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Management Practices Towards the Incorporation of Sustainability in African Universities

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Abstract
The continent of Africa is one of the most resource-rich continents on earth, as it is so well-endowed with natural resources such as crude oil, natural gas, silver, diamond, timber, coal, bauxite, uranium, gold, chromium, mountains, forests, coastal lands, deserts, woodlands, freshwater ecosystems, etc. Despite being endowed with all these natural resources, Africa is still the poorest continent in the world. This calls for sustainable management, development and protection of the environment, and from this arises the need for African universities to help their societies respond to all these environmental, economic, and societal challenges. This study observes and evaluates the incorporation of sustainability practices in African universities. The main question in this study is, 'How are universities incorporating sustainable-oriented practices in African sustainability-focused universities as far as CORE system (Curriculum, Operations, Research, and Engagement) is considered? The employed research methodology mainly relies on content analysis of UI Green Metric ranking and universities' websites of selected universities in Africa from the UI Green Metric Sustainable University assessment and ranking index to observe the universities' integration of sustainability practices. The sample of the study is selected from four hundred and seven (407) top sustainable universities ranked by the UI Green Metric. The total population observed and evaluated in this study includes the only eleven (11) sustainability-focused Universities in Africa according to UI Green Metric sustainable ranking. It is obvious that from the observations made in this study that the studied universities have sustainability as part of their goal and have plans, policies, and strategies; they have gone ahead to incorporate some of their sustainability goals. From the findings, the eleven universities need to increase their commitment in the Operational Eco-efficiency (Setting and Infrastructure, Energy and Climate Change, Waste Reduction/ Recycling, Water Conservation, and Transportation) aspect of the CORE system. Also, in the area of Education in the CORE System, all the studied universities performed below average and need to really be more committed in this aspect of sustainability which is very important in the education of students and the society about sustainability. African universities should strive for the attainment of the sustainable development goals to achieve a sustainable society.
Keywords: Management and Sustainability Practices, Content Analysis, CORE System, UI Green Metric, African Universities.

1. Introduction

Climate change is hitting the people of Africa so hard. By the year 2100, the temperature will rise by 4°C. There will be 40% less rainfall. Some areas will get drier, and much drier at that. There will be more droughts. There will be more high winds. There will be more floods, and other extreme weather events. This presents African governments with many challenges. The GDPs of many nations in Africa will drop. Crop lands will reduce to 90%. Security defence would be stretched, which will affect people's health. Certain diseases are deeply affected by (a) socioeconomic issues, (b) the public health context, and (c) weather related changes. Weather changes would affect food and cause waterborne diseases, vector-borne diseases, and airborne diseases. Weather changes would also directly affect nutrition and food. Soil would be salinized, sometimes to toxic levels. Food spoilage would increase due to mycotoxins. Food security would decrease. Flooding, droughts, famine and other events would affect the health of people through injury, malnutrition and diseases. The increase of heat and drought would expose people to chemicals, pollutants, and waste (WHO Africa Region, 2015).

The demand for the incorporation of sustainability practices in both government and non-governmental educational institutions have become increasingly apparent during the last decades. The University is the essential agent of change in the global economy and in the preparation of professionals who can influence the attainment of a sustainable society. Universities are in a strategic position to educate and research for sustainability. Considering the fact that most corporate organizations have sustainability on their agenda, there is a need for universities to produce professionals that are sustainability-minded. This is why the importance of the present research links to current discussions regarding sustainability approaches in universities (Cavas *et al.*, 2014).

For these reasons, there is a great concern in universities to increase their students' awareness and commitment to sustainable practices. As a result, sustainable practices regarding transportation, construction, energy, waste, food, water, and landscaping are encouraged among students' organizations on campus (Emanuel, 2010). By seeking to incorporate sustainability in the system, many higher education institutions are adopting

specific sustainable management systems (Clarke & Kouri, 2009). A management system is usually based on management by objectives (Lundberg *et al.*, 2009), in which the main aim is through the process of planning, organizing, leading, and controlling employees towards performances regarding specific set of objectives. Although higher education institutions are interested in performing under a variety of objectives in their management system, this research focuses on those related to sustainability. To significantly address these problems, university management practices must have the potential to contribute to the integration of sustainability (Vecchio, 2012). Hence, an approach as the one presented here can contribute to research regarding sustainability-oriented practices in universities (Emanuel & Adams, 2011). It is the above problems that set the stage of this study in observing management practices towards the incorporation of sustainability in the top sustainability focused African universities.

2. Literature Review

Africa is the second-most- populous and largest continent after Asia in the world. It is made up of 55 countries recognized by the United Nations and African Union with 1,216 billion people. Africa is so well-endowed with natural resources and various ecosystems. It is also considered a strategic continent for global development opportunities. There are five main regions in Africa. Figure 1 shows the five regions with countries under each region according to Course hero, (2017) and Al Jazeera, (2016), Mapping Africa's Natural Resources: An overview of the continent's main natural resources. They are namely: Southern Africa, Central Africa, West Africa, East Africa and North Africa. (i) Southern Africa is made up of ten countries, such as South Africa, Zimbabwe, Botswana, Mozambique, Malawi, Zambia, Namibia, Lesotho, Angola and Swaziland. (ii) Central Africa is made up of six countries, such as the Democratic Republic of Congo, São Tomé and Príncipe, Central African Republic, Gabon, Congo, and Equatorial Guinea. (iii) West Africa is made up of eighteen countries, such as Nigeria, Mali, Chad, Guinea, Liberia, Cape Verde, Senegal, Togo, Burkina Faso, Niger, Ghana, Côte d'Ivoire, Guinea-Bissau, Cameroon, Benin, Mauritania, Gambia and Sierra Leone. (iv) East Africa is made up of fifteen countries, such as, Tanzania, Sudan, South Sudan, Ethiopia, Comoros, Uganda, Eritrea, Mauritius, Djibouti, Madagascar, Burundi, Seychelles, Kenya, Somalia and Rwanda. (v) North Africa is made up of six countries, such as Morocco, Libya, Algeria, Western Sahara, Tunisia and Egypt.

