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PERSPECTIVE ON TERTIARY EDUCATION IN NIGERIA

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TABLE OF CONTENTS

CHAPTER NINE

DEVELOPMENT OF CIRCULAR ECONOMY PROGRAMME IN NIGERIAN UNIVERSITIES: ROLES OF NATIONAL UNIVERSITIES COMMISSION

By

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Abstract

The circular economy (CE) offers a systems-level alternative to the dominant linear "take–make–waste" model by keeping materials and products in use and regenerating natural systems. Universities are strategic actors in that transition because they educate future professionals, conduct research, and manage large campus estates — all of which present opportunities for circular practices. This chapter examines the roles the National Universities Commission (NUC) can play to accelerate circular economy programmes across Nigerian universities. It argues that NUC's statutory powers (policy guidance, programme approval, and quality assurance) position it to: (1) issue national policy and implementation guidelines for university circularity; (2) coordinate and fund capacity-building for administrators, academics and technical staff; (3) broker multi-stakeholder partnerships (industry, government, NGOs); and (4) establish monitoring and evaluation (M&E) systems and accreditation criteria that reward circular practices. The chapter situates these roles in established CE scholarship and higher-education practice, and offers practical recommendations for NUC action (policy templates, training curricula, pilot campuses, and national M&E indicators). Implementing these measures will align Nigerian universities with national circular economy goals and international good practice.

Keywords: Circular economy; higher education; National Universities Commission; Nigeria; policy; capacity building; monitoring and evaluation; university-industry partnerships

Introduction

The circular economy is an increasingly popular concept in the field of economics, with the potential to address pressing environmental issues such as resource depletion and pollution. It presents an alternative to the traditional linear economy, which is based on a "take-make-waste" model. The circular economy, on the other hand, aims to keep resources in use through strategies such as reuse, repair, and recycling. This approach has been gaining traction in both academia and industry, with many organizations adopting circular economy principles to reduce their environmental impact and improve their bottom line.

The implementation of a circular economy in universities in Nigeria has been widely recognized as a key factor in achieving sustainable development and promoting environmental responsibility. However, the roles of National Universities Commission in the development of circular economy in the Nigeria Universities cannot be underestimated. The critical roles of NUC in facilitate the development of circular economy in the Nigerian universities through; policy formulation and implementation of capacity building programme for implementer and facilitating partnerships between universities and external organizations and stakeholders on circular economy and implementation of monitoring and evaluation.

Thus, this chapter is discussed under the following subheadings.

Clarification of concepts

- Circular economy

- Concept of National Universities Commission

- Roles of National Universities Commission in the development of Circular Economy in the Nigerian Universities

Concept of circular economy

The concept of a circular economy is gaining increasing importance as the world grapples with the challenges of resource depletion, environmental degradation, and climate change. The circular economy model focuses on minimizing waste and maximizing the use of resources, promoting sustainability and reducing environmental impact. Central to the concept of a circular economy are four core principles: reduce, reuse, recycle, and remanufacture. These principles offer a fundamental shift from the traditional linear economy, which has been the dominant model for industrial production and consumption (Onukwulu, Agho, & Eyo-Udo, 2022).

The first core principle of circular economy is "reduce." This principle according (Okwiri, 2017, Shahbaz, et al., 2017; Olayiwola & Sanuade, 2021; Okoroafor, et al., 2022; Onukwulu, et al 2022) advocates for the minimization of resource use and waste generation throughout the production and consumption processes. In the context of energy supply chains, reducing the consumption of raw materials, such as fossil fuels, can have significant environmental benefits. The extraction and

burning of fossil fuels are among the primary contributors to greenhouse gas emissions, air pollution, and environmental degradation. By reducing the dependence on these non-renewable resources, Onukwulu, et al (2022) noted that energy companies can help curb the negative impacts of energy production on the environment. This reduction can also extend to energy consumption, where more efficient systems and technologies can be employed to minimize energy waste across supply chains. For example, energy-efficient technologies, such as smart grids and demand response systems, can help optimize energy distribution and reduce unnecessary consumption.

The second principle of circular economy is "reuse," according to (Dufour, 2018; Akpan, 2019, Bassey, 2022, Oyeniran, et al., 2022, Martin, 2022; Onukwulu, et al 2022), this emphasizes the importance of finding new uses for products or materials that have reached the end of their initial life cycle. Reusing materials and components within energy supply chains can significantly extend their life and reduce the need for new resources. For instance, in the renewable energy sector, components such as solar panels, wind turbines, and batteries can be refurbished and reused after their initial lifespan. Rather than discarding these materials, they can be reintroduced into the production process, reducing the need for raw material extraction and minimizing waste. Reuse can also be applied to energy systems, such as repurposing energy storage devices or finding secondary uses for byproducts of energy generation. By prioritizing reuse, energy companies can lower costs and reduce their environmental footprint (Onukwulu, et al 2022.

