

organisations will be less likely to adopt EMA. This further explains the reason why this study utilised institutional theory which articulate a fundamental question as to which groups require management attention, and which are not? And the more critical stakeholder resources are to the success and viability of the organisation, the more likely the organisation will satisfy their demands.

Further more, the Nigerian governments as part of its efforts in improving its role in the promotion of environmental and sustainability efforts of firms, should formulate national policies and programmes by establishing a centre such as the example of Kenya where the Kenya National Clean Production Centre (KNCPC) exists as a government body mandated with the task of training manufacturing businesses on EMA and promoting resource efficiency among local manufacturers. This initiative will improve the competence of the firms in EMA techniques and methods, and remove the problem of informational barrier.

In South Africa, government should introduce green tax incentives and other market-based environmental policy instruments as a reward for environmental performance by firms. This will help ameliorate the perceived financial barrier to EMA practices. Apart from financial benefit, corporate firms in South Africa should be motivated by the need to promote sustainable business practices, ensure eco-efficiency and strategically position the firm for long run economic superiority.

Management of firms should integrate environmental issues into strategic planning, provide incentives for environmental management activities within the organisation, and give the needed support and leadership for environmental performance within firms in Nigeria where EMA practice is low for possible improvement, and in South Africa where EMA practice is higher to ensure sustainability of this practice.

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APPENDIX I: LIST OF SAMPLED COMPANIES IN NIGERIA AND SOUTH AFRICA.

TABLE 1: LIST OF SELECTED LISTED FIRMS IN NIGERIA

S/N	SELECTED FIRMS IN NIGERIA	INDUSTRY
1	Guinness	Brewery
2	Nigeria Breweries	
3	Dangote Cement	Building Materials
4	Lafarge (WAPCO)	
5	Cement Company of Northern Nigeria	
6	Nestle	Food, Beverages & Tobacco
7	Nigeria Bottling Company	
8	Floor Mills of Nigeria	
9	National Salt Company of Nig	
10	Seven Up	
11	Dangote Floor	
12	Dangote Sugar	Healthcare
13	GlaxoSmithkline	
14	May & Baker	
15	Neimeth	
16	Evans Medical	Industrial/Domestic Products
17	Vita Foam	
18	BOC	
19	First Aluminium	Oil and Gas (Marketing)
20	Mobil Oil	
21	Oando Plc	
22	Total Plc	Chemical and Paints
23	Berger paints	
24	Portland paints/Sandtex	
25	DN Meyer	

TABLE 2: LIST OF SELECTED LISTED FIRMS IN SOUTH AFRICA

S/N	SELECTED FIRMS (S/A)	INDUSTRY
1	Sab - Miller Plc	Breweries
2	KWV	
3	Distell Group	
4	Pretoria Portland Cement Ltd	Building Materials
5	Aveng Ltd	
6	Tiger Brands	Food, Beverages & Tobacco
7	Pioneer Foods	
8	British American Tobacco	
9	Clover Industries Ltd	
10	Illovo Sugar	Healthcare
11	Life Health Care group	
12	Adcock	
13	Aspen Pharmacare	
14	Bowler Metcalf Ltd	Industrial/Domestic Products
15	Mpack	
16	Lonmin	
17	Nampack	
18	Transpaco	Oil and Mining
19	Exxaro	
20	Coal of Africa	
21	Sasol	Chemical and Paints
22	Accentuate Ltd	
23	Spanjaard Ltd	
24	AECI Ltd	
25	OMNIA	

