STAKEHOLDER PERCEPTIONS OF THE BENEFITS AND BARRIERS OF IMPLEMENTING ENVIRONMENTAL MANAGEMENT SYSTEMS IN THE NIGERIAN CONSTRUCTION INDUSTRY

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Abstract. This study investigates stakeholder opinions of the major benefits and barriers of Environmental Management Systems (EMS) to the Nigerian construction industry, and the perceived issues to EMS adoption among organisations in the industry. The study highlights the environment as an important stakeholder in the industry because it affects and is affected by construction activities on a regular basis. It identifies the importance of ISO 14001 in ensuring adequate consideration for the environment is maintained on construction projects. The research adopts a quantitative approach by analysing responses from an online survey among construction industry professionals in Nigeria. The questions on the survey were drawn from a similar study carried out in Asia and the results were analysed using the Weighted Average and Standard Deviation statistical approach. Results reveal that the major benefits of EMS to the Nigerian construction industry were improved efficiency in waste management and environmental protection, as well as an overall increase in employee motivation due to better opportunities for training and development. Lack of technological support in organisations and the high cost of implementing EMS were viewed as the major barriers towards its uptake in construction companies. The findings also indicate that a feasible EMS implementation strategy must not ignore the unique nature of the Nigerian construction industry, which comprises mostly small and medium enterprises. The study concludes by recommending the use of a waste management plan based on the Reuse-Reduce-Recycle-Recover model and an employee training plan to ensure continuous improvement in the organisation's environmental management strategy.

Keywords: ISO 14001, corporate responsibility, sustainability, environmental management, construction, Nigeria.

Introduction

Sustainability has become an important factor in today's world, and huge importance is increasingly attached to the environment as a stakeholder in major construction industries (Haigh, Griffiths 2009; Hammond, Booth 2010; Medineckiene *et al.* 2010). Many construction projects have included sustainability as one of their key performance indicators (Fewings 2013); productivity and progress are often based on the ability to meet several environmental criteria. According to Chan and Chan (2004), it appears that the industry is no longer just focusing on maximising value for money for the client. Preserving the environment has undoubtedly become part of the social responsibility of

organisations towards the global community (Castka, Balzarova 2008).

An Environmental Management System (EMS) is a tool that helps organisations to manage and positively improve their level of impact on the environment (Christini *et al.* 2004; Oke 2004). An EMS helps a company measure its environmental performance and provides the framework for the integration of sustainable development goals within the organisation's corporate plan (Ilinitch *et al.* 1998; Jolevski 2013). Typically, an EMS is made up of policies, goals, plans, regulatory requirements and is usually reflected in the company's annual reports. Christini *et al.* (2004) gives the following basic characteristics for an organisation's EMS: (i) goals, methods and a timeline for

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achieving environmental criteria; (ii) procedures for maintaining a paper trail in relation to those goals; (iii) a defined structure and a matrix of responsibilities, as well as allocated resources; (iv) corrective actions and emergency procedures; (v) employee training plan; and (vi) a plan for monitoring and auditing the organisation's performance in achieving the EMS goals.

The earliest set of standard EMS was released by the British Standards Institution in 1992 as the standard BS7750 'Specification for Environmental Management Systems'. BS7750 was designed to complement the European regulation, Eco-management and Audit Scheme, which had also been launched by the EU in the mid-90s (Bohoris, O'Mahony 1994; Wenk 2004). One of the current, most widely used and recognised standards for environmental management is the ISO 14001. This is a specification document that forms part of the ISO 14000 series designed for the purposes of audit and specification by the International Organisation for Standardisation (ISO) (Zhang *et al.* 2000). Christini *et al.* (2004) compared ISO 14001 to an integrated management system that streamlines the policies, documentation, data collection, auditing of quality, environmental, and health and safety management systems. In essence, ISO 14001 provides guidelines that can improve the management portfolio of any type of organization in any country and not just their environmental performance (Morrow, Rondinelli 2002).