"Recycle" is the third core principle of circular economy according to Onukwulu, et al (2022); Okeke, et al., (2022), El Bilali, et al (2022), McCollum, et al., (2018) and Aftab, et al., (2017) is closely related to the previous two principles. Recycling involves processing used materials into new products, preventing them from being discarded as waste. In energy supply chains, recycling can take many forms, such as the recovery of valuable metals from decommissioned wind turbines or the recycling of batteries used in energy storage systems. This reduces the need for new raw materials, which are often scarce or environmentally damaging to extract. Recycling also helps to divert waste from landfills and reduces pollution. One key area where recycling has gained attention in the energy sector is in the management of electronic waste (e-waste). Solar panels, batteries, and other energy-related technologies often contain materials such as silicon, lithium, and cobalt, which are valuable and can be recycled for use in new products. As the demand for renewable energy sources grows, so too does the need for effective recycling systems to manage the materials used in these technologies (Onukwulu, et al 2022).

The fourth core principle of circular economy is "remanufacture," Onukwulu, et al (2022); Kabeyi & Olanrewaju, (2022), Lohne, et al., (2016) and Kinik, Gumus & Osayande, (2015), refers it to the process of restoring used products to a like-new condition by repairing, upgrading, or replacing worn-out components. In energy supply chains, remanufacturing can help extend the life of expensive equipment and reduce the need for new production. For example, remanufacturing turbine blades for wind energy or refurbishing power plants can reduce the environmental and economic costs of building new infrastructure. Remanufacturing is not limited to the repair of physical components; it can also apply to the revitalization of energy systems. For instance, in the

power generation sector, outdated or inefficient power plants can be upgraded with new technologies to enhance their performance and reduce their environmental impact. By incorporating remanufacturing into energy supply chains, companies can conserve resources, reduce waste, and support the transition to a more sustainable energy infrastructure (Onukwulu, et al 2022).

The circular economy is a model of production and consumption that emphasizes reducing waste, reusing resources, and recycling materials to create a closed-loop system. Unlike the traditional linear economy, which follows a "take, make, dispose" approach, the circular economy focuses on maintaining the value of products, materials, and resources in the economy for as long as possible (Dickson & Fanelli, 2018; Bassey, 2022, Okeke, et al., 2022, Onukwulu, et al 2022). Circular economy is a systematic process focusing on services and goods production, its utilization practices, consumption behaviour and recycling or reuse of the resources to minimize waste and maximize the use of resources. Circular economy deals with an organized and planned actions and activities to ensure regeneration of waste resources and ensuring by-product and materials are reuse by recycling and regenerating natural systems for sustainable environment (Ogunode, 2025).

Circular economy is the activities of closed-loop systems and it involves the following; products and materials are designed to be reused, recycled, or repurposed at the end of their life rather than being disposed of as waste; reduction of the amount of resources extracted from the environment and the amount of waste sent to landfills; presents economic opportunities by creating a closed-loop system, education services can save money on raw materials; reduction of waste disposal costs, and potentially develop new revenue streams from recycled to schools; and stimulate innovation as schools look for ways to design products that can be easily reused or recycled (Ogunode, 2025).

The conservation of natural resources has become a rising global concern in recent years, and the concept of Circular Economy (CE) has gained significant prominence due to its comprehensive nature, encompassing a wide range of related concepts. Circular economy is a framework that seeks to reduce waste and pollution and maximise the value of products and materials by sharing, leasing, reusing, repairing, refurbishing, and recycling them (Rezk et al., 2023; Kirchherr et al., 2023; Rezk, Piccinetti, Salem, Omoruyi, Santoro, 2024). Achieving a circular economy will require transformation throughout the supply chain and significant involvement of all the key actors, including government, business, researchers, and consumers, with the goal of achieving economic sustainability; the circular economy model works at three different levels: micro (products, businesses, and customers), macro (eco-industrial parks), and macro (cities, regions, countries, and beyond). It is based on this that this seek to explore the roles of National Universities Commission in enhancing the development of circular economy in the Nigerian universities.

Concept of National Universities Commission

The National Universities Commission is a parastatal under the Federal Ministry of Education. It was established in 1962 as an advisory unit in the Cabinet Office with the responsibility of advising the Federal Government of Nigeria on the development of University Education. However, in 1974, it became a statutory body following the promulgation of Degree No. 1 of 1974, (now Act No. 1 of 1974) and the first Executive Secretary, in the person of Professor Jubril Aminu was then appointed. In contemporary times, the powers of the NUC are derived from the National Universities Commission Act, CAP. N81, Laws of the Federation of Nigeria, 2004, and, Education (National Minimum Standards and Establishment of Institutions) Act, Laws of the Federation of Nigeria, 2004 (As Amended). These Laws are in simple parlance referred to as NUC's Establishing and Operational Acts, respectively.

