Consilience: The Journal of Sustainable Development
Vol. 18, Iss. 2 (2017), Pp. 84-110

Environmental Management System for Nigeria's Higher Education: Two-Year Pilot Analysis

Felix O. Iyalomhe
Polo Centre of Sustainability, Imperia, Italy
Department of Biological and Environmental Science, Kampala International University
fo.iyalomhe@polocentre.org

Giuseppe T. Cirella
Polo Centre of Sustainability, Imperia, Italy

Alessio Russo
[b]Laboratory of Urban and Landscape Design, School of Arts, Culture and Sports, Far Eastern Federal University, Vladivostok, Russia;

Anne Jensen
[c]Department of Policy Analysis, University of Aarhus, Roskilde, Denmark

Philipa Idogho
Department of Office Technology and Management, Auchi Polytechnic, Auchi, Nigeria

Abstract

Hypothetical research into how the introduction and utilisation of Environmental Management Systems (EMS) could be instituted into Nigeria's higher education scheme, as a means to improve environmental awareness and sustainable development practices on university campuses, is explored. Qualitative methodologies are utilised based on reviewed literature, semi-structured interviews, personal experiences and structured questionnaires. Effective potential EMS for Nigeria's higher education, demands policy-oriented government directives and commitments in terms of strict regulatory legislation and coordination of related management support. Reported two-year findings illustrate EMS implementation blockage due to a lack of government initiative and managerial commitment accompaniment throughout Nigeria's overall education sector. This blockage includes inadequate salary structures, lack of funding, insufficient academic curriculum and disconnect between universities and society at large. The research posits a preliminary platform towards creating EMS practices and processes, and its significant role in the definition of sustainable

campuses and research via educative activities. It highlights the need for re-evaluation of Nigeria's higher education scheme and its academic curriculum to create room for improved environmental awareness and performance, and work toward sustainable development, especially, in an era where several universities in Nigeria are housing dilapidated infrastructures and weak related institutional frameworks.

Keywords: environmental management systems; drivers; barriers; Nigeria higher education; sustainable practices; environmental awareness

Acknowledgements:
The authors gratefully appreciate the study participants, community and greater university conurbation of Auchi Polytechnic, Edo State, Nigeria.

I. Introduction

The need for Environmental Management Systems (EMS) has become increasingly significant due to recent concerns of environmental problems becoming ever-so challenging, complex and expensive to manage. EMS, as described by a number of studies, is a means to systematically address environmental problems while integrating sustainability into higher education (Adomssent *et al.* 2008, Cortese 2003, Hansen and Lehmann 2006, Lozano 2006, 2010, 2011). Higher education and universities worldwide are expected to play a vital role in building the skills and capacity to manage environmental problems at multiple scales and have been recognised as ideal environments for EMS implementation (Jain and Pant 2010, Barwise 2001). EMS implementation, at the university level, has been steadily expanding globally. This momentum, however, has not reached Nigerian universities that lack EMS amalgamation into its strategic management plans. To date, there are no universities in Nigeria with functioning EMS. At best, there exist several contingent management initiatives being used to address prevalent environmental impacts.

The implementation of EMS in Nigeria's higher educational institutions would be a positive and real program-changing step for the progress and well-being of its educative and environmental systems; in particular, Nigeria's educational institutions lack focus in addressing environmentally-related programs amidst several growing environmental problems (e.g. massive natural resource and ecosystems degradation and occurrences of climatic events). This is, perhaps, due to a lack of awareness and concern among students, the general population and decision makers for the environment. Nationally, there has been an intensification of unsustainable industry-related development and no serious attempt in employing appropriate sustainable management strategies. Such practices and negligent policy continue to result in large-scale negative impacts on livelihoods dependent on natural resources and untold hardship on already vulnerable livelihoods, property and local investment (Kola-Lawal *et al.* 2014). The purpose of this study is to identify relevant means to promote EMS in Nigeria's public sector via its higher education institutions in order to enhance environmental management performance of Nigeria as a whole. This study will add knowledge base and somewhat parallel EMS research in higher education similar to that of Adomssent *et al.* (2008), Cortese (2003), Hansen and Lehmann (2006), Lozano (2006, 2010, 2011),

Sammalisto (2004, 2007) and Sammalisto and Lindhqvist (2008). This investigation improves upon this knowledge base by backing it up as a proven tool for greener campuses with more environmental aware students, staff and decision makers, and sustainable environmental-related development.

This two-year analysis of EMS, conducted at Auchi Polytechnic, Auchi, Edo State, Nigeria, serves as a foundation for environmental awareness and indicative environmental performance from its higher academic institutions. It reviews EMS already implemented in such institutions in the West and examines possible EMS implementation in Nigerian universities. It discusses Auchi Polytechnic's environmental practices and its corresponding management strategies and, empirically, identifies why and how possible drivers, barriers and success factors for EMS may be beneficial. This cause and effect process is in support of genuinely implementing EMS Nigeria-wide. As a pilot effort, geared toward reawakened consciousness for the environment and an educative step of enactment for actual EMS implementation at Auchi Polytechnic, we are optimistic that this can be replicated in other universities throughout the country. In the long-term, this transmissive approach of academic training centres developing, not only future leaders but full-scale nation building, is key to environmental awareness and management in Nigeria.

II. EMS in Universities

Since the 1990s, major environmental problems have been given a great deal of attention at the United Nations arena. Key United Nations environmental conferences (UN 2016, Hens and Nath 2003, Pickering and Owen 1997) have challenged governments at all levels to take real steps towards protection of natural resources and the human environment, management of environmental problems at varying societal levels and enhancement of environmental performances by formulating policies on environmental issues and sustainability (Noeke 2000, Bennett and James 1999). International Standard Organizations (ISO) introduced regulatory standards, such as ISO 14001 in 1996 and ISO 9000 in 2000 to serve as guidelines for environmental performance and standardised management concepts and processes that have resulted in increased efficiency of operations, put focus on customer requirements and facilitated communication between the organisation and interested parties (Sammalisto *et al.* 2015, Sammalisto 2007, Viebahn 2002, Disterheft *et al.* 2012, Jain and Pant 2010, Sayre 1996). The ISO

14001 standard for EMS has been primarily implemented in private sectors like manufacturing and relating industrial practices, as a structured management framework for an organisation to manage its environmental related process and practices. The driving force for its implementation has been the requirement and longing of customer satisfaction, ensured legal compliance, improved impacts management (e.g. by reducing the risk of uncontrolled emissions), improved public image and increased cost-effectiveness of capital and natural resources (Kincheloe and McLaren 2008, Brorson and Larsson 1999, Banergee 1998).

