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Circular Economy Programme in Tertiary Education Nigeria: Benefits and Challenges

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Abstract: The Circular Economy has gained increasing attention as a sustainable development model in recent years. However, despite its potential benefits, the implementation of circular economy initiatives in tertiary institutions in Nigeria faces significant obstacles. This study aims to assess potential benefits, the implementation of circular economy initiatives in tertiary institutions in Nigeria and investigate the challenges faced in implementing circular economy initiatives in tertiary institutions in Nigeria. Through a comprehensive literature review, data analysis, we have identified potential benefits, the implementation of circular economy initiatives in tertiary institutions in Nigeria and the main obstacles hindering the successful implementation of circular economy initiatives in Nigerian tertiary institutions. Our findings suggest that lack of policy support, inadequate resources, and limited stakeholder involvement are major barriers to the effective adoption of circular economy principles in these institutions. Furthermore, our research proposes potential solutions and recommendations to overcome these challenges and promote the integration of circular economy practices in the Nigerian higher education system. Overall, our study sheds light on the current state of circular economy implementation in tertiary institutions in Nigeria and provides valuable insights for policymakers, educators, and other stakeholders looking to drive sustainable change in this sector.

Keys words: Circular Economy, Tertiary institutions.

1.0 Introduction

Tertiary education, also called post-secondary education, is any level of education pursued beyond high school, including undergraduate and graduate credentials. These credentials encompass certificates, diplomas or academic degrees. Tertiary education refers to specialized education in a specific field, taken on after finishing high school. Tertiary education is non-compulsory and provided in a specialist institution, usually a college, polytechnic or university. This form of education may be delivered virtually or at a distance (Top-hat, 2023).

Tertiary education is an organized educational system that is consciously designed for manpower production, in-service training and national development. Tertiary education is an education that

advances teaching, research and community services for national development. Tertiary education is an education industry that is meant for the production of manpower and national development via implementation of teaching, research and provision of community services. The objectives of tertiary education includes; to provide higher education opportunities via effective teaching, researching and provision community services; to develop produce students with specialized knowledge and skills for solving personal problem and national problem; to prepare student for national workforce and to contribute to societal and community development; to provide academic program of various disciplines; to provide quality instruction in field of studies and to conduct researches to generate new knowledge for national development and to solve complex problems (Muhammad, 2022; Ogunode, 2025a).

According to statistics, the world is currently facing a growing concern of resource depletion and environmental degradation. As a result, the concept of circular economy has emerged as a potential solution to promote sustainable development. In this regard, many tertiary institutions are now being encouraged to adopt recycling and reuse practices as well as shift towards renewable energy sources. The education sector, from primary school to postgraduate study, plays a vital role in ensuring students of all ages are equipped with the key skills and knowledge to apply circular thinking in their chosen careers. Climate change has been a major concern for tertiary institutions in Nigeria, as it has affected them in various ways. One of the primary impacts of climate change on these institutions is the changing weather patterns, which has led to extreme weather events, such as floods and droughts. This has resulted in disruptions to academic calendars, as schools are forced to close due to flooding or lack of water. As a result, students' education is interrupted, and they are unable to keep up with their studies (Muhammad & Muhammad, 2024)

Extracurricular activities, though beneficial for students' development, can also have negative environmental impacts. The transportation required for sports events and field trips can significantly increase carbon emissions. Additionally, the use of resources, such as water and energy, during these activities can also have a detrimental effect on the environment. With the escalation of environmental defiance such as climate change, the deterioration of natural resources, and the increment in waste, the CE has emerged as one of the modern and innovative resolution to achieve this balancing (Muhammad & Muhammad 2023**;** Ganawi, 2025). It is based on this that this study seeks to explore the benefits and challenges facing implementation of circular economy in the Nigerian tertiary institutions

2.0 Literature Review

3.0 Concept of Circular Economy

A circular economy is an economic system aimed at minimising waste and making the most of resources. Unlike the traditional linear economy, which follows a ‘take, make, dispose’ model, a circular economy focuses on reducing, reusing, and recycling materials to keep products, components, and materials at their highest utility and value at all times (Oknkwor, 2024). Circular economy is a system where materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting. The circular economy tackles climate change and other global challenges, like biodiversity loss, waste, and pollution, by decoupling economic activity from the consumption of finite resources. The circular economy is based on three principles that includes; , driven by design: eliminate waste and pollution; circulate products and materials (at their highest value) and regenerate nature (Ellen MacArthur Foundation 2025).

Circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the life cycle of products is extended. In practice, it implies reducing waste to a minimum. When a product reaches the end of its life, its materials are kept within the economy wherever possible thanks to recycling. These can be productively used again and again, thereby creating further value. This is a departure from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern. This model relies on large quantities of cheap, easily accessible materials and energy

(European Union 2025). The circular economy is different. It works like nature—where nothing is wasted. In this model: Products are designed to last longer; Items are repaired and reused instead of thrown away; Materials are recycled into new products and Waste is minimized or turned into something useful (Muhammad, 2022 GoSharpener 2025). Circular economy, on the other hand, aims to minimize waste and promote a sustainable use of natural resources, through smarter product design, longer use, recycling and more, as well as regenerate nature. Circular economy can help to tackle the problem of pollution, circular economy can play a critical role in solving other complex challenges such as climate change and biodiversity loss (UNDP 2023).

Circular economy approaches according to (UNDP 2023) are all around us. They can be employed in a number of different sectors from textiles to buildings and construction, and at various stages of a product's lifecycle, including design, manufacturing, distribution, and disposal.

In textiles and fashion, there are initiatives that employ regenerative agriculture to produce organic cotton and other natural fibres, using natural colorings and dye, thus ensuring higher quality and safer garments for the health of consumers and the environment. By producing higher quality garments, clothing can also last longer, be repaired, thrifted, and recycled.

In buildings and construction, circular solutions can include reducing virgin material use, re-using existing materials in circulation, or substituting carbon-intensive materials for regenerative alternatives such as timber.

In a circular economy, electronic goods are refurbished, water-soluble, recyclable and truly biodegradable packaging becomes the norm, and animal waste is used as natural fertilizers and processed into biogas for cooking, heating and lighting (UNDP 2023).

The Pillar of Circular Economy includes;

Pillar 1: Materials are cycled at continuous high value

Instead of degrading resources through downcycling or inefficient processes, this principle emphasizes preserving material complexity. Cascading materials in their most valuable form ensures longer usability, supports repair and remanufacturing, and reduces the need for virgin resource extraction.

Pillar 2: All energy is based on renewable sources

Circular economies are powered entirely by renewable energy, with systems designed to minimize energy loss, avoid unnecessary conversions, and favor local, efficient generation and cascading use—like capturing waste heat.

Pillar 3: Biodiversity is supported and enhanced

A regenerative economy actively protects and restores biological diversity. Circular strategies reduce land degradation, avoid ecosystem disruption, and prioritize conservation—especially in vulnerable habitats.

Pillar 4: Human society and culture are preserved

True circularity values cultural diversity and social cohesion alongside ecological sustainability. This pillar emphasizes fair labor, inclusive governance, and respect for local traditions and knowledge.

Pillar 5: Health and wellbeing are structurally supported

In a circular system, economic activity must never compromise human or planetary health. Toxic substances are phased out, and processes an product are redesigned for safety and dignity.

Pillar 6: Human activities maximize generation of societal value

This pillar reframes value creation to include emotional, cultural, aesthetic, and ecological contributions—not just financial profit. Businesses are encouraged to generate positive externalities wherever possible.

Pillar 7: Water is extracted and cycled sustainably

Water is a finite and shared resource. Circular systems limit freshwater extraction, rewater efficiently, and recover energy and nutrients from wastewater—while protecting natural watersheds (IMD 2024).

3.0 Method

The paper assess potential benefits, the implementation of circular economy initiatives in tertiary institutions in Nigeria and investigate the challenges faced in implementing circular economy initiatives in tertiary institutions in Nigeria. The paper is a position paper that adopted a systematic literature review-based method. The method allows to collect and review the related previous literature from various online sources. With the aid of digital platform, the researcher collected secondary information to generate knowledge on this topic from 2015-2025. The position paper followed qualitative narrative design method. The researcher has visited different online sites to collect the previous literature and analyze the literatures on potential benefits, the implementation of circular economy initiatives in tertiary institutions in Nigeria and investigate the challenges faced in implementing circular economy initiatives in tertiary institutions in Nigeria. The previous findings are critically analyzed and presented in different themes as on potential benefits, the implementation of circular economy initiatives in tertiary institutions in Nigeria and investigate the challenges faced in implementing circular economy initiatives in tertiary institutions in Nigeria.