According to Bisong, (2025) , the functions of NUC include to: advise the President, States Governors and Private Proprietors through the Minister of Education on the creation of new universities and other degree awarding institutions in Nigeria; prepare, after consultation with all the State Governors, the universities , the National Manpower Board and such other bodies as it considers appropriate, periodic master plans for the balanced and coordinated development of all universities in Nigeria, and such plans shall include: the general programmes to be offered by the universities in order to ensure that they are fully adequate to meet the national needs and objectives; undertake periodic reviews of the terms and conditions of service of personnel engaged in the universities and to make recommendation thereon to the Federal Government where appropriate; lay down Minimum Standards for all universities in the Federation and to accredit their degrees and other academic awards after obtaining prior approval therefor, through the Minister from the President; be the regulatory agency responsible for the work related to the proper conduct of the affairs of universities, provided that the accreditation of degrees and other academic awards shall be in accordance with such guidelines as may be laid down and approved by the Commission from time to time.

For Olaleye, and Oyewole, (2016), and Ogunode, and Samuel (2022) and Ogunode, Edinoh, and Rauf, (2023) the specific functions of NUC include; determination and maintenance of Minimum Academic Standards (MAS) in the NUS: approval of programmes and courses in Nigerian Universities and other degree-awarding institutions; accreditation of academic programmes run in the NUS; monitoring of universities; and the provision of guidelines and processing of applications for the establishment of private universities in Nigeria.

Ogunode, Nwisagbo, and Soetan-Ayanfe, (2024) noted that the NUC also formulate policies for the universities. These policies include quality assurance, recruitment, data collection and dissemination policy and general administrative policies such as establishment of unit or directorate. NUC according to ….can also issue directive to the universities in Nigeria to implement policy or programme.

Roles of National Universities Commission in the development of Circular Economy in the Nigerian Universities

Policy formulation for implementation of circular economy, creation and implementation of capacity building programme for implementer, facilitate collaboration and partnerships with external organizations and stakeholders and monitoring and evaluation

Policy formulation for implementation of circular economy

The National Universities Commission can support the development of circular economy in the Nigerian universities by formulating an implementable policies and actions plans for the universities. This policy framework will help the universities to develop their individual actions for the implementation of circular economy in the various universities. Policy formulation is a crucial aspect of implementing circular economy in universities in Nigeria. The need for universities in Nigeria to adopt circular economy practices and outlines potential policies that can support this implementation is crucial. The policy frame work will capture stakeholder involvement and collaboration in the programme implementation. The policy will help to developing effective policies within the university system to promote sustainable development in the institutions It should also require universities to submit CE action plans during programme approvals and reaccreditation cycles (NUC Act, 2004). Consultative policy design involving academics, students, industry, and local governments will improve implementation (European Commission, 2020).

Creation and implementation of capacity building for implementer

The National Universities Commission can also support development of circular economy in the Nigerian universities by organizing Capacity building programme for all the universities administrators and leaders. Capacity building for implementation of circular economy in universities in Nigeria can yield numerous benefits for both the academic community and the country as a whole. By developing the necessary skills and knowledge required for the circular economy, universities can become leaders in sustainable development and set an example for other institutions and industries. This not only improves the reputation of the universities, but also contributes to the overall progress of the country towards a more sustainable future. Capacity building for the implementers of circular economy can also lead to increased research and innovation opportunities for universities. As the world shifts towards sustainable practices, there is a growing demand for research on circular economy and its implementation. By equipping universities with the necessary resources and expertise, they can conduct cutting-edge research and contribute to the advancement of this field. Capacity building is a cornerstone of promoting circular economy practices in rural areas. Developing training programs that focus on practical skills related to recycling, waste management, and sustainable agriculture can empower universities stakeholders to take action. Workshops led by experts can provide hands-on

experience and demonstrate the feasibility of circular practices in everyday life (European Union 2025). Training should cover CE principles, curriculum integration, research methods, and campus operations. Such programmes can empower universities to lead in sustainable innovation and knowledge generation (Mendoza et al., 2019; UNEP, 2021).