Over the past two decades, a number of public sector universities have also implemented EMS as mechanisms to improve their environmental performance and operational tasks in parallel to growing conservation, protection and sustainability of natural resources (Jain and Pant 2010, Sammalisto *et al.* 2015, Joseph and Philip 1996). The University of Gävle in Sweden represents one example of the Western world's implementation of EMS. This includes the indirect aspects of education and research in their EMS, while working to certify ISO 14001 in order to acquire international acceptance and recognition (Disterhoft *et al.* 2012). EMS implementation denotes the creation of a number of routines and novel approaches to work within an organisation in an environmentally-sound manner. Within higher education institutions, this requires the training of staff, faculty and management for improved awareness and skills, and understanding of why they need to work within the EMS framework. The EMS framework elucidates how their tasks will contribute to an improved environmental performance and long-term sustainability on campuses and beyond.

Von Malmborg (2003) and Emilsson and Hjelm (2002, 2009) examined the potentials of ISO 14001 certified EMS practices in the public sector of Sweden. They revealed that in order to suit the public sector, ISO 14001 certified EMS must be simplified and integrated with other management systems to have one standardised management system. Moreover, the EMS scope has to be broadened and include aspects of caring and social administration, as it affects the overall goal of public sector entities. Note, since public and private sectors function in a different manner, within two different spheres relative to differing institutional logics, these findings are not necessarily compatible with private sector requisites (Lozano 2011, Kirkland and Thompson 1999, Welford 1998, Kuenen 1986). Emilsson and Hjelm (2009) stress the development and its likely contributions and constraints with extending EMS into a sustainability

management approach. They conclude it may point to a more comprehensive understanding of an organisation's total impact on nature and society, and relating management needs.

EMS in universities has been gaining momentum and academic interest since about the beginning of the new millennium. For example, in 2003, a survey carried out in Sweden showed 60% of Swedish universities indicated government directives as a key EMS external driver. Internal drivers, such as the role of staff, faculty, students and top management, between 1999 and 2003, were found to have a variation in values as a result of contrasting university procedural implementation, while noteworthy, major EMS barriers included lack of management support, resources and commitment (Sammalisto 2004, 2007, Sammalisto and Lindhqvist 2008). Further research, from the University of Gävle, indicated that EMS implementation from 1999 to 2003 showed that 60% were in favour of government directives as a major external driver (Sammalisto and Bororson 2006), while 70% favoured staff and faculty commitment, 36% indicated good image and credibility on the part of the university, whilst 28% specified student involvement as important (Sammalisto and Arvidsson 2005). Moreover, Thompson and van Bakel (1995) stressed that the appointment of an environmental coordinator and active support from top management would serve as an extremely important driver. Several EMS barriers identified within the period of 1999 to 2003 showed approximately 54% favoured low priority and lack of resources, 34% weak management support and follow up and about 18% long turnover in showing results (Sammalisto 2007).

Similar research and survey methods in the United Kingdom's higher education system indicated a problem with an overloaded curriculum (Martin *et al.* 2006). This overload was shown to come at the expense of newer programs, including EMS implementation – noted among academic staff as inappropriate, they themselves undertrained and under aware of the issues. Moreover, Price (2005) explained that EMS implementation in Canadian universities supported coordination with other universities, leadership roles for environmental programs and student initiatives as major EMS drivers. In addition, a few studies showed ISO 14001 certified EMS typically warranted an environmental performance improvement of university campuses (Ammenberg *et al.* 2001, Alshuwaikat and Abubakar 2008, Omrcen *et al.* 2013, Davey *et al.* 1999, Joseph and Philip 1996). Hence, the basis of the literature indicates that emphasis should first be put on environmental impacts, and the ways in which

reducing these will benefit higher education, before EMS as a tool can be implemented.

III. Auchi Polytechnic Environmental Management Initiative

Auchi Polytechnic is one of the top technical universities in Nigeria. It was founded in 1963 as a technical college and converted to a Polytechnic in 1973. Its national status is to produce well-trained, highly skilled graduates for Nigeria's economy and growing society. Key disciplines taught include engineering, sciences, environmental management and art and design. Auchi Polytechnic is located in Auchi, one of the most vibrant and cosmopolitan towns in the southern Nigeria, where there is inordinate environmental degradation and pollution related activities from excessive oil and solid minerals explorations.

Auchi Polytechnic has three campuses, jointly composed of approximately 58,000 students and a faculty of about 14,650. The activities of this institution have direct impact on the surrounding environment and have resulted in several environmental protection-based initiatives put into practice, including the use of waste baskets and noise reduction initiatives. Positioned in strategic locations, throughout the institution's grounds, waste baskets have helped to prevent solid waste littering campus-wide. Contracted members of staff empty the waste baskets daily, with hazardous waste buried for decomposition. To combat noise pollution, university management passed a number of bylaws to prevent unauthorised vehicles, motorcycles and other motorised vehicles from entering campus grounds. Apart from noise reduction, these bylaws help reduce campus-wide air pollution and carbon dioxide emission.

At Auchi Polytechnic, indirect impacts on the environment have yet to be considered, even though there are several environmental courses and programs in landscape planning, estate management and urban and regional management. No core courses are taught on human interaction with the environment or the wellbeing of environment in terms of our responsibility as human beings. This has meant that there is no, or very little, research or trained students on sustainable development, let alone on indirect environmental impacts. Correspondingly, direct environmental impacts at Auchi Polytechnic are carried out within five operations: (1) its power plant, (2) laboratory and workshop facilities, (3) staff and student

activities on campus, (4) contractor and subcontractor activities and (5) teaching and collaboration with stakeholders and with the community at large. Together, these activities have had a wide range of impacts on the environment. Table 1 summarises the types of measures put forward by the Polytechnic to control its direct environmental effect thus far (B. Campbell, personal communication, 5 January 2016).

Table 1. Auchi Polytechnic environmental aspects.

Environmental area	Treatment or Program	Quantity
Water	No waste water treatment	Average 888,689,819 L/year
Solid waste	No treatment in place	Average 61,680 ton/year
Hazardous waste	No treatment in place	Not available
Emergency response system	Fire put-out Program	Not available
Energy		
Electricity	No energy or alternative energy	Electricity 45,761,343 kwh/year
Diesel	savings program	Diesel 10,000,000 L/year
Petrol	in place	Petrol 917,922 L/year
Air pollution		
Noise	No air pollution	Not available
Carbon dioxide	treatments in place	Not available
Sulphur oxide		Not available
Paper used on campus		
Offices	No paper saving	43,000,000 million sheets/year
Library	program in place	3,368,000 million sheets/year
Buildings on campus	Ecological floor plan	80 buildings designed with ecological blueprint
EMS	No system in place	Environmental regulations initiatives since 2004 to date
Education	No compulsory environmental courses	Except the Department of Environmental studies

According to Table 1, environmental aspects at Auchi Polytechnic are regulated by informal environmental initiatives as opposed to an ideal EMS approach shown in Figure 1. This indicates that there is a level of environmental awareness at the Polytechnic but staff and faculty do not deem its significance as job-related or see its relevance to their jobs.