Figure 1. The Five Regions in Africa and Mapping of Africa's Natural Resources

Regardless of being so well-endowed with the ecosystem and natural resources in the continent, Africa still holds a small position in the global economy. This is because so many people are still living in poverty, wars and food insecurity. So many diseases, such as malaria and HIV/AIDS, are still wreaking havoc in the continent. Several ecological resources and valuable ecosystems are being degraded and lost. While most developed countries are busy pursuing the attainment of the Sustainable Development Goals, many African countries are still struggling to implement the Millennium Development Goals. Poor governance has led to lack of basic infrastructure, inadequate health services, and insufficient access to quality education, all of which makes it difficult to achieve sustainable development goals. The impacts of climate change have been predicted to have a devastating effect in Africa. This would affect some of the coastal cities like Lagos, Alexandria, and Cape Town due to sea-level rise. It would also affect the health, food production, and security of countries in the continent. The continent needs a high economic growth rate to combat the high level of poverty that is devastating the people in the continent. There is also need to protect the environment and natural resources that the continent is endowed with, considering the fact that Africa has the lowest carbon footprint because Africa produces only 4% of the global emissions that are affecting the climate, along with the future of the lives of people and the earth.

Good governance is a high demand in solving the challenges in all the countries in Africa. Africa will soon be the continent with the largest, youngest population in the world and this could be an advantage for the continent if the potentials and creativity of this youthful population are properly harnessed towards a vibrant economic growth (MESA:2004-2008).

2.1. Climate Change and its Effect in Africa.

Agriculture is a major sector in Africa's economy. 70% of the African population survives by farming, and agriculture generates a third of the income in Africa. Over 95% of agricultural crops are watered by rainfall in Africa. The effect of global warming makes food crop production in Africa vulnerable to climate change. It is predicted that in the year 2020, the rain-fed agriculture in Africa may drop to half. The effect of climate change is also causing devastating effects on the survival of fisheries globally. This is because of the increase of ocean temperatures caused by global warming, which in turn makes most fish to relocate to cooler waters more suitable for their survival. This causes devastating effects on the income of people that depend on fishing as a source of livelihood. Furthermore, global warming will affect the health of people in Africa. This effect can lead to the increase of diseases like malaria in the continent. Malaria, which is one of the biggest and most dangerous killers in Africa, has been reported by scientists to be on the increase and spreading because of the effects of climate change. By the end of the century, it has been predicted about 5-7% increase in the spread of malaria in the continent. The effect of global warming would increase cases of deadly diseases that have been affecting people. This can also affect the air quality of the continent which will in turn cause respiratory problems. The most vulnerable ones will be affected by these threats of the effects of global warming. This will increase the rate of migrations of African to other parts of the world (YALI, 2015).

According to AMCEN 12 decision (2008), though there is an update of AMCEN 15 decision (2015), as far as the increase of the concentration of greenhouse gases in the atmosphere is concerned, the continent of Africa has actually contributed the least, but Africa is the most vulnerable continent that is facing the impact of climate change and it also has the lowest adaptive capacity. In order to achieve the Sustainable Development Goals, Africa should focus on the implementation of climate change programs which in turn will lead to the alleviation of poverty with an emphasis on women and children, who are the most vulnerable groups. Adaptation should be the most immediate focus for Africa, considering the fact that the continent is the most vulnerable region to the impact of climate change. The continent should enable human resource development through capacity building, and should focus on the empowerment of relevant institutions, mentoring and learning-by-doing approaches, training to improve through observation, research and knowledge management and to enhance education, awareness, and communication at local and community levels towards the attainment of a sustainable society.

2.2. The ESD -Education for Sustainable Development

Sustainability is defined by the Bruntland Report Our Common Future as a development that considers and meets our current needs without compromising or jeopardizing the ability of the future generations to meet their own needs; this interconnects with the economic, social, and environmental aspects of the triple bottom line (WCED- World Commission on Environment and Development, 1987). Recently, so many definitions of sustainability in relation to sustainable higher education have become known (Madeira et al, 2011). Also, some scholars have argued that waste reduction , efficient environmental management, resource conservation, environmental health, and a booming economy through green energy depicts a sustainable campus, which will promote equity and social justice in exporting these values to the society at large (Alshuwaikh and Abubakar ,2008). In 2014, Milutinovic and Nikoli were of the opinion that the vision of a sustainable development in higher education should be a world everyone has the opportunity to profit from a quality education, learning values, behaviours and lifestyle that is required for positive societal transformation and a sustainable future (Jorge et al., 2013).

An increasing number of higher education institutions have been engaged in integrating the concept of sustainability into the university system in the last two decades (Ceulemans et al., 2011; Lazano et al., 2013; Shephard & Furnari, 2013). Alshuwaikhat & Abubakar,2008; Lozano, R, (2006), is of the view that this is because of the high level of awareness in the society about sustainability issues and the effects of activities on campus in the community and the environment. Alshuwaikhat & Abubakar (2008) and Jabbour (2006 are of the view that this contribution can happen within the area of the administrative management of the university system, education, research, and outreach/engagement. Consequently, it is imperative to evaluate management practices towards the integration of sustainability (Leal Filho, 1997, de Castro, et al., 2012). Sustainable development rests on three pillars: economic, environmental and social. These three dimensions are often used in various development programs which are the triple bottom line of sustainability. In considering the issue f sustainability, it is necessary that each dimension gives the same consideration to guaranty sustainable outcome (Rogers et al., 2008).

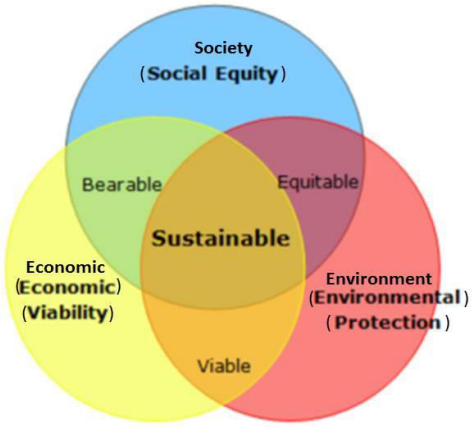


Figure 2. The Pillars of Sustainability

Figure 2 shows that to get sustainable results, a fine balance must be reached between the three components. If one component overpowers the others, the outcome will be unsustainable. Scholars have stressed the basic types of activities given in higher education institutions assessing the main elements in this transformative process towards sustainability (Hills *et al*., 2011, Christensen, *et al*., 2009, Ferrer-Balas, D., 2008). For instance, Christensen *et al*. identified that the main activities are related to the fields of operation and maintenance, teaching, research, and outreach which is engagement and cooperation with local communities, companies, the media, *etc.* (Christensen *et al*., 2009). Similarly, different definitions focus on the activities as a CORE System (Hills *et al*., 2011). The abbreviation stands for curriculum, operations, research and engagement. The CORE model is presented as a widely holistic implementation of campus sustainability initiatives on campus (Hills *et al*., 2011). Models like these are based on assessments as the one of Lukman and Glavic. (Lukman & Glavic, 2007) argued that desirable outcomes of sustainability-oriented practices are those fostering on innovations within a knowledge-based society, research, and technical development. Lukman and Glavic also argued that incorporating sustainability-oriented practices into everyday activities involves a further identification of variables such as operations, forming networks and reporting to stakeholders (assessment tools, sustainability indicators), education and research (programs, curriculum, teaching methods), and management performance (vision, mission, statement, strategy, and sustainability council/ coordinator). The construction of a framework of sustainability assessment in universities is enriched by the CORE system/model in approaches to management practices.

