

# Development of an Environmental Management Information System for Sustainable Human Capital Development in Africa

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**Abstract:** Considering the environmental degradation across Africa as a result of security menace leading to environmental challenges which has affected greatly the natural resources management has poised human, political and economic instability on the entire continents. This however calls for a serious attention to all stakeholders. Case study is the Niger Delta avengers destroying the pipelines at the South-eastern part of the country and Boko haram insurgents spread across the North-Eastern part; both in Nigeria, West Africa. Using an IT approach, an EMIS conceptual model was proposed to bring about awareness to all and the consequent effects on the environments, citizenry and the entire nation at large.

**Keywords:** EMIS, Environment, Human Capital, Model, Sustainable development.

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## NONMENCLATURE:

EMIS – Environmental Management Information Systems.

## I. INTRODUCTION

Environmental management can be describe as the management of both people and resources to attain human goals while protecting environmental values in other to sustain natural systems within a geographical location. This is highly essential for the sustenance of current and future generation<sup>[3]</sup>. According to Melnyk<sup>[1]</sup>; as the principal user of nature, humanity is responsible for ensuring that its environmental impacts are benign rather than catastrophic<sup>[1]</sup>. Therefore maintenance of the ecosystem and its sustainability must be the paramount goal of every individual and a nation at large as a great tool towards human capital development for an optimal living.

## II. ENVIRONMENTAL STANDARD

In other to sustain the environmental resources, there are standards enmarked by the ISO (International Standard Organisation) to be strictly adhered to towards building a sustainable/reliable and adaptive EMIS (Environmental management system) tailored along the captured environmental data.

A good typical EMS coordinates manages, implement and sustain environmental policies based on certain criteria – Government policies, ISO standard and its effects on the geographical location. EMS however assists with Planning, controlling and monitoring policies in an organization.

## III. CASE STUDY

Considering the attacks by Niger Delta avengers destroying the oil pipelines (at the South Eastern part of Nigeria) thereby causing oil spillage at this region. Also the frequent Boko haram insurgent constant attacks and destruction of the

ecosystem at the North Eastern part of Nigeria resulting into environmental pollution are the major concerns in this research.

#### **A. Oil Spillage**

There is serious ecological resources devastation in the Niger Delta region on the overall sustainability as a result of oil spillage. Multinational Oil Corporation unguided activities across this region and vandalism of oil pipelines/bunkering by the youth in this region as a result of resource marginalization and political instability has caused serious damage to the ecosystem most importantly the aquatic animals. Therefore the environmental consequences from oil and gas exploration activities in the region are unquantifiable <sup>[4]</sup> more especially to the aquatic species (Fig. 1) resulting into environmental degradation (Fig. 4).



**Figure 1: Oil Spillage**

#### **B. Environmental Pollutants, Hazards and Insecurity**

This is the emission of poisonous gas into the ecosystem being land, water or atmosphere resulting into environmental mayhem. A typical example is the permission to dumping of toxic radioactive waste from Italy to Koko community in Nigeria. This is principally caused as a result of ignorance, poverty and illiteracy <sup>[5]</sup>. This has greatly affected human lives and the entire town as a whole which are predominantly Fishermen and Farmers. Incessant bombing and attacks by Boko Haram terrorist and suicide bombers in Nigeria have also damaged the environmental resources, death and atmospheric pollution thereby affecting lives (Fig. 2).



**Figure 2: Terrorist Attacks**

Improper dumping of refuse and poor waste management system (Fig. 3) across African continent has brought down the life expectancy in human. This is even done along the major highways polluting the whole environment (Fig. 4).