As evidence of the importance of EMS in large construction related organisations: (i) Rio Tinto Plc demonstrates a commitment to maintaining their responsibility to their stakeholders by ensuring that risks related to social wellbeing, environmental stewardship and economic prosperity are understood and managed (Rio Tinto 2008). This commitment has formed the foundation of their business conduct and their sustainable development framework is named: 'The way we work'. The framework forms part of their EMS, which governs their overarching sustainability strategy (Rio Tinto 2008); (ii) Carillion Plc is one of the international construction companies that have fully integrated their EMS into their wider corporate risk management processes (Carillion Plc 2014). The majority of their establishments in the UK, Middle East and North Africa operate under ISO 14001 (Carillion Plc 2014); and (iii) The British Standards Institution (BSI) has also published a case study of Costain Plc, a leading British engineering and construction firm, which shows that the implementation of ISO 14001 has helped in reducing the amount of waste generated by 53% and 93% has been diverted from landfill in the last four years (BSI Group 2014).

Industrial sectors have been slow to embrace EMS in Africa and, moreover, most construction companies have simply failed to engage with EMS. Therefore, the purpose of this study is to explore the opinions of construction professionals towards their perceptions of the benefits and barriers of implementing EMS in the Nigerian construction industry, so as to identify a strategy for improved organisational ownership of sustainable issues.

1. Environmental management systems in the African construction industry

The paradigm shift towards the implementation of environmental management in Africa is gradually gaining significance (Aminu *et al.* 2010). This has materialised out of the need for an environmentally conscious approach within the construction industry, which accounts for a large percentage of development in Africa. Adebayo (2002) pointed out that the driving force was best explained by the Amsterdam Treaty in 1997, which takes on an all-encompassing approach to sustainable development and encourages an integrated approach in managing and implementing environmental policies that affect the economy, leading to parallel progress in all the relevant fields. In other words, the underlying idea of sustainable construction in Africa is the fuel that drives development within the construction industry, which is one of the most productive sectors in Africa (Ofori 2006; Medineckiene *et al.* 2010). It could, therefore, be said that the environment is a primary stakeholder in the economic development of Africa, especially in the area of construction (Marzouk *et al.* 2013).

Haigh and Griffiths (2009) justified the case for considering the environment as a stakeholder by approaching this from a strategic viewpoint because the environment is not only affected by an organisation but affects it, hence solidifying Freeman's (1984) criteria. However, when the influence of the environment is examined with respect to climate change, it is seen as possessing powerful, legitimate, urgent and proximate properties, all of which qualify it as a primary stakeholder (Haigh, Griffiths 2009). In this sense, the natural environment has a strong economic stake in the affairs of businesses, organisations and governments (Dixon *et al.* 2007; Medineckiene *et al.* 2010).

There are multiple benefits to be reaped through the implementation of EMS in African construction organisations. Ofori (1998) suggested that one major benefit is the ease with which effective construction waste management can be achieved using EMS frameworks and standards. This will amount in notable cost savings and reduce many health, safety and environmental risks that may arise during the course of any project (Ofori 1998; Jolevski 2013). Shen and Tam (2002) also noted that effective waste management would lead to reduced hazardous waste generated from both onsite and offsite construction processes.

Adebayo (2002) explained that in spite of obvious benefits of environmental management and the international legislation and guidelines that are available, few African countries have succeeded in making remarkable strides in

this area. There is still a consistent gap between theory and practice in most African nations and between legislation and implementation (Ofori 2006). Many of the construction companies have failed to implement the necessary adjustments and progress is still remarkably slow compared to the rest of the world (Adebayo 2002).

Hill and Bowen (1997) noted that the initial implementation of the environmental management framework in South Africa was voluntary because it enabled the solutions to the issues of implementing sustainability in construction to be tested in the African environment before consequently being assimilated into a legal agenda. However, Adebayo (2002) explained that in African countries, like Nigeria, a number of construction project stakeholders in Africa chose to neglect the more important aspects of protection and quality of the environment and focus more on the economic angle. As such, there is still a slow rate of progress in terms of the adoption of EMS in Nigeria, even though it is one of the largest economies in Africa, alongside South Africa (BBC News 2014). Only 44 companies have been equipped with ISO 14001 certifications (ISO 2012) and a large percentage of these are multinational corporations (Windapo, Jegede 2013). Moreover, many of these organisations view this certification as a diploma earned after an examination, rather than as a process that needs to be implemented and improved upon (Boiral, Sala 1998).