2.3. Sustainability and Education for Sustainable Education (ESD) in African Universities.

According to MESA:2004-2008, African Ministers of Education in 2006 took a step of commitment to sign a commitment agreement to implement the UNDESD (United Nations Decade of Education for Sustainable Development) from 2005-2014 within Africa's Second Decade of Education. They majorly committed themselves to support strategic development for implementing the UNDESD specifically in their various countries. This was to make sure that the principles of Sustainable Development Goals were embedded in educational development plans, programs, and outreaches at all levels. The African Ministers of Education stressed the point of making sure that African cultures, languages, ways of life, and knowledge system are embedded within the plans, programs, and outreaches in the Decade of Education in Africa.

Moreover, African Ministers of Education have already made some visible progress in the commitment of the sustainable development agenda, in areas such as indigenous knowledge in their various national curricula, poverty alleviation, and health. UNESCO's drafted strategy for ESD in the sub-Saharan region of Africa has given the African Ministers of Education and practitioners the guidance and training needed for the implementation of the SD within the context of the UNDESD in Africa. The major strategic principles in the UNDESD are invigorating a grassroots process for a paradigm shift in education, encouraging an interdisciplinary approach, taking a multidimensional approach that is holistic, and embedded approach to ESD in Africa. This emphasizes the involvement, participation, decentralization, and encourages coherence and harmonization, thus mainstreaming gender and emphasizing the crosscutting nature of ICT via the Education for Sustainable Development. Within this strategic plan, a partnership initiative for Education for Sustainable Development has been established by innovative universities across the continent of Africa. This is led by UNEP's Environmental Education and Training Unit, which includes UNEP, UNESCO, AAU, SADC, NBI, GVU, LEAD, UNU, ICRAF, ANAFE, HOA-REC/N and many others. This initiative encourages MESA in creating a mechanism ad supportive environment for universities to participate in handling the issues of sustainable development, climate change, and environmental challenges in Africa.

Considering the core issues by the UNESCO in the international Implementation Scheme for the UNDESD, 2005 for Education for Sustainable Development such as Environmental issues: natural resources, disaster prevention, conservation of biodiversity, transforming rural societies and environments, sustainable urbanization and mitigation of economic issues: corporate social responsibility and accountability, poverty alleviation, a wholesome market economy socio-cultural issues: good health, promotion of peace and security, fulfilment of human right, gender equality, reinforcement of intercultural understanding , good governance, preservation of cultural diversity crosscutting complex issues: sustainable consumption and production, urbanization and climate change. The vision of the UNDESD is to attain a world of equal opportunity that ensures that everyone benefits from quality education and learn the value, behaviour and lifestyle required for a sustainable future and for positive societal transformation (UNESCO, 2015).

2.4. Sustainability Assessment Tools

Considering the pillars of sustainability in Figure 3, the concept of Sustainability is concerned with the complete system and interconnected of economic, social, and environmental aspects (Lozano, 2006). Therefore, Sustainability practices are always multidimensional and no strictly one-dimensional activity (for example, economic) exists, because it is always related to environment and social aspects. This is to say that university's performance in research, education, and environmental protection are interconnected and multidimensional, too. Consequently, when the sustainability of the University is under consideration, all the dimensions should all be evaluated.

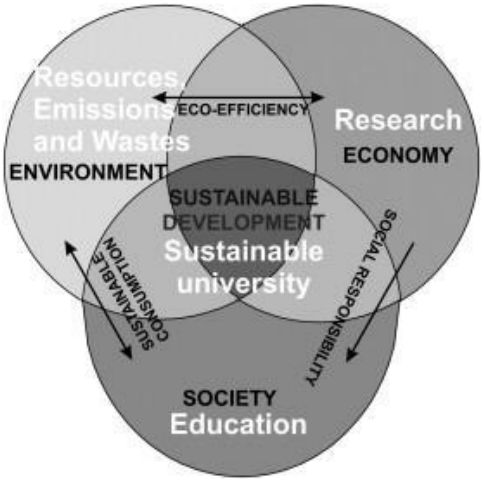


Figure. 3 A Sustainable Development model (Lukman, 2007)

The use of different assessment tools has been used in investigating the assessment of sustainability in universities with a number of critical reviews and meta-analyses. UI GreenMetric a global tool for assessing and ranking sustainability for universities which addresses this lack. The mission for the assessment and ranking of UI GreenMetric is in the interest of and should be accessible to campuses and universities in developing countries like African countries, as well as universities in the developed countries. This is just a good start for assessing campus sustainability activities. This assessment came from a number of understandings regarding the problems of introducing sustainable concepts in the Sustainability Environmental Assessment (SEA) context. Another aim of UI GreenMetric is employing its global scope to raising awareness of sustainability, as this can be an agent of change as far as sustainability is concerned (Lauder, 2015).

Table1. UI GreenMetric Assessment Categories for Assessing Sustainability in Universities.

Categories	The Percentage of Total Points (%)
1 Setting and Infrastructure (SI)	15
2 Energy and Climate Change (EC)	21
3 Waste (WS)	18
4 Water (WR)	10
5 Transportation (TR)	18
6 Education (ED)	18
TOTAL	**100**

Source: http://greenmetric.ui.ac.id/ranking-2017/

2.4.1 Setting and Infrastructure

The campus setting and infrastructure information will give the basic information of the university consideration towards a green environment. This indicator also shows whether the campus deserves to be called a Green

Campus. The aim is to trigger participating universities to provide more space for greenery and in safeguarding the environment, as well as the development of sustainable energy.

2.4.2 Energy and Climate Change

The university's attention to the use of energy and climate change issues be the indicator with the highest weight in this ranking. In our questionnaire, we define several indicators for this particular area of concern, i.e. energy-efficient appliance usage, renewable energy usage policy, total electricity use, energy conservation program, green building, climate change adaptation and mitigation program, and greenhouse gas emission reduction policy. With this indicator, universities are expected to increase the effort in energy efficiency of their building and to care more about nature and energy resources.

2.4.3 Waste

Waste treatment and recycling activities are major factors in creating a sustainable environment. The activities of university staff and students on campus will produce a lot of waste, therefore some programs and waste treatments should be among the concern of the university, i.e. recycling program, toxic waste recycling, organic waste treatment, inorganic waste treatment, sewerage disposal, policy to reduce the use of paper and plastic in campus.