APPENDIX II

TABLE 1: DETAILS OF EMA PRACTICES AMONG LISTED FIRMS IN NIGERIA AND SOUTH AFRICA

PARAMETER	MEASUREMENT
OCCURRENCE OF ENVIRONMENTAL COSTS IN FIRMS	Cost incurred for treating and disposing of toxic wastes
	Cost of licensing for producing contaminants
	Cost resulting from recycling
	Cost of maintaining pollution prevention equipment
	Cost of hiring environmental staff
	Cost of acquiring/installing pollution control equipment
	Cost of acquiring/installing Recycling equipment
	Cost of evaluating and selecting pollution control equipment
	Cost of implementing EMS and obtaining ISO 14001
	Cost of R & D on environmental issues
	Waste management cost
	Cost of monitoring carbon emissions level
	Cost of designing environmental friendly process
	Cost of renewable sources of energy
	Cost of conducting environmental audit
	Cost of inspecting products and processes
Cost of developing environmental performance measures	
Cost of testing contamination and measuring contamination level	
GENERATION OF ENVIRONMENTAL COST	Environmental costs are generated by your company
	Environmental costs are generated separately from overheads
	The accounting system provides detailed environmental cost data
	Accounting department is properly linked to section that generate environmental costs
TECHNIQUES FOR APPLYING EMA IN FIRMS	Activity Based Costing for environmental cost allocation
	Total Cost Assessment for inclusion of environmental costs in investment appraisal
	Full Cost Accounting for long term and short term environmental costs
	Life Cycle Costing for quantification of environmental costs
	Material Flow Accounting for analysing physical flows of materials
	Estimation of environmental costs to determine its selling price
	Identification of opportunities for reduction of environmental impacts
	Incorporation of environmental goals into business strategy
	Estimation of potential environmental contingencies
Creation of environmental cost accounts	
SUSTAINABLE BUSINESS PRACTICES IN FIRMS	Recycling of waste/effluent produced
	Use of water catchment (Water saving methods)
	Monitoring levels of carbon emissions
	Use of renewable sources of energy
	Investment in cleaner technologies

Sources: Bartolomeo *et al.*, (2000), Burritt *et al.*, (2002), Enahoro (2009), Mumbi (2014)

APPENDIX III

Table 1: FREQUENCIES AND MEAN DISTRIBUTION OF PROBLEMS ASSOCIATED WITH EMA PRACTICES IN NIGERIA AND SOUTH AFRICA

Factors	S A		A		U		D		SD		Mean	
	N	S	N	S	N	S	N	S	N	S	N	S
ATTITUDINAL BARRIERS												
Low priority of accounting for environmental cost	1	2	9	10	5	4	4	5	2	1	3.14	3.32
Reluctance to change	4	0	5	8	4	3	5	5	3	6	3.10	2.59
FINANCIAL BARRIERS												
Cost implication	4	2	9	19	3	0	3	1	3	0	3.48	4.00
Efficiency or Financial consideration	3	0	5	6	6	12	7	4	-	-	3.19	3.09
Resource Constraints	2	3	5	15	3	4	5	0	1	0	3.13	3.95
Insignificance of environmental costs	-	-	4	3	8	11	8	7	1	1	2.71	2.73
INFORMATIONAL BARRIERS												
Difficulty in collecting environmental cost	2	0	5	4	7	13	7	5			3.10	2.95
Difficulty in allocating environmental cost	3	0	10	6	3	9	3	6	2	1	3.43	2.91
Low environmental cost in overhead	1	0	8	5	6	12	4	4	2	1	3.10	2.95
INSTITUTIONAL BARRIERS												
Lack of institutional pressure	2	0	7	7	6	10	5	4	1	1	3.19	3.05
Shareholder power	4	0	4	10	7	6	5	6	1	0	3.24	3.18
Stakeholder power	3	0	2	4	6	8	4	3	1	1	3.13	2.94
MANAGEMENT BARRIERS												
Few incentives for managing environmental costs	4	0	8	9	4	10	5	3	-	-	3.52	3.27
Lack of environmental responsibility and accountability	5	3	6	14	3	0	4	5	2	0	3.40	3.68
Lack of integration of the environment into strategic planning	3	0	6	9	5	6	2	4	3	0	3.21	3.26
Lack of management support	6	1	3	11	6	4	4	5	2	1	3.33	3.27

Source: Field Survey (2016)

KEY: N- Nigeria, S= South Africa.