Du Plessis (2005) suggested that one reason for this lapse in sustainable development in Africa is that many policies do not take into account the unique nature of the African environment and the differences in the way the construction industry is structured across various parts of the continent. The appropriateness of many EMS measures does not take into account the local economic conditions especially the reliability of key infrastructure services. Moreover, the EMS framework needs to be embedded into organisational culture and government policy (Balzarova *et al.* 2004).

Windapo and Jegede (2013) explained that the majority of the construction companies in Nigeria are small and medium enterprises. Many of the EMS standards are tailor made to be implemented by large and well established organisations and it is difficult to apply them in smaller companies (Sjostrom, Bakens 1999). This may be due to the high initial cost implication of implementing the environmental management framework (Oke 2004; Ervin *et al.* 2013), which was identified as a major barrier to EMS implementation in a similar study in Ghana (Famiyeh *et al.* 2014).

Adebayo (2002) argued that in order to bridge this conflict between theory and practice, policies need to be tailored to suit the African context. Current research in the African built environment is now shifting in this direction. Adegbite (2013) demonstrated that various aspects of established systems from other economies can be

scrutinised and analysed to determine best practice for a developing economy such as Nigeria.

Nigeria, officially the Federal Republic of Nigeria is often referred to as "the Giant of Africa", due to its large population and economy (Holmes 1985). Nigeria has been identified as a regional power in Africa, with its economy (Gross Domestic Production (GDP)) becoming the largest in Africa with more than $500 billion, overtaking South Africa and becoming the world's 26th largest economy (BBC News 2014). The Nigerian construction industry contributes a substantial amount to the GDP of the economy and is mostly made up of small and medium indigenous companies, while a majority of the larger companies are managed by international organisations (Idoro 2012).

2. Methods

A survey method was chosen to explore the opinions of construction professionals towards their perceptions of the benefits and barriers of implementing EMS in the Nigerian construction industry. The questions were adapted from a similar study carried out by Shen and Tam (2002). The questionnaire was compiled and administered using an online distribution technique with the aid of Survey Monkey software (www.surveymonkey.com) to 500 construction industry professionals in Nigeria via email. Members of professional bodies were targeted via an online directory of Nigerian Industry professionals (www.nigerianprofessional.com). Respondents were also sourced from tertiary institutions and members of various organisations who have the data of their staff published publicly on their websites.

Forty completed responses were received (an 8% response rate). Although it is considered a low response rate, it is typical of online surveys carried out in developing countries (Business Day Online 2013). Furthermore, the quality of the Nigerian internet service is known to lead to partial or no response from participants, as explained by Czaja and Blair (2005).

The data was analysed using one of the statistical measurements of central tendency: Mean or Weighted Average. The Weighted Average formula shown in Equation (1) is taken from the same form of analysis performed by Shen and Tam (2002). WAS_i denotes the Weighted Average Score for each given factor i, α_j denotes the numerical value given to each of the ranking categories, where one is allocated to the lowest rank, and five is allocated to the highest rank, n_{ij} denotes the number of respondents for factor i with respect to the ranking category j, and N denotes the total number of respondents for the whole question.

$$WAS_i = \frac{\sum_{j=1}^{5}(\alpha_j n_{ij})}{N}. \tag{1}$$

Shen and Tam (2002) noted that this formula alone is not sufficient to calculate the ranking of each of the factors. This analysis, therefore, employed the use of a coefficient of variation, which is determined by dividing the WAS_i by the standard deviation, which is a recognised measure of dispersion (Naoum 2013). This coefficient was then added to the WAS_i to give an adjusted score on which the final ranking was then based. The Adjusted Score formula is shown in Equation (2), where WAS_i denotes the score calculated for each factor i and δ_i is the standard deviation for each factor i, calculated using the weighted average score.

$$\text{Adjusted Score} = WAS_i + \frac{WAS_i}{\delta_i}. \qquad (2)$$

3. Results

3.1 Benefits of environmental management systems

The study presented a set of nine factors, which are considered the benefits of implementing EMS in the

Table 1. Frequency distribution of participant responses to the benefits of implementing EMS in the Nigerian construction industry