2.4.4 Water

Water use on campus is another important indicator in GreenMetric. The aim is that universities can decrease water usage, increase conservation programs, and protect the habitat. Water conservation programs and piped water uses are among the criteria.

2.4.5 Transportation

Transportation systems play an important role on the carbon emission and the pollutant level in university. Transportation policies to limit the number of motor vehicles on campus, as well as the use of campus buses and bicycles will encourage a healthier environment. The pedestrian policy will encourage students and staff to walk around campus, and avoid using private vehicle. The use of environmentally friendly public transportation will decrease the carbon footprint around campus.

2.4.6 Education

This criterion comprises 18% of the total score. This expansion of the criteria is based on the thought that university has an important role in creating the new generation concern with sustainability (GreenMetric, 2017).

In the next section, the methodology applied in this study will be briefly illustrated.

Table 2. Indicators used in assessing and ranking Sustainability in Universities by UI GreenMetric

No. Categories and Indicators	Points Weighting
1. Setting and Infrastructure (SI)	**15%**
SI 1 Open space area/total area	300
SI 2 Open space area/total people	300
SI 3 Area on campus covered in forested vegetation	200
SI 4 Area on campus covered in planted vegetation	200
SI 5 Non-retentive surfaces/total area	300
SI 6 Sustainability budget/total university budget	200
Total	1500
2. Energy and Climate Change (EC)	**21%**
EC 1 Energy efficient appliance usage	300
EC 2 Renewable energy usage policy	300
EC 3 Total electricity use/total people	300
EC 4 Energy conservation program	300
EC 5 Green building	300
EC 6 Climate change adaptation and mitigation program	300
EC 7 Greenhouse gas emission reduction policy	300
Total	2100
3. Waste (WS)	**18%**
WS 1 Recycling program for university waste	300
WS 2 Toxic waste recycling	300
WS 3 Organic waste treatment (garbage)	300
WS 4 Inorganic waste treatment (rubbish)	300
WS 5 Sewerage disposal	300
WS 6 Policy to reduce the use of paper and plastic on campus	300
Total	1800
4Water (WR)	**10%**

WR 1 Water conservation program	500
WR 2 Piped water	500
Total	1000
5. Transportation (TR)	**18%**
TR 1 Total cars entering/total people	200
TR 2 Total bicycles/total people	200
TR 3 Transportation policy on limiting vehicles on campus	400
TR 4 Transportation policy on limiting parking space	400
TR 5 Campus buses	300
TR 6 Bicycle and pedestrian policy	300
Total	1800
6. Education (ED)	**18%**
ED 1 Sustainability courses/total courses	300
ED 2 Sustainability research funding/total research funding	300
ED 3 Sustainability publications	300
ED 4 Sustainability events	300
ED 5 Sustainability organizations (student)	300
ED 6 Sustainability website	300
Total	1800
TOTAL	**10000**

Source: http://greenmetric.ui.ac.id/ranking-2017/

Looking at the above assertions in Table 1, in order to achieve an exploratory qualitative study in this research, these cardinal dimensions of sustainability interwoven with the CORE System/Model (Curriculum, Operation, Research and Engagements) would be used in observing the sustainability oriented-practices of the eleven top African Sustainability focused universities according to UI GreenMetric. The methodology that was applied in this study will be explained in the next section.

3. Methodology

This study is an exploratory qualitative research that is based on content analysis. This study observed and evaluated the management practices towards the incorporation of sustainability in African universities. It is intended by this research using content analysis of UI GreenMetric and universities' websites to observe universities' incorporation and management practices related to sustainability to answer the research question of this study, which is, 'How are Africa universities' managements incorporating sustainability in sustainability focused Universities as far as CORE system (curriculum, operations, research, and engagement) is considered?' The UI GreenMetric Sustainable University assessment and ranking index was selected since it considers the Operations, Curriculum, Research and Engagements (CORE system) of universities with indicators such as setting and infrastructure, energy and climate change, waste, water, transportation and education. This covers a triple bottom line of sustainability (Environment, Economy and Society) which other indexes like GASU, GEENSHIP, AASHE: STARS, ESM and others, focused mostly on operational Eco-efficiency.

3.1. Limitations of the study

This research observed Management practices towards the incorporation of sustainability practices based on the assessment of UI GreenMetric sustainable ranking index, the website contents and sustainability annual reports of universities using the CORE system in interpreting the results of the research.

3.2. Procedure for Data Collections and Analysis

The sample of the study was selected from four hundred and seven (407) top sustainability focused universities in the world ranked by UI GreenMetric 2015 and 2016. The total populations of the study observed and evaluated in this study are the only eleven (11) Sustainability focused Universities in Africa according to UI GreenMetric sustainable ranking index. The study sample includes Kafrelsheikh University, American University in Cairo, Covenant University, Ota, University of Kwazulu Natal, South Valley University, Minia University, University of Education Winneba, Universitie Cadi Ayyad, Polytechnic of Namibia, University of South Africa, and University of Tlemcen. Table 3 shows the sustainability website links of the selected universities in their various regions.

Table 3: Selected Top African's Sustainability Focused Universities and their Sustainability Website Links or Sustainability Annual Report Links.

Regions	No	University	Sustainability Websites
Southern Africa	1	University of Kwazulu Natal (South Africa)	http://conservancy.ukzn.ac.za/Homepage..aspx
	2	University of South africa (South Africa)	http://www.unisa.ac.za/sities/corporate /default
	3	Polytechnic of Namibia (Namibia)	http://nust.na
West Africa	4	Covenant University, Ota (Nigeria)	http://covenantuniversity.edu.ng/News/Covenant-University-Flags-off-Waste-to-Wealth-Initiative#.Wbg-qcZx2M9
	5	University of Education, Winneba (Ghana)	http://www.uew.edu.gh/
North Africa	6	Kafrelsheikh University (Egypt)	http://www.kfs.edu.eg/sustainability
	7	American University in Cario (Egypt)	http://www.aucegypt.edu/about/sustainable-auc
	8	South Valley University (Egypt)	http://www.svu.edu.eg/arabic/
	9	Minia University (Egypt)	http://www.minia.edu.eg/new/
	10	Universitie Cadi Ayyad (Morocco)	https://www.uca.ma/
	11	University of Tlemcen (Algeria)	https://www.univ-tlemcen.dz/

The data collection was carried out between January and September, 2017. In order to qualify and quantify the data, the researcher used descriptive data analysis to determine the authenticity of the situation at stake. Descriptive data analysis involves the calculation of percentage distribution. This method of data analysis was used because percentage explains precisely the state of things without the complexities of other statistical methods. The data analysis used in this study involves tables, charts and diagrams which describes the common sustainability practices in the selected universities. The formula used in calculating percentages in this study is:

$$\frac{\text{University Total Score in each Category}}{\text{UI GreenMetric Total Score in each Category}} \times \frac{100}{1} = \%$$