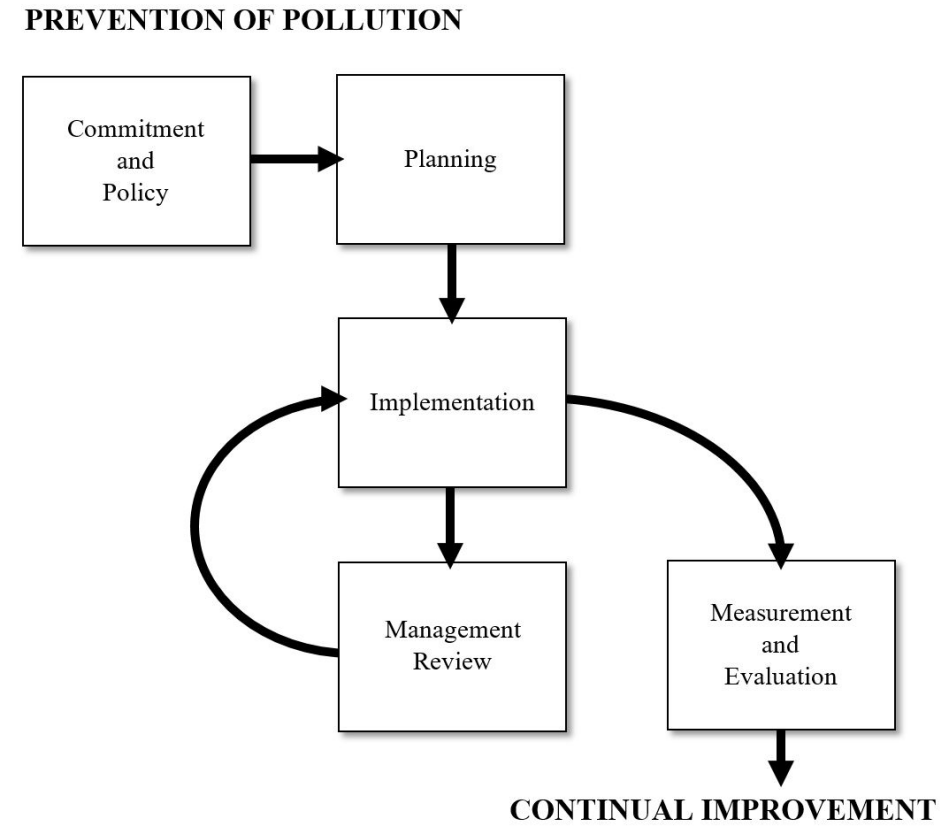


Figure 1. EMS policy cycle, adapted from Cascio *et al.* (1996).

Based on the works of Cascio et al (1996), Figure 1 illustrates, in general, how an EMS implementation cycle works from the prevention of pollution to a state of continual improvement. When implemented, its focus ideally is on bettering environmental impacts, improving efficiency, complying with legislation and demonstrating to stakeholders a commitment to environmental conservation and protection.

(i) Policy

Auchi Polytechnic has over the last decade or so proven to have a valued history of environmental action. The Department of Environmental Studies, in conjunction with top management, have assisted in establishing initiatives that monitor activities connected to environmental conservation and protection. As mentioned, Auchi Polytechnic put in place a waste control system throughout its campuses, to regulate generated waste by staff, faculty and students and to comply with national and state environmental regulations. Auchi Polytechnic also has adopted environmental practice to conduct its activities in an environmentally-friendly

manner, in part because it recognises its own environmental impact and lack of leadership required to improve upon environmental performance and minimise any associated degradation. Five specific areas are targeted include: (1) academic activities (2) research, (3) environmental and human health, (4) management of buildings and (5) grounds and operations management within campus workshops.

(ii) Planning

Auchi Polytechnic has no formal EMS or structured implementation scheme as shown in Figure 1. According to top management personnel interviewed, "we [Auchi Polytechnic] do not currently have a strategic plan, audit or any of that, but we are lucky to have a lot of good people who do a lot of good things". Another top management staff notes that "the Polytechnic is heavily decentralised, there is very little policy follow up or dissemination. Nobody knows what policies there are and there is no system to inform them". In 1981, Auchi Polytechnic hired an architecture and design firm to create its campus plan. This campus plan was not specific to environmental management; however, it did include aspects that relate to transportation and environmental planning and, if desired, could be upgraded to current standards (S. Jimoh, personal communication, 22 September 2015). There has also been some unit or school level planning, in the form of student projects and committee forecasting initiatives to facilitate management sets and annual plans for waste and energy. The Polytechnic's medical centre has internal protocols that focus on public awareness, hazardous waste and other health and safety issues. In 2000, students in higher degree level programs held a public consultation on environmental management objecting to the impacts the Polytechnic had on the affected landscape and nearby urbanised areas. This consultation focused on town planning, surveying and estate management.

(iii) Implementation

Actions have been taken toward environmental management at Auchi Polytechnic since the early 1980s. Burning of solid waste (e.g. office paper) and burying of chemicals (K. Osigbemhe, personal communication, 27 December 2015). Between 1998 and 2003, 76,000 kilos of hazardous waste was buried. In energy terms, for example in 2003, the energy used at Auchi Polytechnic comprised 25,761,343 kWh of electricity, 687,922 litres of diesel

and 6,000,000 litres of petrol (A. Aleogho, personal communication, 10 March 2016). However, to date no alternative energy savings program has been put in place. Throughout its campuses, power outages are supplemented via backup diesel and petrol generators. In the last decade, the Polytechnic has witnessed a consistent annual rise in carbon dioxide and sulphur dioxide emissions. Implementation of newly installed technology (i.e. upgraded generators) has aimed to reduce these emission levels by consuming less fuel.

Facilities management has also done a large number of maintenance upgrades within campus workshop buildings. It automated energy management in some buildings, creating better control and regulation of ventilation systems and temperature. Unfortunately, a huge problem is access to sufficient funds, and thus, a complete maintenance overhaul has not been possible, according to A. Aleogho (personal communication, 10 March 2016). Renovation and repair include leaky roofs, old windows and cracked foundations – all of which affect energy efficiency of indoor environments (Balf and Stuart 2001). Little or no initiative to address operational environmental impacts of the daily operation of the polytechnic has been implemented. Examples of potential actions include wastewater treatment, organic food purchasing, environmentally friendly transportation and ecologically-sound building designs.

To date, one environmental action that has had little conservational attention is the purchasing and consumption of office paper (B. Kabaka, personal communication, 30 June 2015). Small efforts include photocopying material double-sided in print shops, especially within library and relating office areas, and reducing the use of hardcopy student calendars. Still, in 2003, the Polytechnic used 43,106,813 sheets of photocopied office paper, according to S. Umar (personal communication, 5 January 2016) which translates into 3,657 trees, 327,612 litres of diesel, 16,726,563 litres of water, 1,366,654 kWh of electricity and 8,105 kg of air pollution (M. Igbape, personal communication, 24 May 2015). This is exacerbated during the period of examinations where academic staff has to print their examinations due to a lack of digital implementation. Since the early 1980s, many courses and research projects have contested these issues, with the majority of environmentally friendly initiatives and output limited to the School of Environmental Studies.