Beneficial Factor	Large Extent	Moderate Extent	Some Extent	Minimal Extent	No Extent
BF-a	4	7	9	12	6
BF-b	12	9	9	7	1
BF-c	18	7	5	6	2
BF-d	20	7	5	4	2
BF-e	8	9	10	10	1
BF-f	10	9	6	11	2
BF-g	8	13	10	7	0
BF-h	16	10	7	4	1
BF-i	21	4	7	3	3

Table 2. Calculated Average Significant Score (ASS) and Beneficial Index Value (BIV) for participant responses to benefits of implementing EMS in the Nigerian construction industry

BF	ASS	δ	BIV	BIV^R
BF-a	2.76	1.22	5.02	9
BF-b	3.63	1.18	6.71	6
BF-c	3.87	1.30	6.84	5
BF-d	4.03	1.25	7.26	2
BF-e	3.34	1.15	6.24	7
BF-f	3.37	1.29	5.99	8
BF-g	3.58	1.02	7.10	3
BF-h	3.95	1.12	7.46	1
BF-i	3.97	1.33	6.97	4

construction industry. These factors were selected based on a synthesis of relevant literature and were presented to the respondents as follows:

BF-a: Cost saving due to the reduction of fines associated with convictions

BF-b: Improving corporate image in environmental performance

BF-c: Contribution to the improvement of public environmental standards

BF-d: Contribution to environmental protection

BF-e: Increasing overall business competitiveness

BF-f: Reduction of environmental complaints

BF-g: Improving staff work environment, thus increasing their morale

BF-h: Reduction of environment-related sickness and injuries

BF-i: Reduction of environmental risks – polluted air, land and water

Respondents were asked to rank these factors into the following categories: Large Extent, Moderate Extent, Some Extent, Minimal Extent and No Extent. Table 1 gives a summary of the participant responses and the frequency distribution of this ranking. In order to determine the overall highest and lowest ranking factors, the weighted average of each factor was calculated using the formula in Equation (1). The results of this calculation are shown in Table 2, under Average Significant Score (ASS).

The ASS could be used to determine the ranking of each factor. However, the weighted average does not take into account the variation of the individual responses (Shen, Tam 2002) and gives an inaccurate representation of the highest and lowest ranking factors. Therefore, an adjusted score was calculated using the coefficient of variation for each factor, which was calculated with the formula in the figure above. This adjusted score was tagged Beneficial Index Value (BIV). The final ranking of each factor is shown under the column BIV^R in Table 2.

The final ranking of the factors is, therefore, shown as follows:

BF-h: Reduction of environment-related sickness and injuries

BF-d: Contribution to environmental protection

BF-g: Improving staff work environment, thus increasing their morale

BF-i: Reduction of environmental risks - polluted air, land and water

BF-c: Contribution to the improvement of public environmental standards

BF-b: Improving corporate image in environmental performance

BF-e: Increasing overall business competitiveness

BF-f: Reduction of environmental complaints

BF-a: Cost saving due to the reduction of fines associated with convictions

Based on the results presented it can be seen that factors BF-h (Reduction of environment-related sickness and injuries), BF-d (Contribution to environmental protection) and BF-g (Improving staff work environment, thus increasing their morale) are deemed the top three benefits of EMS ranked by respondents. The lowest ranking benefits were BF-e (Increasing overall business competitiveness) BF-f (Reduction of environmental complaints) and BF-a (Cost saving due to the reduction of fines associated with convictions) in that order. Figure 1 is a graphical representation of the final ranking.

3.2 Barriers to environmental management systems

A list of barriers to implementing EMS in the construction industry was presented to the respondents as follows:

    EB-a: Lack of government legal enforcement
    EB-b: Increase in management and operation costs
    EB-c: Lack of trained staff and expertise
    EB-d: Lack of client support
    EB-e: Lack of sub-contractor cooperation
    EB-f: Lack of supplier co-operation
    EB-g: Difficult co-ordination of environmental performance among multi-tier subcontractors
    EB-h: Lack of working staff support
    EB-i: Time-consuming for improving environmental performance
    EB-j: Change of existing practice of company structure and policy
    EB-k: Increase in documentation workload
    EB-l: Lack of tailor-made training on environmental management
    EB-m: Lack of technological support within organisation

Respondents were again asked to rank these factors into the following categories: Large Extent, Moderate Extent, Some Extent, Minimal Extent and No Extent. Table 3 provides a summary of the distribution of the participant responses.