3.3. Validity of the Research.

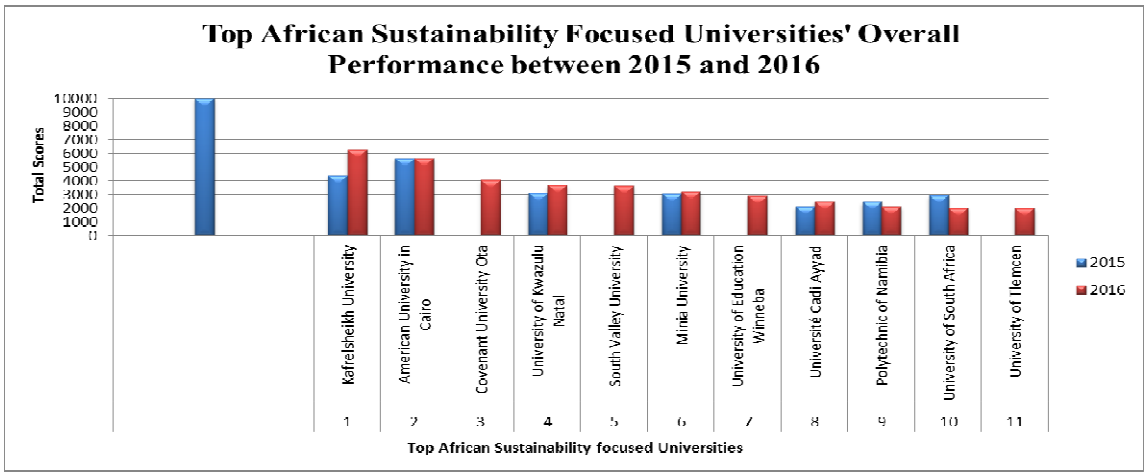
According to Onwuegbuzie *et al.,* (2012) and Jupp (2006), many researchers apply content analyses as one of the most sustainable instruments in investigating the contents of a websites. The rigorous way of analysing a document in a systematic way in order to reduce the cause and quantitatively investigate the document's characteristics is content analysis. The central issue of concern in this research places special attention to the degree in which the data used here inter-connects with the theoretical arguments generated to answer the proposed research question of this study, which is, 'How are University's managements incorporating sustainability-oriented practices in sustainability focused African universities as far as CORE system (Curriculum, Operations, Research, and Engagement) is considered?' which lies in the quality of the assessment tools elaborated to assess the embeddedness of sustainability practices in European universities. This study presents secondary research (quantitative research) based on content analysis methodology using the published data on UI GreenMetric and universities' websites which are related to sustainability to analyse the sustainability-oriented practices of the eleven selected top sustainability focused African universities according to the ranking of UI GreenMetric 2015 and 2016.

4. Findings and Evaluations

From our observations, the result shows that though to different extent, the only eleven African sustainability-focused universities in the UI Green Metric assessment and ranking index have taken sustainability seriously and are making efforts to incorporate sustainability practices in their universities. Table 2 shows the result of the UI GreenMetric assessment and ranking 2015 and 2016 for the selected universities in Africa and their scores on each indicator.

Table 4: UI GreenMetric 2015/2016 Sustainability Assessment and Ranking of top African's Sustainability focused Universities.

CORE System				Operation										Curriculum, Research & Engagement	
UI GreenMetric Sustainability indicators		Total Score		Setting and Infrastructure		Energy and Climate Change		Waste		Water		Transportation		Education	
		10000		1500		2100		1800		1000		1800		1800	
Ranking / University		2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
1	Kafrelsheikh University	4397	6254	562	913	826	1137	1050	1299	490	810	905	1053	564	1042
2	American University in Cairo	5661	5661	600	871	1450	1572	1350	1026	900	650	912	1158	449	384
3	Covenant University Ota		4073		817		703		1077		200		667		609
4	University of Kwazulu Natal	3114	3692	693	1306	404	449	975	450	250	230	375	699	417	558
5	South Valley University		3649		487		522		900		270		762		708
6	Minia University	3082	3222	410	685	514	595	750	300	250	140	453	556	705	946
7	University of Education Winneba		2882		684		661		375		470		606		86
8	Université Cadi Ayyad	2131	2499	400	526	184	191	600	249	270	190	312	699	365	644
9	Polytechnic of Namibia	2485	2124	102	156	633	325	900	450	475	275	75	252	300	666
10	University of South Africa	2941	2036	233	462	426	273	1425	1251	305	0	379	50	173	0
11	University of Tlemcen		2014		603		320		0		0		899		192



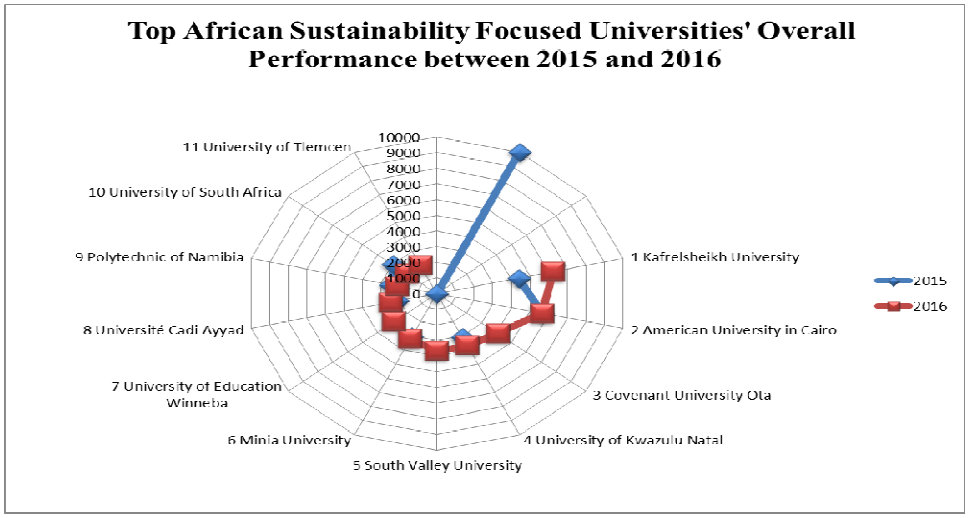


Figure 4. Analysis of Top African Sustainability focused Universities' Overall Performance between 2015 and 2016 with Bar and Radar Chart.