(iv) Checking and Corrective Action

Decentralised initiatives within the Polytechnic board do not disseminate broadly and in effect lack capability for a systematic approach to establishing a university-wide EMS. As a result, no staff is responsible for implementing environmental regulations or the necessary procedures, according to B. Kabaka (personal communication, 12 February 2015). However, there are some levels of monitoring of air pollution, water use, energy use, hazardous waste disposal and solid waste disposal by a unit or school responsible – but it is by no means comprehensive. There have also been no audits in the areas of solid waste composition or office paper consumption, but there are some independent efforts from various stakeholders to monitor some of the institution's environmental actions and to try to coordinate appropriate checks and balances.

Undoubtedly, EMS is needed not only at Auchi Polytechnic but throughout Nigeria's higher education institutions. Having researched this necessity and urgency it is evident that a vast educative platform is needed, perhaps in the form of a public or private forum for introductory planning and later corrective protocols. EMS introduction and implementation via education would serve as a core training centre and focus on potential impacts, including: degraded air quality, resource and infrastructure depletion, conservation, pollution prevention and aspects of social and economic benefits.

IV. Methodology and Material

For the purpose of this study, a frequency distribution of 48 % was used as a benchmark to reduce self-reporting biasness of EMS drivers and barriers, and to some degree, highlight the circumstantial reality in other case study-related analyses. The data collected originally was put together by Iyalomhe (2009) and revisited in 2015 and 2016, respectively. The distribution for the questionnaire was divided by way of two methods: administered take-home questionnaires (n^a) and telephone interview questionnaires (n^t). The questionnaires used in each method were identical. Equation 1 illustrates the combinative total number of respondents (n) from both datasets.

$$n = n^a + n^t \qquad (1)$$

The total number of respondents (n) equated to 101. Our pilot analysis illustrates the combinative as well as singular results

from the two datasets. The quality of the questionnaire was double checked for content and language editing with 12 environmental and 9 non-environmental experts, in five sister universities in the southern region of Nigeria before they were administered. Selected experts were asked if they had expertise and responsibilities in environmentally related programs or departments at Auchi Polytechnic.

First, a total of 65 take-home questionnaires were administered to potential responding candidates between June and August 2015. To avoid any possible delay or non-receipt of questionnaires, they were directly delivered or mailed using the local postal service. A total of 50 respondents turned in the administered questionnaires (n^d), representing a pilot take-home survey response rate of 76.9 %, totalling 16.9 % students, 43 % faculty and 18.5 % management staff. The selected candidates were then distributed between environmental and non-environmental backing to reduce the possibility of inherent self-reporting and reverse causality biasness (Kola-Lawal *et al.* 2014). To further help reduce any bias, we ensured the questionnaires were understood by each respondent and administered in such a way that respondents would have plenty of time to fill out the questionnaires by taking and completing them on their own time and sending them back to us within a one-week time frame.

Second, a year later, we conducted two sets of follow-up telephone interviews in June and July 2016. These telephone interview questionnaires were conducted by the Rector of Auchi Polytechnic. The first set of telephone interviews were conducted with Senior Administrators (SA), Department Heads (DH) and Faculty Members (FM), while the second set was done with Heads of Student Affairs (HSA) and Staff Management (SM). For this purpose, a total of 79 calls (i.e. 15 for SA, 12 for DH, 23 for FM, 13 for HSA, and 16 for SM) were made, with 51 persons ($n^{\wedge}$) (i.e. 64.5 %) accepting to take the telephone interview (i.e., 10 for SA, 7 for DH, 18 for FM, 7 for HAS, and 9 for SM) – see Figure 2 for an illustrative breakdown.

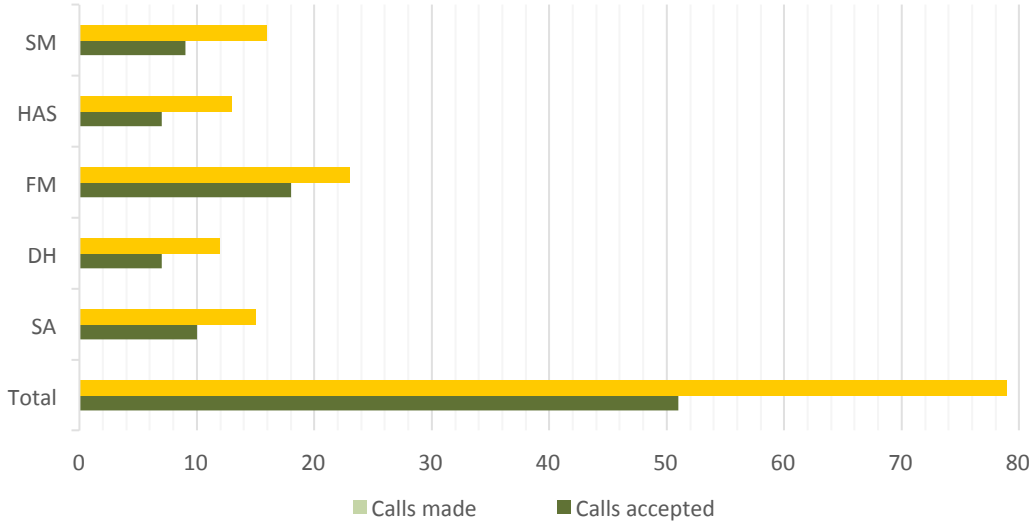


Figure 2. Telephone interview calls made versus calls accepted. Note: Senior Administrators (SA), Department Heads (DH) and Faculty Members (FM), Heads of Student Affairs (HSA) and Staff Management (SM).

All the interviews were confidential and anonymous, and have been integrated into our analysis and compared with the responses from the administered questionnaires.

V. EMS at Auchi Polytechnic: Two-Year Pilot Analysis

The structured questionnaires were administered to elicit relevant information related to four key EMS themes: (1) general awareness, (2) possible drivers, (3) possible barriers and (4) attitude to the environment and usefulness of EMS. For the questionnaires, we estimated a response rate of 80 %, equating to 52 out of 65 administered questionnaires with a distributive spread of 20 % students, 50 % faculty and 10 % management staff. Figure 3 illustrates the questionnaire actual responses versus estimated responses. The response rate was 3.1 % below our estimation with 50 respondents.