In order to determine the overall highest and lowest ranking factors, the weighted average of each factor was calculated. The results of this calculation are shown in Table 4, under Average Barrier-effect Score (ABS). As in the previous section, an adjusted score was calculated using the coefficient of variation for each factor. This adjusted score was tagged Environmental Barrier-effect Index Value (EBIV). The final ranking of each factor is shown under the column EBIV[R] in Table 4.

The final ranking of the factors is, therefore, shown as follows:

    EB-a: Lack of government legal enforcement
    EB-m: Lack of technological support within organisation
    EB-l: Lack of tailor-made training on environmental management

    EB-c: Lack of trained staff and expertise
    EB-b: Increase in management and operation costs
    EB-d: Lack of client support
    EB-j: Change of existing practice of company structure and policy
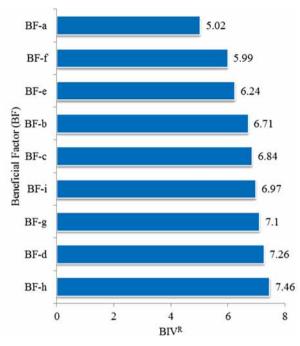   EB-h: Lack of working staff support

Fig. 1. Ranking profile of the beneficial factors perceived by Nigerian construction professionals

Table 3. Frequency distribution of participant responses to the barriers of implementing EMS in the Nigerian construction industry

Environmental Barrier-effect Factor	Large Extent	Moderate Extent	Some Extent	Minimal Extent	No Extent
EB-a	25	6	3	1	2
EB-b	13	11	7	6	0
EB-c	16	9	9	2	1
EB-d	16	3	14	2	2
EB-e	7	13	7	4	6
EB-f	8	9	7	6	7
EB-g	10	9	8	6	4
EB-h	8	9	11	7	2
EB-i	3	10	8	11	5
EB-j	6	12	11	7	1
EB-k	8	8	7	11	3
EB-l	20	6	6	5	0
EB-m	15	13	5	4	0

EB-g: Difficult co-ordination of environmental per-
formance among multi-tier subcontractors

EB-e: Lack of sub-contractor cooperation

EB-k: Increase in documentation workload

EB-f: Lack of supplier co-operation

EB-i: Time-consuming for improving environmental
performance

Based on the results presented above, the factors
EB-a (Lack of government legal enforcement), EB-m

Table 4. Calculated Average Barrier Score (ABS) and Barrier-effect Index Value (EBIV) for participant responses to barriers of implementing EMS in the Nigerian construction industry

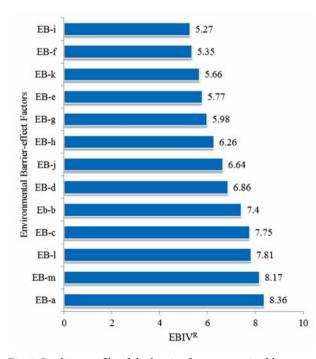| EB	ASS	δ	EBIV	EBIVᴿ
EB-a	4.38	1.10	8.36	1
EB-b	3.84	1.08	7.40	5
EB-c	4.00	1.07	7.75	4
EB-d	3.76	1.21	6.86	6
EB-e	3.30	1.33	5.77	10
EB-f	3.14	1.42	5.35	12
EB-g	3.41	1.32	5.98	9
EB-h	3.38	1.17	6.26	8
EB-i	2.86	1.19	5.27	13
EB-j	3.41	1.05	6.64	7
EB-k	3.19	1.29	5.66	11
EB-l	4.11	1.11	7.81	3
EB-m	4.05	0.98	8.17	2

Fig. 2. Ranking profile of the barrier factors perceived by Nigerian construction professionals

(Lack of technological support within organisation) and EB-l (Lack of tailor-made training on environmental management) emerged as the top three barriers to achieve benefits of environmental management practice ranked by the survey respondents. The lowest ranking barriers were EB-k (Increase in documentation workload), EB-f (Lack of supplier co-operation) and EB-i (Time-consuming for improving environmental performance). Figure 2 is a graphical representation of the final ranking.