Facilitate collaboration and partnerships with external organizations and stakeholders

NUC can assist in the creation and implementation of workshops and programs that focus on promoting circular economy principles within the school community. By empowering these teachers to take an active role in promoting a circular economy, the implementation of such programs in Nigerian schools can be more effective and have a lasting impact. NUC can also facilitate collaboration and partnerships with external organizations and stakeholders to enhance the impact and reach of circular economy programs in the universities. With their important role in promoting the teaching and learning of circular economy principles, it is essential to prioritize the hiring and training of qualified teachers in Nigerian universities. Collaboration among stakeholders is crucial for the successful implementation of circular economy in universities in Nigeria. This ensures that all parties involved work together towards a common goal, leading to more effective and sustainable outcomes. Collaboration among stakeholders brings together individuals with diverse backgrounds and expertise. This enables a multidisciplinary approach to addressing the complex challenges of implementing circular economy in universities in Nigeria. By working together, stakeholders can contribute their unique perspectives and skills, leading to innovative solutions. Collaboration allows for the sharing of resources among stakeholders. This can include financial resources, knowledge, and equipment. This helps to alleviate the burden on individual stakeholders and makes the implementation process more efficient. When stakeholders collaborate, they are more likely to support each other's initiatives. This creates a positive and supportive environment for the implementation of circular economy in universities in Nigeria. Stakeholders can provide advice, share best practices, and offer assistance when needed. Collaboration according to European Union (2025), among various stakeholders is essential for promoting circular economy practices in rural areas. Local governments, businesses, NGOs, and community members must work together to create a cohesive strategy that addresses the unique needs of each community and universities. Engaging stakeholders in the planning process ensures that initiatives are relevant and tailored to local contexts. Financial support from government agencies or NGOs can help alleviate the initial costs associated with implementing new practices. For instance, funding could be allocated for purchasing equipment that facilitates recycling or composting. Adland, Cariou & Wolff, (2019), Oyeniran, et al., (2022) advocated for collaboration and partnership to enhance development of circular economy.

Monitoring and evaluation

The NUC have a critical role of ensuring effective monitoring and evaluation of circular economy implementation in the universities. The implementation of circular economy in universities in

Nigeria has numerous potential benefits that can be achieved through proper monitoring and evaluation. By the NUC By utilizing this approach, the commission can effectively track and measure the progress in implementing circular economy practices and identify any areas for improvement. Monitoring and evaluation can provide valuable insights into the effectiveness of circular economy initiatives in universities (Ogunode, 2025). This can include evaluating the impact of these practices on reducing waste and promoting sustainable resource use. NUC via M & E can also use this information to make informed decisions on how to further improve their implementation of circular economy principles. Monitoring and evaluation by NUC can help universities assess the economic benefits of circular economy practices. This includes identifying cost-saving opportunities, such as reducing energy and water usage, as well as potential revenue streams from recycling and reuse initiatives. By tracking these benefits, universities can demonstrate the financial viability of implementing circular economy practices, which can attract further funding and support. To ensure the effectiveness of circular economy initiatives in educational institutions, monitoring and evaluation are crucial components of any strategy. Establishing clear metrics for success allows universities stakeholders to assess their progress and identify areas for improvement. Regular evaluations can help determine whether specific initiatives are meeting their objectives and contributing to overall sustainability goals (European Union 2025).

Summary

In conclusion, implementation of circular economy in universities in Nigeria has numerous benefits, ranging from shaping a more sustainable future to driving economic growth. The involvement of the NUC is vital in the realization of the goals of circular economy in the universities. The NUC has the roles of providing policy framework for implementation in the universities, creation and implementation of capacity building programme for implementer, facilitate collaboration and partnerships with external organizations and stakeholders and monitoring and evaluation By providing theses legal documents and other support in this important aspect, universities can become leaders in sustainability and contribute to the overall progress of the country. Collaboration allows stakeholders to identify potential barriers to the implementation of circular economy in universities in Nigeria. By working together, they can anticipate challenges and develop strategies to overcome them. This leads to a more streamlined and effective implementation process.

Monitoring and evaluation of the implementation of the programme by NUC can also aid in measuring the environmental impact of circular economy initiatives in universities. This can include evaluating the reduction of greenhouse gas emissions, water pollution, and other environmental indicators. By monitoring these impacts, universities can showcase their commiment to sustainability and contribute to the larger goal of mitigating climate change and protecting the environment. The NUC has a critical role to enhance the successful implementation

of circular economy practices in universities in Nigeria. Government should direct the NUC to fully mobilize all human and materials resources to support the full implementation of the circular economy in the Nigeria universities.

Implementing CE in Nigerian universities offers benefits ranging from waste reduction and cost savings to research innovation and climate action. The NUC, through its statutory authority, can catalyze this transition by:

1. Formulating national CE policy frameworks;
2. Building capacity across the university system;
3. Facilitating partnerships; and
4. Establishing robust M&E mechanisms.

By mobilizing these functions, the NUC will align Nigerian universities with national sustainability goals and international CE best practices (Rezk et al., 2024).

Revise Questions

1. What is the circular economy?
2. Define the National Universities Commission.
3. List four roles of the National Universities Commission in the development of the circular economy in Nigerian universities.

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