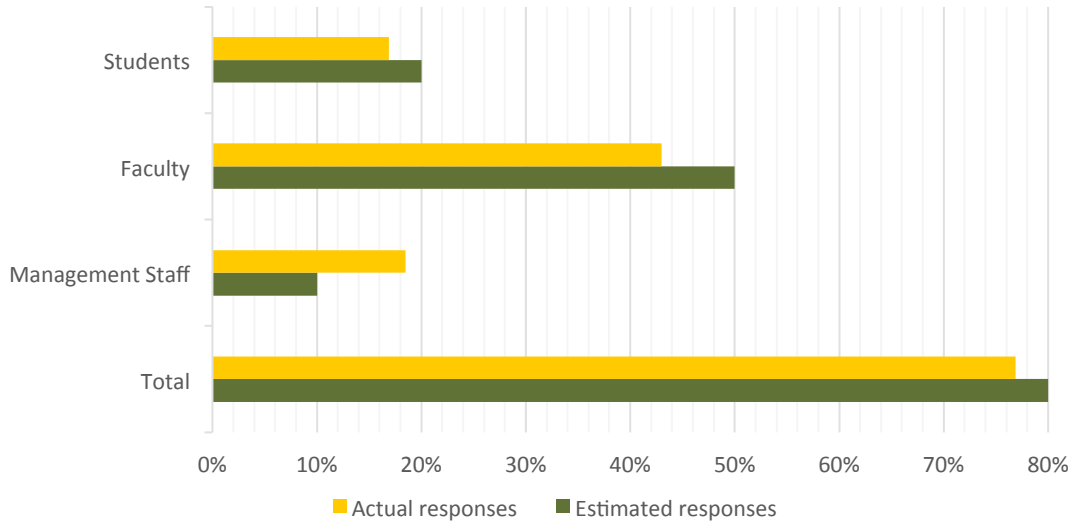


Figure 3. Questionnaire actual responses versus estimated responses from a total of 65 potential responding administered questionnaires.

For the purpose of the pilot study in 2015 the actual responses fell short of our estimations, however, the responses satisfied our curiosity to continue with the research a year later in 2016. Table 2 to 5 illustrate the analysis of the two types of surveyed questionnaires.

(i) General Awareness

First, the initial process spurred a general understanding of the amount of EMS awareness at Auchi Polytechnic. A summary of questions and responses is shown in Table 2. It illustrates, despite the fact there seems to be general environmental awareness, EMS knowledge is very limited among staff, faculty and management.

Table 2. A summary of the total number of respondents (n) to the general awareness of EMS; n = 101; n^a = 50 (*a* = administered); n^t = 51 (*t* = telephone); Y = Yes; N = No.

Questions	n		n^a		n^t	
	Y	N	Y	N	Y	N
1. Is there any environmental awareness among staff, faculty and students at Auchi Polytechnic?	85	16	47	3	38	13
2. Do you think activities at Auchi Polytechnic affect the environment?	75	26	41	9	34	17
3. Are you aware of any global or national environmental regulations or standards?	43	58	24	26	19	32
4. Are you aware of environmental management systems or EMS?	21	80	11	39	10	41

The general awareness of EMS at Auchi Polytechnic is low, although there is increasing concern for environmental issues in the University, but still there is little or no consideration for a scientific approach needed for educative implementation of EMS. This institutional lack of understanding and inaction should not be under evaluated as it can lead to an exacerbated ecological footprint and relating high-level costs. As noted earlier, these costs are directly or indirectly related to energy use, water use, solid waste generation, air emissions and green procurement (i.e. the process to conserve resources and prevent pollution). At Auchi Polytechnic, this lack of general awareness of EMS may be consequential to the statistical augmentation of used resources and lack of solutions to such inquires.

(ii) Possible Drivers

A second core aspect of the process to understanding EMS at Auchi Polytechnic is to familiarise the stance of possible EMS drivers. The total respondents suggested factors they thought could encourage and support EMS at the Polytechnic – shown in Table 3. Positive responses are illustrated from the total number of respondents (n) from the questionnaires.

Table 3. Positive responses from the total number of respondents (n) relative to possible EMS drivers; n^a = 50 (*a* = administered); n^t = 51 (*t* = telephone).

Drivers	Positive respondents		
	n	n^a	n^t
Strict legislative regulatory laws on EMS implementation	94	46	48
Government directives	87	44	43
Integration of environmental courses in all programs	78	39	39
Government incentives for compliance and punishment for non-compliance	86	41	45
Sources of revenue for the University	81	41	40
University management support	87	40	47
Prevailing regional environmental pollution and contamination	80	38	42
Environmental awareness campaign in the University	54	25	29
To improve standard and image of the University	64	34	30
Dilapidated structures and infrastructure of the University	68	39	29
Functional environmental departments in the University	78	39	39
Engagement of environmental expertise	65	30	35

At Auchi Polytechnic strict legislative and regulatory policies, government directives as well as incentives for compliance and punishment for non-compliance are seen as the most frequently stated external drivers for EMS implementation. These external drivers function at a national level and require

political and jurisdictional provision. As a higher education institution, Auchi Polytechnic potentially can prompt discussion and influence for both of these provisions. However, for the Polytechnic it is unclear how much weight is needed to acquire enough funding and support for full EMS implementation.

Internal related drivers indicate Auchi Polytechnic views EMS implementation as a source of revenue from the government, while at the institutional level, indicates best practices functionality via a top-down approach (i.e. from top management support). In addition, the dilapidated structures and infrastructure of the University, alongside a functional environmental department, where teaching and research work to incorporate both staff and students, indicate potential strong stimuli for an educative EMS-based initiative. Moreover, the inclusion of environmental courses within the country's higher education curriculum core section, would hugely foster environmental awareness and consciousness among students, and thus facilitate EMS practices and processes at the Polytechnic.

(iii) Potential Barriers

The third aspect relates to possible barriers to EMS at Auchi Polytechnic, which oppositely correlate with the possible drivers. This is understandable since, comparably, they are opposing forces weighting against one another for institutional knowledge and implementation. The identified possible barriers to systematic EMS being introduced at Auchi Polytechnic are broken down in Table 4. Positive responses are illustrated from the total number of respondents (n) from the questionnaires.

Table 4. Positive responses from the total number of respondents (n) relative to possible EMS barriers; $n^a = 50$ (*a* = administered); $n^t = 51$ (*t* = telephone).

Barriers	Positive respondents		
	n	n^a	n^t
Lack of commitment from government and University management	93	44	49
Lack of funds and expertise	96	46	50
Academic curriculum of the University	87	40	47
The disconnect between the University and society	67	38	29
Top-down policy implementation in the University	67	30	37
Lack of academic freedom in the University	56	25	31
Inadequate power supply and internet facilities	63	29	34
The salary structures for academic and non-academic staff in the University	68	33	35
Student apathy for environmental studies in the University	57	24	33
Emphasis on traditional professional programs in the University	60	21	39

At the Polytechnic, the majority of respondents believed that a lack of funding and commitment on the part of management and government will hinder EMS implementation. The academic curriculum of the country's universities will also not allow EMS to be given consideration mostly due to pre-built, time-consuming and non-inclusive curriculums. It is evident that if an EMS implementation team has limited expertise and resources, staff and faculty most likely will grant EMS low priority. According to our findings, inadequate staff salary structures already overly impact on the performance of their duties, an elevated lack of profession-based EMS expertise and consistent disconnect between universities and society. This disconnect further narrows the window of opportunities for relevant policy strategies needed to signify the importance of EMS in the Nigeria higher education. In addition, current barriers to EMS implementation at Auchi Polytechnic also relate to the inherent apathy of students to take environmental courses due to the seemingly lack of prospect therein.