3.3 Implementation of environmental management systems

A list of strategies for implementing EMS in the construction industry, which could contribute to the growth in the adoption of EMS within Nigeria, was presented to the respondents as follows:

EM-a: Legal requirements on environmental protection

EM-b: Reduction, reuse and recycling of construction and demolition wastes

EM-c: Imposing responsibilities of protecting environment on managerial staff

EM-d: Applying environmentally friendly technology on site

EM-e: Providing in-house training on environmental management

EM-f: Establishing waste management plan

EM-g: Continuous efforts in improving environmental management

EM-h: Inclusion of environmental management in tendering requirements

EM-i: Effective communication on environmental issue between all layers of subcontractors

EM-j: Close supervision at site level

Again respondents were asked to rank these factors into the following categories: Large Extent, Moderate Extent, Some Extent, Minimal Extent and No Extent. Table 5 provides a summary of the distribution of the participant responses.

To determine the overall highest and lowest ranking factors, the weighted average of each factor was calculated. The results of this calculation are shown in Table 6, Average Effectiveness Score (AES). By adopting the same analytical method employed in previous sections, an adjusted score was calculated using the coefficient of variation for each factor. This adjusted score was tagged Effective Index Value (EIV). The final ranking of each factor is shown under the column EIVᴿ in Table 6.

The final ranking of the factors is, therefore, shown as follows:

EM-i: Effective communication on environmental issue between all layers of subcontractors

EM-j: Close supervision at site level

Table 5. Frequency distribution of participant responses to the strategies of implementing EMS in the Nigerian construction industry

Environmental Management Measures	Large Extent	Moderate Extent	Some Extent	Minimal Extent	No Extent
EM-a	24	5	6	1	2
EM-b	14	12	6	5	1
EM-c	11	12	11	3	1
EM-d	18	9	7	3	1
EM-e	16	10	8	4	0
EM-f	18	10	7	2	1
EM-g	14	16	4	3	1
EM-h	19	9	5	4	1
EM-i	13	13	12	0	0
EM-j	21	12	3	0	2

Table 6. Calculated Average Effectiveness Score (ASS) and Effectiveness Index Value (EIV) for participant responses to strategies of implementing EMS in the Nigerian construction industry

EB	ASS	δ	EIV	EIV^R
EB-a	4.26	1.14	8.00	4
EB-b	3.87	1.13	7.30	10
EB-c	3.76	1.04	7.39	9
EB-d	4.05	1.10	7.74	7
EB-e	4.00	1.03	7.90	6
EB-f	4.11	1.05	8.03	3
EB-g	4.03	1.01	8.00	4
EB-h	4.08	1.13	7.68	8
EB-i	4.03	0.81	8.99	1
EB-j	4.32	1.00	8.62	2

EM-f: Establishing waste management plan

EM-a: Legal requirements on environmental protection

EM-g: Continuous efforts in improving environmental management

EM-e: Providing in-house training on environmental management

EM-d: Applying environmentally friendly technology on site

EM-h: Inclusion of environmental management in tendering requirements

EM-c: Imposing responsibilities of protecting environment on managerial staff

EM-b: Reduction, reuse and recycling of construction and demolition wastes
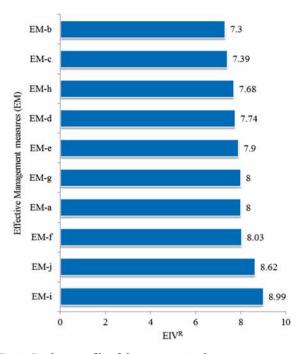

Fig. 3. Ranking profile of the strategic implementation measures perceived by Nigerian construction professionals

Based on the results presented above, the factors EM-i (Effective communication on environmental issue between all layers of subcontractors), EM-j (Close supervision at site level) and EM-f (Establishing waste management plan) emerged as the top three benefits of environmental management practice ranked by the survey respondents. The lowest ranking benefits were EM-h (Inclusion of environmental management in tendering requirements), EM-c (Imposing responsibilities of protecting environment on managerial staff) and EM-b (Reduction, reuse and recycling of construction and demolition wastes) in that order. Figure 3 is a graphical representation of the final ranking.