According to the analysis of Figure 4, it is clear that the eleven top African sustainability focused universities performed below average in the general incorporation of sustainability practices in 2015 and 2016. There was an increase in the overall commitment to the incorporation of sustainability practices in Kafrelsheikh

University and American University in Cairo while there was a low commitment to the incorporation of sustainability practices in Covenant University Ota, South Valley University, Minia University, University of Education Winneba, Universitie Cadi Ayyad, University of Tlemcen, University of Kwazulu Natal, University of South Africa, and Polytechnic of Namibia in 2016.

Table 5: Percentage Analysis of Selected Top African Sustainability focused Universities' Sustainability Practices using CORE System and UI Green Metric Indicators Between 2015 and 2016

CORE System		Operation										Curriculum, Research & Engagement	
UI GreenMetric Sustainability indicators		Setting and Infrastructure		Energy and Climate Change		Waste		Water		Transportation		Education	
		1500		2100		1800		1000		1800		1800	
Ranking / University		2015	2016	2015	2016	2015	2016	2015	2016	2015	2016	2015	2016
1	Kafrelsheikh University	37.5	60.9	39.3	54.1	58.3	72.2	49	81	50.3	58.5	31.3	57.9
2	American University in Cairo	40	58.1	69	74.9	75	57	90	65	50.7	64.3	24.9	21.3
3	Covenant University Ota		54.5		33.5		59.8		20		37.1		33.8
4	University of Kwazulu Natal	46.2	87.1	19.2	21.4	54.2	25	25	23	20.8	38.8	23.2	31
5	South Valley University		32.5		24.9		50		27		42.3		39.3
6	Minia University	27.3	45.7	24.5	28.3	41.7	16.7	25	14	25.2	30.9	39.2	52.6
7	University of Education Winneba		45.6		31.5		20.8		47		33.7		4.8
8	Université Cadi Ayyad	26.7	35.1	8.8	9.1	33.3	13.8	27	19	17.3	38.8	20.3	35.8
9	Polytechnic of Namibia	6.8	10.4	30.1	15.5	50	25	47.5	27.5	4.2	14	16.7	37
10	University of South Africa	15.5	30.8	20.3	13	79.2	69.5	30.5	0	21.1	2.8	9.7	0
11	University of Tlemcen		40.2		15.2		0		0		49.9		10.7

Table 5 depicts the percentage analysis of the selected top African sustainability-focused universities' commitment to the incorporation of sustainability practices in 2015 and 2016 using the CORE system. The Operational aspect of the system involves the setting and infrastructure, Energy and Climate change, Waste, Water and Transportation. While the Curriculum, Research and Engagement (Outreach) are all under Education according to the UI Green Metric sustainability assessment indicators.

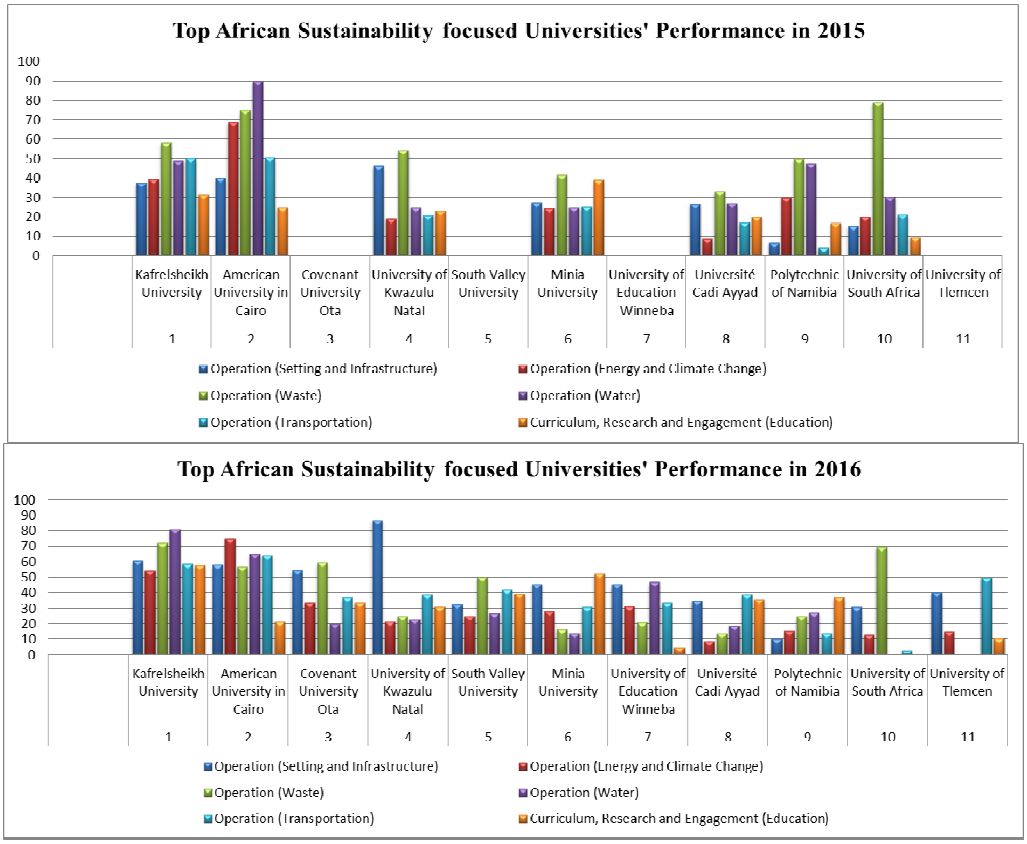


Figure 5. Analysis of the Sustainability practices in the studied Universities using the CORE system and UI GreenMetric Sustainability Indicators between 2015 and 2016.