Figure 3: Poor waste disposals

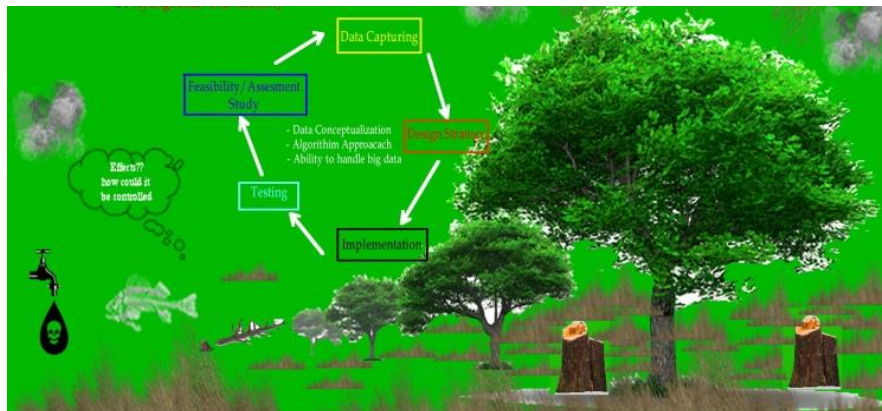


Figure 4: Environmental degradation Hazards

#### IV. PROPOSED EMIS MODEL

For continuous and effective sustainability of our environment and ecosystem, a conceptual model was developed using an Information Technological (IT) approach. This developed proposed model is called an Environmental Management Information System (EMIS) as shown in Fig. 1 below. This model can be used in sensitizing people especially in both developing and under developing countries across the globe. It can be used by the media for orientation and adverts on the need for environmental sustainability.

Meanwhile, one of the important Environmental Management System (EMS) frameworks was developed in 1996 by the International Organization for Standardization (ISO) for the ISO 14001 standard. This framework is the official international standard for an EMS which is based on the Plan-Do-Check-Act methodology<sup>[3]</sup>.

The analysis of my proposed model on each stages of development is stated as follows:

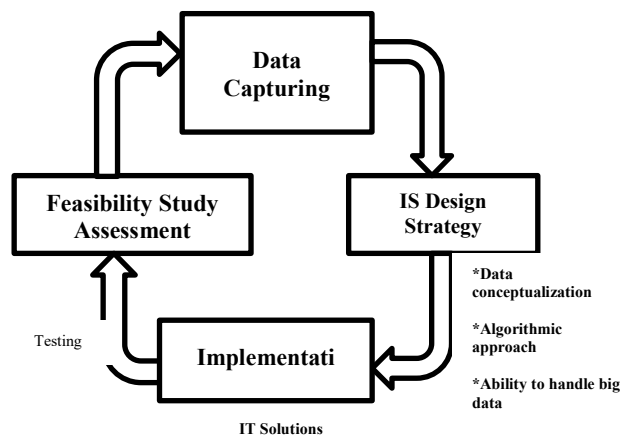


Figure 5: EMIS Model

**a. Feasibility Study / Assessment**

This is the first stage of the developmental plan in terms of the environmental challenges facing / affecting sustainability of nature and its natural resources. The case study identified in this regards cut across Oil Spillage (Niger Delta- Nigeria), Boko Haram havoc (North Eastern part of Nigeria) and poisonous Industrial emission into the atmosphere across Africa.

**b. Data Capturing Plan**

This have to do with gathering of data based on the results derived from the first stage (feasibility study) of the model development. Data were captured at the affected area of prominence via Oral interview, Questionnaires and review of relevant past literatures. However, inferences were drawn using data collation approach (Fig. 5).

**c. IS Design Strategy**

The Information Systems design approach took its root from the second stage (Data Capturing Plan) by processing (Fig. 5) the collated data using information technology techniques. This involves Data Conceptualization, Algorithmic Approach and permissibility of the system to handle big data.

**d. Implementation / Testing**

This is the last phase of the EMIS development involving IT solutions using software developmental strategy based on the previous stage approach. In this stage, inference derived is used for orientation: awareness - adverts (audio – visual approach). However the feedbacks derived determines whether the model meets the set objectives or not.

This is by ensuring that the results (Fig. 5) of the implementation phase based on the captured data is in accordance with the ISO benchmarks and meets the human capital requirements towards environmental sustainability.



**Figure 5: IS Developmental Flow**

**V. CONCLUSIONS**

For any continent to experience progress and economic stability, it is mandatory that environmental resources be well managed and effectively sustained. Therefore every action or occurrence that negates the sustainability of environmental resources needed to be given a critical attention. This can be as a result of political instability culminating into insecurity, oil spillage and sorts of environmental pollution which are all hazardous to the ecosystem. An Environmental Management Information System (EMIS) framework / model was developed based on captured data depicting the environmental degradation and how the results obtained from the model can be employed to create awareness on environmental sustainability for human capital development in Africa using an Information Systems approach.

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