CONCEPTUALIZATION OF SUSTAINABILITY THINKING IN NIGERIAN POLYTECHNICS ENGINEERING PROGRAMME: AN EMPIRICAL EXPLORATION

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Author's Biography

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Research Highlights

The study aimed to qualitatively explore three phenomena associated with sustainability, viz: concept of sustainability, meaning of sustainability thinking and relevance of sustainability thinking in engineering education, using participants from academia and industry in Nigeria. The findings of the study revealed that the participants showed great deal of understanding of the concepts, and are unequivocally analogous to descriptions, meanings and conceptualizations as embodied in many United Nations' documents. The results of the study on the relevance of sustainability thinking in engineering education also indicated that there is a desperate need, from both academia and industry, for the engineering programmes to adequately integrate sustainability in their curriculum. Reasons presented are generally in line with grounds usually advanced globally for re-orienting engineering curricula.

Graphical Abstract

Research Objectives

This study centered on the following research questions:

1. How is the concept of sustainability perceived in the electrical/electronic engineering field in both academia and industry?
2. What is the meaning of sustainability thinking according to the perceptions of electrical/electronic engineering experts from academia and industry?
3. How does sustainability thinking relevant in engineering education in Nigerian polytechnics?

Evidences are available which showed that Nigerian society is increasingly promoting planet's catastrophe, such as decreased biodiversity, increased CO₂ emission, pollution, depletion of natural resources, etc (Akinwunmi, 2014; Olayinka, 2013; and Oyedapo, 2012). As a result, developing and implementing changes in the curriculum to educate students in sustainability is essential in order to produce graduates with higher-level cognitive and critical as well as problem solving skills for our industries. This study therefore, assesses the stakeholders' understanding of the concepts associated with sustainability as a preliminary analysis for

eventual development of conceptual sustainability thinking model. This study will consequently provide prospective researchers with a solid foundation for further study especially in the field of sustainability education in Nigeria.

Methodology

The researchers adopted a qualitative approach of data collection through interview with the research participants. This research was accomplished in the North-Western geopolitical zone of Nigeria consisting of seven states and 10 polytechnics. A total of 106 electrical/electronic engineering lecturers and 168 electrical/electronic engineering personnel within 36 manufacturing industries were found in the study area, bringing the total population to 274 subjects. Cluster sampling was used to select four states out of seven, while quota sampling procedure was used in selecting ten (10) participants, including six (6) electrical/electronic lecturers from the six polytechnics, (i.e., one from each institution); and four (4) electrical/electronic engineering personnel from manufacturing industries (i.e., one from each sampled state). This research employed the qualitative approach through semi-structured interview, which was developed based on the specific objectives of the research. The interview guide/protocol was validated by six (6) TVET experts who are practitioners in the areas of sustainable development, education for sustainable development, and engineering education for sustainable development.

Results

The results of this research on the perceptions of the participants on the concept of sustainability bring to light, by and large, that their perceptions of the concept is explicitly the same with definitions, meanings, descriptions and conceptualizations of the term as presented in various UN documents. These perceptions from the participants were aligned to UN reports, conferences, charters and declarations.

The results on the meaning of sustainability thinking based on the perceptions of the participants showed a significant degree of similarity with the general or global meaning of the concept of sustainability consciousness and awareness (Kalsoom and Khanam, 2017, Olsson and Gericke, 2016, de Carvalho, de Fátima Salgueiro, and Rita, 2015). The participants accounted for several specific meanings of sustainability thinking and were captured and categorized under Acquiring Sustainability Competencies (ASC), Embed Sustainability in Curriculum (ESC), Acquiring Competencies in Critical Thinking (ACCT), Sustainability Consciousness (SC), and Comprehensive Thinking (CT).

The results on the relevance of sustainability thinking in engineering education in Nigeria generally reveals that sustainability thinking is extremely required to be integrated in to the engineering programmes in Nigeria. Various reasons were advanced by the research participants whom the researcher coded under Global Institutional Influence (GII), Sustainable Activities (SA), National and International Outcry (NIO), and Sustainable Manufacturing Productions (SMP).

Findings

Findings showed that the participants clearly demonstrated an adequate understanding on the concept of sustainability in line with the various UN's report on sustainable development. The participants have also shown divergent views on the notion of sustainability thinking, and have advanced strong reasons for why sustainability thinking in engineering curricula is relevant and inevitable. The responses of the participants are generally in line with the global reasons

for re-orienting engineering curricula. However, planet's catastrophe are evidently on the increase in the Nigerian society, which brings us to the need for empirically exploring the understanding of engineering education stakeholders as a preliminary move for development and implementing education for sustainability (EfS) in engineering programmes as a new paradigm for sustainable development, and educate students in sustainability to help curb out the menaces in the country.

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