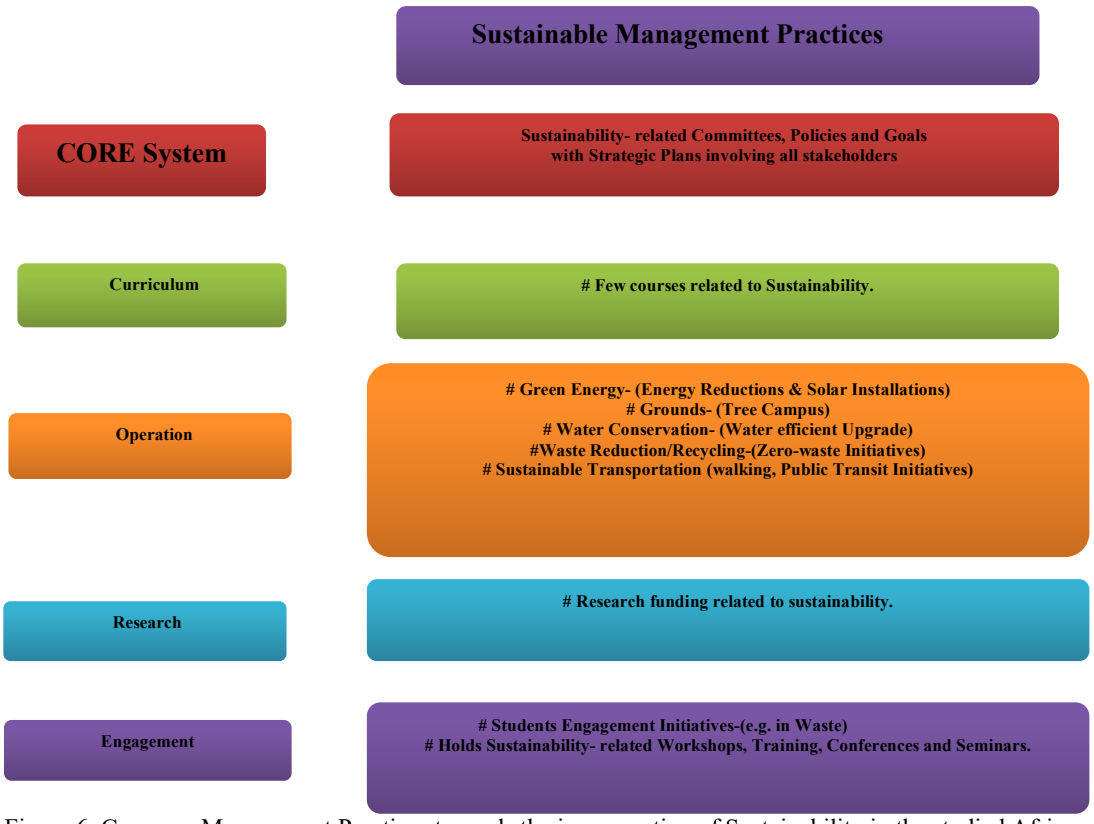


Figure 6. Common Management Practices towards the incorporation of Sustainability in the studied African Universities

4.1. Evaluation of the Operational Aspect of the CORE System (Setting and Infrastructure, Energy and Climate, Waste, Water and Transportation)

Under the Operational aspect of the CORE System, Figure 5 depicts the result of the eleven selected top African sustainability focused universities' performance. In the area of Setting and Infrastructure which consist of; Campus setting, Total areas on campus, Areas on campus covered in forested vegetation, Areas on campus covered in planted vegetation (including lawns, gardens, green roofs, internal planting), Total ground floor area of buildings, Number of academic staff and administrative staff, University budget for Sustainability effort and Retention: Non-retentive surface for water absorption on campus. It is clear that all the universities were below average in their commitment in 2015 but in the 2016, Kafrelsheikh University, American University in Cairo, Covenant University Ota and University of Kwazulu Natal were above average while the rest of the other universities were below average in both years. This shows that in the area of Setting and Infrastructure, which gives the basic information of the university consideration towards a green environment. The eleven university's campuses are still less below from being called Green Campus because of the Setting and Infrastructure on campus, which is for universities to provide more space for greenery and safeguarding the environment.

Also, Figure 5 presents the bar chart analysis of the performance of the selected universities in Energy conservation and mitigating climate change. This involves the energy efficient appliance usage, renewable energy usage policy, total electricity use, energy conservation program, green building, and climate change adaptation and mitigation program, greenhouse gas emission reduction policy. American University in Cairo is seen to be the only university that is more committed to Energy conservation and mitigating climate change in both 2015 and 2016. Kafrelsheikh University was below average in 2015 but a little bit above average in 2016 while the rest of the other universities were below average in their commitment to Energy conservation and mitigation in both years. This indicates that the top African Sustainability focused universities are still behind in commitment to environmental issues and should try their best in mitigating climate change considering the fact that Arica is the most vulnerable continent to the impacts of climate change and has the least capacity to adapt. Africa's priorities are to implement climate change programs in such a way as to achieve sustainable development. Based on the result of the analysis of Figure 5, African Universities are still expected to increase their efforts in energy efficiency to attain a high extent of the Eco-efficiency level of sustainability in their

universities and in their societies.

Considering the area of waste, which has to do with recycling programs at the university, toxic waste recycling, organic waste treatment, inorganic waste treatment, sewerage disposal, policy to reduce the use of paper and plastic on campus activities which are major factors in creating a sustainable environment? Figure 5 shows in 2015, Kafrelsheikh University, American University in Cairo, South Valley University, University of Kwazulu Natal, Polytechnic of Namibia and University of South Africa were the only universities that were above average in their commitment in managing the activities of university staff and students on campus to a large extent in reducing the production of waste through some programs and waste treatments which have been incorporated and implemented. The rest of other universities were below average in their commitment to waste reduction. In 2016, Kafrelsheikh University, American University in Cairo, South Valley University, Covenant University Ota and University of South Africa were the only universities that were more committed to recycling programs towards waste reduction in their various universities while the rest of other universities were really below average in their commitment in managing the activities of university staff and students on campus to a large extent in reducing the production of waste through some programs and waste treatments.

In the area of water conservation, this involves universities decreasing of water usage, water conservation program, piped water uses and protection of the habitat. In 2015, American University in Cairo was the only university that was able to go above average in their commitment in decreasing their water usage on campus, increase their water conservation program, and protect the habitat to a large extent in achieving water conservation while the rest of the other universities were below average in their commitment to water conservation. In 2016, American University in Cairo and Kafrelsheikh University were the only universities that put more effort in decreasing their water usage on campus towards water conservation. The other nine universities are yet to put more effort in decreasing their water usage on campus, increase water conservation program, and protect the habitat to a large extent in achieving water conservation. Considering the fact that Africa will be experiencing drought in the future, African Universities need to put more effort in water conservation on their campuses.

In the area of transportation, American University in Cairo and Kafrelsheikh University were the only universities that were above average in their commitment in decreasing carbon footprint around their campuses in 2015 and 2016. The rest of the other universities were below average in both years. Knowing that, transportation system plays an important role on the carbon emission and the pollutant level in university. The managements of the studied universities have to integrate transportation policy to limit the number of motor vehicles on campus, the use of campus bus and bicycle was encouraging for a healthier environment. The pedestrian policy which encourages students and staff to walk around campus, and avoid using private vehicle and the use of environmentally friendly public transportation which decreases the carbon footprint around campus were implemented. There is a need for more commitment from universities in the area of transportation in decreasing carbon footprint around campus.