(iv) Attitude to the Environment and Usefulness of EMS

Fourth, questions were asked concerning attitude to the environment and whether respondents thought EMS perceptions would be useful to improve environmental awareness and concern at the institution. Table 5 presents the three questions that were used to correlate these questions. The responses indicate 73.3% of respondents do not see the environment is properly taken into consideration, while 63.3% suggest EMS can improve the standard of education and 78.2% of respondents suggest that an EMS tool would bring positive role and responsibility to Auchi Polytechnic.

Table 5. A summary of the total number of respondents (n) on attitude and usefulness of EMS; n^a = 50 (*a* = administered); n^t = 51 (*t* = telephone); Y = Yes; N = No.

Questions regarding its usefulness	n		n^a		n^t	
	Y	N	Y	N	Y	N
1. In regards to the general attitude of staff, students and faculty, is the environment taken into consideration at Auchi Polytechnic?	27	74	16	34	11	40
2. Do you see EMS improving the standards of education in Nigeria?	64	37	38	12	26	25
3. Do you see EMS as a tool that will bring positive role and responsibility?	79	22	40	10	39	12

At an institutional level, attitude to the environment and the usefulness of EMS are fundamental to better understanding its utility and potential. At Auchi Polytechnic, it is clear that a cleaner, healthier environment is desired by students, staff and management but attitudinal concerns indicate initial educative steps will be needed if EMS is to be ensued. If one reflects on a fully implemented EMS at Auchi Polytechnic – with the inclusion of measurable environmental goals, objectives and targets that are reviewed and updated annually – environmental considerations or requirements must be appropriately prioritised and managed. This study indicates that Auchi Polytechnic's present educational system lacks basic knowhow and overall needs for EMS implementation.

VI. Discussion

We have shown that among the respondents there is awareness for the environment and impact on the environment from academic activities at Auchi Polytechnic. Yet, this awareness is not fully embraced by-way-of attitudes and actions of staff, faculty and management. This may be due to a lack of formal environmental training, and what some may label as "environmental awareness", as an over-riding boldness not to be sound environmental caretakers. Moreover, the Polytechnic does not reflect upon its own Department of Environmental Studies, which primarily focuses on academic knowledge and theory-based instruction rather than on the implication or advocacy of such knowledge. This has resulted in a very low level of EMS awareness and relating linkages to environmental standards. As a consequence, we identified relevant internal and external factors that would facilitate EMS at Auchi Polytechnic. The drivers were divided according to their nature of origin and amount of impact rendered. We identified government directives and strict legislative regulatory, with incentive for compliance and punishment for non-compliance, as major external drivers, while the prevalent dilapidated structures and infrastructure can be considered a major internal factor for EMS at Auchi Polytechnic. This result corresponds to a negligent attitude of Nigerian citizens and their inability to accept and embrace relevant changes in day-to-day living, according to P. Imonikhe (personal communication, 19 July 2016).

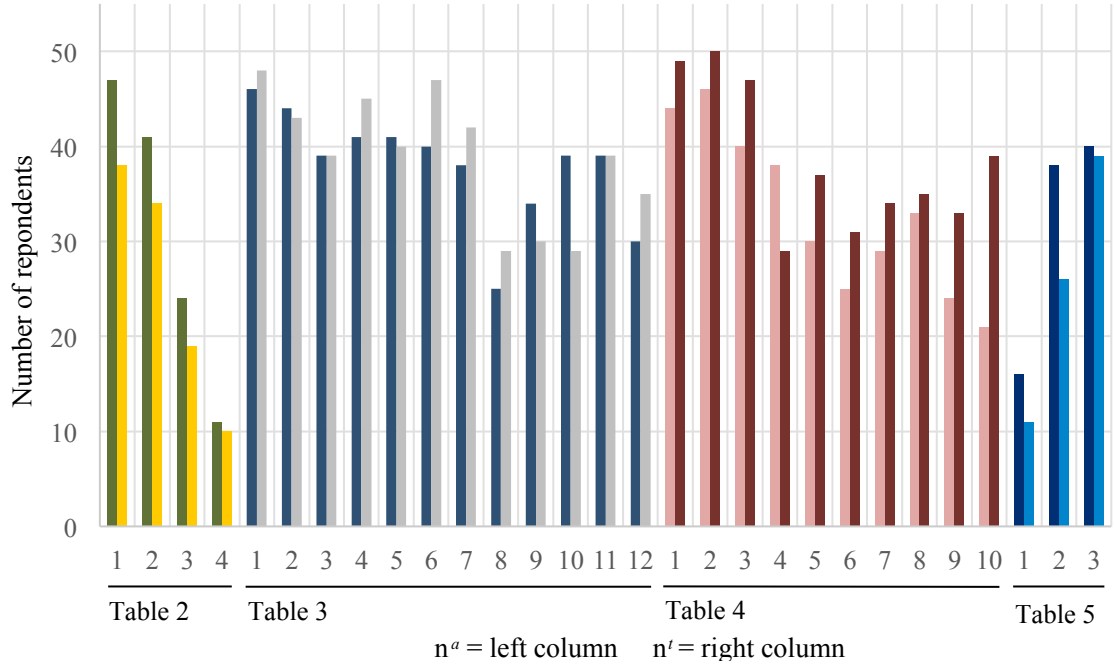
Moreover, EMS at universities in Europe, especially in Sweden, indicates key parallel external drivers – including the role of government and personal commitment of staff, faculty and management. Some European universities have stressed the role

of an environmental coordinator as vital to institutional integrity and standardisation of rules (Sammalisto and Bororson 2006). Furthermore, as sub-drivers for EMS in Europe good representation, credible delivery and optimised management have been seen as integrative, and to some degree, compulsory to institutional frameworks (Mihyo 2003). Conversely, internal EMS drivers reflect one mode that Auchi Polytechnic can use to obtain increased sources of funding (as noted in the data analysis) by 80.2% of respondents. Moreover, 64.4% of respondents said the involvement of environmental expertise in active research and teaching on environmental issues would enhance successful EMS implementation, while 77.2% suggest the integration of environmental courses in all programs of study in the University could also foster its development. Overall, it seems that if the identified drivers are to be effective as a means to a successful introduction of EMS at Auchi Polytechnic, government directives in conjunction with legislative environmental awareness campaigning are to be enacted and obeyed.

In contrast, possible EMS barriers at Auchi Polytechnic are its lack of government and management support. These top-down perspectives have the ability to hinder EMS at even its initial stages. In addition to these finding, the data analysis also showed lack of funding and inadequate academic curriculum as relevant factors to any EMS application. This correlates with previous studies that government and top management personnel are central to any EMS application and, in all likelihood, higher educational institutions Nigeria-wide.

Additionally, an important aspect that should be emphasised is the comparative results from the two types of surveyed questionnaires; that is, an analytic breakdown of data between the administered take-home questionnaires ($n^a = 50$) from June to August 2015 and the telephone interview questionnaires ($n^t = 51$) from June to July 2016. Note, only the method of data collection differed, not the questionnaires used. Figure 4 shows a compilation of positive responses pertaining to all of the questions asked, put into blocks relative to Table 2 to 5.