Inclusion and exclusion criteria

Inclusion

This output of the literatures on potential benefits, the implementation of circular economy initiatives in tertiary institutions in Nigeria and investigate the challenges faced in implementing circular economy initiatives in tertiary institutions in Nigeria presents an in-depth study and result that can infer conclusion on the topic. The study includes: online publication; conference paper, journals sorted from from reputable international journals such as CEON, Elsevier, Hindawi, JSTOR, IEEE, Learn Techlib, SAGE, Nebraska and Springer (Adapted from Ogunode, 2025v).

Exclusion

Also, the literature review excludes information from edited books, preprints, monographs, information below 2015 and book chapters (Adapted from Ogunode, 2025).

4.0 Result and Discussion on benefits of implementation circular economy programme and challenges militating against effective implementation of circular economy in the Nigerian tertiary institutions

Benefits of Implementation Circular Economy Programme

1. Circular economy promotes sustainable development by reducing waste and promoting the reuse of resources. This can lead to cost savings for the institutions and a more environmentally friendly campus. Additionally, a circular economy encourages innovation and the adoption of new technologies, which can enhance academic research and learning.

2. By implementing a circular economy in Nigerian tertiary institutions can also have positive economic impacts. By reducing waste and promoting resource efficiency, the institutions can save on costs and potentially create new revenue streams through the recycling and repurposing of materials. This can also lead to the creation of new jobs in the circular economy sector and contribute to the country's overall economic growth.

3. Another benefit of adopting a circular economy in Nigerian tertiary institutions is the potential improvement in the overall health and well-being of students and staff. By reducing waste and promoting sustainable practices, the institutions can create a healthier and more environmentally friendly environment for everyone on campus. This can have positive effects on the physical and mental health of individuals and contribute to a more productive learning and working environment.

4. In addition to these benefits, implementing a circular economy in Nigerian tertiary institutions can also play a crucial role in addressing global environmental issues. By promoting sustainable practices and reducing waste, these institutions can contribute to the overall efforts of combating climate change and protecting the planet for future generations.

Challenges militating against effective implementation of circular economy initiatives in tertiary institutions in Nigeria

The implementation of circular economy initiatives in tertiary institutions in Nigeria has faced numerous challenges. These problems can be grouped into several main categories, which include economic, social, and political factors.

One of the main challenges facing the implementation of circular economy initiatives in tertiary institutions in Nigeria is the lack of financial support. The implementation of these initiatives requires a significant amount of funding, which is often unavailable due to budget constraints. This makes it difficult for the institutions to invest in the necessary resources and infrastructure to effectively implement circular economy practices.

Another issue that militates against the successful implementation of circular economy initiatives in Nigeria is the lack of awareness and understanding among stakeholders. This includes government officials, university administration, and local communities. Many of these stakeholders are not familiar with the concept of circular economy and its potential benefits. As a result, they are less likely to support and participate in its implementation.

The socio-cultural context of Nigeria also poses challenges for the implementation of circular economy initiatives in tertiary institutions. The society's prevailing attitudes towards waste management and recycling are often unfavorable, making it difficult to change behavior and promote sustainable practices. This is compounded by the fact that there is a lack of proper waste management infrastructure and systems in place.

Furthermore, there are political challenges that hinder the implementation of circular economy initiatives in tertiary institutions in Nigeria. These include a lack of government policies and regulations that support and incentivize circular economy practices. In addition, corruption and bureaucratic procedures can delay the implementation of such initiatives, making it more challenging for institutions to adopt circular economy practices.

4.1 Conclusion and Discussion

In conclusion, the implementation of a circular economy in Nigerian tertiary institutions holds numerous benefits, including promoting sustainable development, fostering innovation and economic growth, improving health and well-being, and addressing global environmental issues. By adopting these practices, these institutions can lead the way towards a more sustainable and prosperous future. Also, there are several problems militating against the effective implementation of circular economy initiatives in tertiary institutions in Nigeria. These challenges span across different areas, including financial, social, cultural, and political aspects. Addressing these issues and finding solutions will be crucial in promoting and achieving the successful implementation of circular economy practices in Nigeria's tertiary institutions.

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