4. Discussion

The study has revealed that environmental protection and waste management are the perceived benefits of implementing EMS in the Nigerian construction industry. This is supported by Zhang *et al.* (2000) who explored the role of EMS in ensuring the conservation of renewable and non-renewable resources. Previous research has shown that the construction industry in Nigeria has impacted the environment negatively in a number of ways. Aminu *et al.* (2010) gives a detailed breakdown of the percentage contribution of the building industry in Nigeria to the overall carbon emission, stating that the country is in a vulnerable state.

This study also revealed that the provision of an effective waste management plan is essential to meeting the needs of waste management under the EMS framework,

just as Poon *et al.* (2004) discovered in his evaluation of the management of construction waste in housing developments. Poon *et al.* (2004) also pointed out the ISO 14001 waste management framework and stated that it also helps in reducing the amount of waste generated on a construction project. The implications of these findings include the ability of EMS to increase significant cost savings and reduce the carbon footprint and hazardous impact on the environment (Ofori 1998).

The reuse and recycling of demolition wastes was considered the least relevant implementation strategy to managing waste by Nigerian construction professionals, perhaps because of the dearth of recycling technology within the Nigerian environment (Awopetu *et al.* 2013). There is still a heavy reliance of landfills in the disposal of waste materials, as construction debris is mostly seen as waste for disposal rather than resources for recycling and reuse (Adebayo 2002; Simion *et al.* 2013). Thus, the waste management plan may often be based on effective disposal of waste, instead of reuse or recycling of materials (Tannahill, Booth 2012). Aminu *et al.* (2010) outlined a proposal for the adoption of the Reuse-Reduce-Recycle-Recover model as a means of reversing this trend.

In a similar study carried out by Morrow and Rondinelli (2002), employee motivation was listed as one of the major reasons that organisations implement EMS and this study demonstrated that this factor was considered to have considerable benefit to the implementation of environmental management in Nigeria. One of the possible indicators of this is the amount of training and development that is invested in employees whose organisations implement EMS (Morrow, Rondinelli 2002). This benefit appeals to the employees need for self-actualisation, which is the highest motivating factor based on Maslow's hierarchy of needs (Martin 2005). Many employees are motivated by the nature of the work itself (Martin 2005) and the study suggests that this is the case in many Nigerian construction companies. Morrow and Rondinelli (2002) discuss the implication of this as leading to a higher level of productivity (Martin 2005) within that organisation.

One major barrier unearthed by the study is the limited access to training as a result of lack of technological support within the organisation. Many construction companies in Nigeria are small and medium enterprises (Windapo, Jegede 2013) and, therefore, may be unable to afford the initial capital investment into training materials and software required to implement EMS in the organisation. Sjostrom and Bakens (1999) attribute the high cost of implementation of EMS as one of the reasons for poor implementation of EMS in smaller organisations. As a result, the training might prove irrelevant to the organisation, especially if it is too expensive to apply. Du Plessis (2005) stated that this barrier may pose a demotivating factor to managers and employees and recommends that

rigid systems be modified to suit the unique African climate.

Many organisations are reluctant to adopt EMS for the purpose of increasing their overall business competitiveness due to its high cost of implementation (Ervin *et al.* 2013). There are many reasons for this gap in the Nigerian construction industry, one of which is the aim of clients and contractors to maximise delivery costs by keeping projects under-budget (Windapo, Jegede 2013). This may also lead to corruption within the industry, which could jeopardise the quality of the eventual project deliverables (Windapo, Jegede 2013). In a similar study, Dada (2012) identified some of the factors that directly influenced the choice of procurement methods on Nigerian construction projects, many of which were based on the need for cost certainty, cost reduction and improved project cost performance. Hence, competitive advantage is defined by which organisation can supply the cheapest design option, in sharp contrast to the criteria used in most developed countries like the UK, where value for money ranks equally alongside environmental performance among the key performance indicators on most projects (Chan, A. P. C., Chan A. P. L. 2004).

The lack of adequate technology can be demotivating to organisations' attempts to adopt EMS, and as the study shows, this is the case in Nigeria, based on the high relevance of the lack of technology as a barrier to EMS implementation. Du Plessis (2005) points out the inability of Africa to compete with most continents in the area of technological advancement and the regular supply of basic infrastructure and Nigeria is no exception. As a result of this, many companies are unable to maximise the potential of the technology that is part of the EMS package. This is also responsible for poor investment of these companies in EMS training and development programmes, as earlier explained.