Figure 4. Positive responses from the total number of respondents (n) to each question from the questionnaire relative to Table 2 to 5. Table columns are coloured and labelled with its pertaining questions; Table 2 refers to general awareness of EMS; Table 3 refers to possible EMS drivers; Table 4 refers to possible EMS barriers; Table 5 refers to attitude and usefulness of EMS; n^a = 50 (*a* = administered); n^t = 51 (*t* = telephone).



The data from Figure 4 indicates limited to low variability. Analogous results point to a consistency over the two-year study and demonstrate no change in social response or standpoint from the Polytechnic toward environmental responsibilities and EMS implementation. This trend further verifies the urgent need to better look into and, potentially, exercise EMS knowhow.

Moreover, a sound interpretation of the current economic situation and the lack of good governance within the country most likely hamper the application of EMS. This notion is associated with current levels of nationwide poverty that does not permit citizens to participate in environmental matters due to survival needs and security. Another suggested barrier to EMS implementation is the academic curriculum of the country, which encourages high academic workloads, excludes environmental courses from general studies, and is often inflexible and does not credit any environmental consideration. In addition, professional attitudes within academia are not favourable in allowing current

systematic structures to change, due to culture-related impunity and non-policy implementation in the country.

Nigeria's higher educational institutions are structured in such a way that they do not appear to be aware of their responsibilities to society at large, let alone the environment. This pilot analysis reveals that positive attitudes toward the environment would result in profound environmental performance if EMS were implemented at Auchi Polytechnic. This somewhat correlate EMS studies for universities in the Western world (Sammalisto *et al.* 2015, Omrcen *et al.* 2013, Noeke 2000, Lozano 2011, Davey *et al.* 1999, Thompson and van Bakel 1995).

VII. Conclusions

This paper provides a two-year pilot analysis on how and why effective EMS could be implemented in Nigeria's higher education. Its scope is to encourage greener campuses and improve upon environmental performance throughout the country's academic institutions. For this purpose, two main research questions associated to Nigeria's higher educational institutions were looked at:

What are the possible drivers for EMS implementation?

Using our pilot analysis of Auchi Polytechnic, possible EMS drivers for its implementation include the need for a functional environmental department, and the integration of environmental courses in all programs of study, as well as the dilapidated structures and infrastructure of the University. In contrast, relevant external drivers for effective EMS in Western universities were also identified – government directives and commitment, university management support, funds and strict legislative regulations all play an important role. We postulate these key possible EMS drivers as a primary step to EMS implementation in Auchi Polytechnic and, potentially, to other higher educational institutions throughout Nigeria.

What are the likely barriers EMS implementation faces?

Our pilot analysis highlights that inadequate academic curriculums would contribute to poor consideration of environmental issues in the Nigerian universities. In addition, this circumstance is exacerbated by a poor salary structure for academics and non-academics in the University. Notable barriers also confronting EMS implementation in the Western world include: lack of funds and resources and lack of management and government commitment. Unique to Auchi Polytechnic, but perceptible in other Nigerian

higher educational institutions, are the inadequate power supply and unreliable internet services, and the emphasis on traditional professional programs in Nigerian universities. This focus on pre-professional curriculums, in our opinion, has fostered the apathy of students for environmental studies in both public and private universities in the southern region of Nigeria.

It has been a part of our premise that this study contributes to the discourse on EMS in Nigeria's higher education scheme, especially in the southern region where environmental degradation and pollution are hugely prevalent. It has provided a preliminary and useful insight into how and why EMS should be introduced into Nigeria's educative system. If properly implemented, it most likely will improve environmental awareness and performance, and work toward sustainable development, especially, in an era where several universities in Nigeria are housing dilapidated infrastructure and weak institutions, and where humanity is confronting constant global change and concomitant challenges.

It is imperative that policymakers at national, state and local levels provide support to university management if EMS is to be fully introduced and implemented. Considering the top-down policy implementation system in Nigeria, if there are government directives that can feed into or from federal agencies – including public and private universities – the same directives via state and local governments may provide additional support and, thus, introduce and implement an EMS application. It is our recommendation, the government should provide adequate funding and resources to universities and ensure proper implementation of policies by putting the responsibility on university management personnel. The academic curriculum should be reconsidered to include how staff, faculty and students can prioritise environmental matters, by possibly reducing academic workloads and allowing room for effective environmental consideration. Both the Nigerian Federal and States' Ministry of Education should assist with the establishment of proper linkages between industry, business and education sectors. This initiative should improve environmental considerations in a cohesive and practical manner through higher education, with filter effects nationwide. In conclusion, it would be beneficial to further analyse possible drivers and barriers in other universities throughout the regions of Nigeria, both private and public universities, and comparatively show the differing challenges and incentives for implementing EMS. Moreover, further studies would be needed to explore how staff and faculty perceive

sustainability within the context of their academic duties in order to boost internal support within EMS nationwide.

References

Adomssent, M., Godemann, J. and Michelsen, G. (2008). *Sustainable University – Empirical evidence and strategic recommendations for holistic transformation approaches to sustainability in higher education institutions*. Paper presented at the 4th International Barcelona Conference on Higher Education, Higher Education for Sustainable Development, Barcelona, 31 March–2 April. http://www.guni-rmies.net

Alshuwaikhat, H. M. and Abubakar, I. (2008). An Integrated Approach to Achieving Campus Sustainability: Assessment of the Current Campus Environmental Management Practices. *Journal of Cleaner Production*, 16 (16), 1777–1785.

Ammenberg, J., Wik, G. and Hjelm, O. (2001). Auditing external environmental auditors – investigating how ISO 14001 is interpreted and applied in reality. *Eco-Mgmt. Aud.*, 8, 183–192.

Balf, T. and Stuart, R. (2001). A Management Tool to Improve Environmental Performance in Higher Education. *The Declaration*, 4 (2), 16–18.

Barwise, B. (2001). Environmental Management System – A Guide for Universities, Higher Education 21. www.eauc.org.uk

Banergee, S. B. (1998). Corporate Environmentalism: Perspectives from Organizational Learning. *Management Learning*, 29 (2), 147–164.

Bennett, M. and James, P. (1999). *Sustainability Measures: Evaluating and Reporting on Social and Environmental Performance*. Greenleaf Publishing Ltd., Sheffield, U.K.

Brorson, T. and Larsson, G., (1999). *Environmental Management: How to Implement an Environmental Management System within a Company or Other Organization*. EMS AB, Stockholm.

Cascio, J., Woodside, G. and Mitchell, P., (1996). *ISO 14000 Guide – The new international environmental management standards*. McGraw Hill, New York.

Cortese, A. D. (2003). The critical role of higher education in creating a sustainable future. *Planning for Higher Education*, 31 (3), 15–22.