From the above findings, African Universities should invest more in renewable energy especially solar energy. They need to engage more in the delivery of a sustainable campus infrastructure with all construction and refurbishment projects rated BREEAM (Building Research Establishment Environmental Assessment Methodology) excellent. They need to increase the number of people commuting by walking, cycling and car sharing. They need to maximize biodiversity on campus and find more opportunities to create green environments. Also, they need to create a sustainable food culture, providing fair-trade products where possible working with local food partners to increase the demand and supply of seasonal, local and organic food. African Universities should incorporate sustainable procurement by ensuring the University purchases from socially, ethically and environmentally responsible businesses and support the community and local, regional and social enterprise through business community partnerships.

4.2. Evaluation of the Educational Aspect of the CORE System (Curriculum, Research and Engagement)

Curriculum, Research and Engagement (Outreach) forms the rest of the CORE system fall under Education, which includes; *Curriculum:*- Number of courses related to environment and sustainability offered, Total number of courses offered, *Research:*- Total research funds dedicated to environmental and sustainability research, Total research funds and Number of scholarly publications on environment and sustainability published and *Engagement:*- Number of scholarly events related to environment and sustainability, Number of staff and student organizations related to environment and sustainability and existence of a university sustainability website.. Figure 5 shows that among the only eleven top African Sustainability focused Universities according to UI Green Metric, it was only Kafrelsheikh University and Minia University that were above average in their commitment in incorporating sustainability practices in their curriculum, Research and Engagement. The rest of the universities were totally below average in their commitment in incorporating sustainability in their curriculum, research and engagement programs. This shows that studied universities are yet to incorporate fully into their curriculum more courses related to sustainability. In the area of Research, universities are yet to fully

encourage research on sustainability related topics both to students and staff, which should be multidisciplinary and interdisciplinary research in sustainability. Universities have not, to a large extent published research with focus on sustainability-related issues. In the area of Engagement (Outreach), Universities have not been able to fully encourage enough sustainability activities/ projects related to community services and development. This is very important considering the critical role universities have in creating the new generation concerned with sustainability since they prepare most of the professionals, who manage and teach both public and private institutions in the society because as major contributors to the values, health and wellbeing of society, universities have a fundamental responsibility to teach, train and research for sustainability. This development is essential, as future professionals will be working globally with companies that increasingly have sustainability on their agenda.

This shows that African Universities need to work hard in the provision of education for sustainable development by engaging more in the development of education potential for sustainable development by enriching learning across the formal and non-formal curriculum. They need to work for the promotion and advancement of education for sustainable development research in relation to enhancing the students and staff experience and building a more sustainable university. They need to advance the central role of education and learning in furthering the University's cross-institutional sustainability agenda and in relation to sustainability leadership and profile in the Higher Education sector. Undertake substantial sustainability research to deliver solutions to the world's most pressing sustainability problems. Facilitate internal communications and enhance internal research interaction for sustainability. Promote sustainability research, making the Institute of Sustainability Solutions Research the single point of contact for organizations wanting to engage with the University on sustainability. They also need to increase the impact of sustainability research, support understanding of multi-disciplinary funding. Identify and communicate funding opportunities and support teams and their project ideas for sustainability research.

5. Conclusion

The purpose of this research was to answer the question: *How are universities incorporating sustainability-oriented practices in African sustainability focused universities as far as CORE system (Curriculum, Operations, Research, and Engagement) is considered?* Eleven African universities have sustainability as part of their goal and have plans, policies, strategies and have gone ahead to incorporate some of their sustainability goals. Universities in North African seen to be more committed in incorporating sustainable practices in their various universities more than others. Universities in the East and Central Africa region need to put more effort in the incorporation of sustainable practices in their universities and societies. From the findings, the eleven African universities and others universities in Africa need to increase their commitment in the Operational Eco-efficiency (setting and infrastructure, energy and climate change, waste reduction/ recycling, water conservation and transportation) in the CORE System. Also, in the area of Education which consists of (Curriculum, Research and Engagement) in the CORE System, the studied African universities need to really become more committed in this aspect of sustainability, which is very important in the education of the students and the society about sustainability. As far as the increase of the concentration of greenhouse gases in the atmosphere is concerned, the continent of Africa has actually contributed the least, but Africa is the most vulnerable continent that is facing the impact of climate change and it also has the lowest adaptive capacity. In order to achieve the Sustainable Development Goals, Africa should focus on the implementation of climate change programs which in turn will lead to the alleviation of poverty with emphases on women and children who are the most vulnerable groups. Adaptation should be the most immediate focus of Africa, considering the fact that the continent is the most vulnerable region to the impact of climate change. The continent should enable human resource development through capacity building and should focus on empowerment of relevant institutions, mentoring and learning-by-doing approaches, training to improve through observations, research and knowledge management and to enhance education, awareness and communication at local and community levels towards the achievement of a sustainable society.

African universities need to increase their commitment towards the incorporation of sustainability practices in the setting and infrastructure, energy and climate change, waste reduction/ recycling, water conservation and transportation system in their campuses and in the curriculum, research and engagement activities. This is because sustainability has the triple bottom lines of economic viability, environmental protection, and social equity will be unsustainable if one dimension overwhelms the others, the outcome will be unbalanced and unsustainable. Considering the fact that adaptation is the most immediate needed response to the vulnerability of the impacts of climate change in Africa. The continent needs capacity building in harnessing human resource and the attainment of sustainable development goals at local and community levels. Africa Universities should rise up and encourage the society at large on the need to strive for the attainment of Sustainable Development Goals that will help in achieving sustainable leadership, management, and protection of the environment in order to face all these environmental, economic and societal challenges.

Abbreviations

AAU- African Association of Universities.
AASHE- Association for the Advancement of Sustainability in Higher Education.
AMCEN- African Ministerial Conference on the Environment.
ANAFE- African Network for Agriculture and Agroforestry Education.
CORE - Curriculum Operation Research Enagegment.
ESD- Eudcation for Sustainable Development.
ESM- Environmentally Sound Management.
GASU- Graphical Assessment of Sustainability in Universities.
GREENSHIP- Greenship Rating Tools.
GVU- Global Virtual University.
HOA-REC/N-Horn of Africa Regional Environment Centre and Network.
ICRAF- International Centre for Research in Agroforestry.
LEAD- Leadership for Environment and Development.
MESA- Mainstreaming of Environment and Sustainability in Africa's Universities.
NBI- Nile Basin Initiative.
SADC- Southern African Development Community.
STARS- Sustainability Tracking, Assessment & Rating System.
UNEP- United Nations Environment Programme.
UNESCO- United Nations Educational, Scientific and Cultural Organization.
UNDESD- United Nations Decade of Education for Sustainable Development.
UNU- United Nations University.
WHO- World Health Organization African Region.
YALI- Young Africa Leaders Intivatives.

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