The difficulty in implementing EMS without appropriate technology is more vivid when examined against the complexity of the environmental management process. Christini *et al.* (2004) outlines the factors that need to be taken into account when implementing an EMS including proper documentation, which is difficult to achieve without the right infrastructure. However, the study concluded that an increase in documentation workload is considered one of the least relevant barriers to the adoption of EMS by Nigerian construction firms. It also concluded that the time consuming nature of the environmental improvement process had the least relevance to the decision to adopt EMS in organisations. This is in contrast to the view presented by Windapo and Jegede (2013) with regards to the priority placed on the value of time by managers of small businesses.

Effective communication on environmental issues between all layers of sub-contractors emerged as the most

effective environmental management measure in Nigeria based on the findings from the study. This is validated by the case study of Beers Skanka, a USA construction firm, which was discussed by Christini *et al.* (2004) and which highlighted the importance of communication in EMS policy formation. Effective communication is also the foundation to the Plan-Do-Check-Act Model adapted into an EMS framework by Zhang *et al.* (2000) as it is one of the tools by which continuous improvement can be achieved (Gupta 1995). Christini *et al.* (2004) recommended the development of an employee training plan to further enhance the training and development of the supply chain by employing tools such as site inductions and documentation of best practice from previous projects. The essence of this is to encourage the collation of a set of internal standards by which the organisation can improve its environmental management processes. This strategy is useful in developing informal frameworks which may then be tested and passed on to legal institutions for policy formation, as Hill and Bowen (1997) recommend in their analysis of South African implementation of EMS. The strategy is, therefore, relevant in dealing with the lack of formal environmental frameworks highlighted by Aminu *et al.* (2010).

The need to closely monitor activities on site was highlighted in the study as an important factor in ensuring that suppliers, sub-contractors, and other project stakeholders are aware of the organisation's environmental goals and adhere to the relevant EMS. Christini *et al.* (2004) explain the success of any approach to environmental management is dependent on the effectiveness of the management strategy employed in coordinating the activities of all relevant stakeholders. The study showed that the challenge with supply chain coordination was seen as a minor barrier to EMS. This implies that supply chain management in Nigeria is not a pressing challenge to environmental performance.

Conclusion

The construction industry is a major contributor to the GDP of many developing countries and is pivotal to the growth and development of the Nigerian economy. The study has pointed out that the implementation of EMS in the construction industry will contribute to productivity within that sector, as the environment has become a more relevant industry stakeholder. Furthermore, it is important that construction companies are more proactive in dealing with sustainability issues, by ensuring that their activities are more eco-friendly and comply with recognised environmental standards. The findings from the study survey administered among construction professionals in Nigeria has given insight into the major benefits and barriers of EMS and how these insights could be used to generate a

more effective implementation strategy within construction organisations.

The study showed that the need for project managers to keep projects under budget and the inability of many organisations to afford the high cost of EMS personnel training are some of the major barriers to EMS adoption. When matched against the identified importance of employee training to the adoption of EMS and its role in increasing employee morale, the need for a strategy that will be less financially cumbersome for small and medium enterprises becomes apparent. The study identified that further research into a framework that accommodates the priority that project managers and clients place on project cost-savings in Nigeria may be more effective in ensuring an increase in the implementation of EMS. In addition, the importance of an employee training plan was highlighted in this study as an effective tool in ensuring continuous development and improvement on environmental management legislation.

The study supported previous research on the effectiveness of ISO 14001 in managing construction waste, which is a major environmental challenge in Nigeria. It is therefore recommended that further studies on a waste management plan based on the Reuse-Reduce-Recycle-Recover model in place of the current waste disposal model be carried out. Effective communication in order to effect continuous improvement, and a close monitoring of site activities to ensure that all stakeholders are aware of the importance of environmental management were also identified as enablers to ensure stakeholder adoption of an organisation's environmental strategy.

This study has highlighted a number of benefits that can be reaped from the successful adoption of the EMS framework in the Nigerian construction industry. It is recommended that further research be carried out in this area as an increase in adoption of EMS will not only be of benefit to more organisations in the construction industry, but also to other industry sectors in Nigeria. A well-defined EMS implementation framework in Nigeria may also serve as the basis for developing an environmental management framework for developing countries in Sub-Saharan Africa and other parts of the world.

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