Davey, A., Earl, G. and Clift, R. (1999). Driving environmental strategy with stakeholder preferences: A case study of the University of Surrey. *In:* F. W. Leal, ed., *Sustainability and University Life*. Peter Lang, Frankfurt, 47–66.

Disterheft, A., Caeiro, S., Ramos, M. R. and Azeiteiro, U. M. (2012). Environmental Management Systems (EMS) Implementation Processes and Practices in European Higher Education institutions–Top-down versus Participatory Approaches. *Journal of Cleaner Production*, 31, 80–90.

Emilsson, S. and Hjelm, O. (2002). Implementation of standardised environmental management systems in Swedish local authorities: Reasons, expectations and some outcomes. *Environmental Science and Policy*, 5 (6), 443–448.

Emilsson, S. and Hjelm, O. (2009). Towards sustainability management systems in three Swedish local authorities. *Local Environment*, 14(8), 721–732.

Hansen, J. A. and Lehmann, M. (2006). Agents of change: Universities as development hubs. *Journal of Cleaner Production*, 14 (9-11), 820–829.

Hens, L. and Nath, B. (2003). The Johannesburg Conference. *Environment, Development and Sustainability*, 5, 7–39.

Iyalomhe, F. (2009). *Implementation of Environmental Management Systems and ISO 14001 in Nigeria Higher Education: Drivers and Barriers. Auchi Polytechnic as Case Study*. Master dissertation,

University of Gävle, Gävle, Sweden.

Jain, S. and Pant, P. (2010). Environmental Management Systems for Educational Institutions: A Case Study of TERI University, New Delhi. *International Journal of Sustainability in Higher Education*, 11 (3), 236–249.

Joseph, G. and Philip, M. (1996). *ISO 14001 Guilds: The New International Management Standards*. McGraw-Hill, New York.

Kincheloe, J. and McLaren, P. (2008). Rethinking Critical Theory and Qualitative Research. *In:* N. Denzin, and Y. Lincoln, eds., *The Landscape of Qualitative Research: Theories and Issues*. Sage, Thousand Oaks, CA, 260–299.

Kirkland, L. H. and Thompson, D. (1999). Challenges in Designing, Implementing and Operating an Environmental Management System. *Business Strategy and the Environment*, 8, 128–143.

Kuenen, D. (1986). *UNESCO Universities and Environmental Education: Background Paper*. UNESCO, Paris, 13–31.

Kola-Lawal, C., Wood, M., Alo, B., Clark, A., (2014). Factors in Organisational Environmental Management System Implementation – Developed vs. Developing Country Contexts. *Journal of Sustainable Development of Energy, Water and Environment Systems*, 2 (4), 408–421.

Lozano, R. (2006). Incorporation and institutionalization of SD into universities: Breaking through barriers to change. *Journal of Cleaner Production*, 14 (9-11), 787–796.

Lozano, R. (2010). Diffusion of sustainable development in universities curricula: An empirical example from Cardiff University. *Journal of Cleaner Production*, 18 (10), 637–644.

Lozano, R. (2011). The state of sustainability reporting in universities. *International Journal for Sustainability in Higher Education*, 12 (1), 67–78.

Martin, S., Dawe, G. and Jucker, R. (2006). Embedding Education for Sustainable Development in Higher Education in the UK. *In:* J. Holmberg, and B. E. Samuelsson, B. E., eds., *Drivers and Barriers for Implementing Sustainable Development in Higher Education*. UNESCO, Paris, 61–67.

Mbohwa, C. and Fukada, S. (2002). ISO 14001 Certification in Zimbabwe: Experiences, Problems and Prospects. *Corporate Environmental Strategy*, 9 (4), 427–436.

Mihyo, P. S. (2003). European Union Environmental Regulations and their Potential Impact on Market Access for Africa's Export. *In:* D. Olowu, and S. Sako, eds., *Better Governance and Public Policy: Capacity Building for Democratic Renewal in Africa*. The Kumarian Press, Bloomfield, CT, 125–138.

Noeke, J. (2000). Environmental Management Systems for Universities: A Case Study. *International Journal for Sustainability and Higher Education*, 1 (3), 237–251.

Omrcen, E., Lundgren, U. and Dalbro, M. (2013). Chapter 5: Can an environmental management system be a driving force for sustainability in higher education? A case from the University of Gothenburg, Sweden. *In:* A. König, ed., *Regenerative Sustainable Development of Universities and Cities: The Role of Living Laboratories*. Edward Elgar, Cheltenham, U.K., 88–106.

Price, T. J. (2005). Preaching what we practice: Experiences from implementing ISO 14001 at the University of Glamorgan. *International Journal of Sustainability in Higher Education*, 6 (2), 161–178.

Pickering, K. T. and Owen, L. A. (1997). *An Introduction to Global Environmental Issues*. Psychology

Press, Routledge, U.K.

Sammalisto, K. (2004). *From Government Directive to Sustainable Development in Swedish Universities*. Paper presented at the International Conference on Environmental Management for Sustainable Universities, Monterrey, Mexico, 9-11 June 2004.

Sammalisto, K. (2007). *Environmental management system – a way towards sustainable development in universities*. Doctoral dissertation, The International Institute for Industrial Environmental Economics, Lund University, Lund, Sweden, IIIEE Dissertations 2008:1.

Sammalisto, K. and Arvidsson, K. (2005). Environmental management in Swedish higher education. Directives, driving forces, hindrances, environmental aspects and environmental co-ordinators in Swedish universities. *International Journal of Sustainability in Higher Education*, 6, 18–35.

Sammalisto, K. and Brorson, T. (2006). Training and communication in the implementation of environmental management system (ISO 14001): A case study at the University of Gävle, Sweden. *Journal of Cleaner Production*, 16 (3), 299–309.

Sammalisto, K. and Lindhqvist, T. (2008). Integration of sustainability in higher education: A study with international perspectives, *Innovative Higher Education*, 32 (4), 221–233.

Sammalisto, K., Sundström, A. and Holm, T. (2015). Implementation of Sustainability in Universities as Perceived by Faculty and Staff – a Model from a Swedish University. *Journal of Cleaner Production*, 106, 45–54.

Sayre, D. (1996). *Inside ISO 14000: The Competitive Advantage of Environmental Management*. St. Lucie Press, Delray Beach, FL.

Thompson, D. and van Bakel, S. (1995). *A Practical Introduction to Environmental Management on Canadian Campuses*. National Round Table on the Environment and Economy, Canadian Cataloguing in Publication Data, Ottawa.

UN. (2016). *Dag Hammarskjöld Library Research Guides: UN Documentation: Environment*. http://research.un.org/en/docs/environment

Viebahn, P. (2002). An Environmental Management Model for Universities: From Environmental Guidelines to Staff Involvement. *Journal of Cleaner Production*, 10 (1), 3–12.

Von Malmborg, F. (2003). Environmental Management Systems: What is in it for Local Authorities? *Journal of Environmental Policy and Planning*. 5 (1), 3–21.

Welford, R. (1998). *Corporate Environmental Management: System and Strategies*. Earthscan Publications, London.