

Integrating Circular Economy (Ce) Practices Into University Management In Nigeria

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ABSTRACT

Objective: The study examined circular economy (CE) Practices that University Management should adopt to enhance sustainable university education in Nigeria. The study used secondary data. The secondary data were collected from both print and online publication. The study concluded that cycling, reuse, eco-design, and sustainable procurement are some of the circular economy (CE) practices that university management can adopt to ensure sustainable university education across Nigeria. Resting on these findings, it is suggested that the paper recommends that the Nigerian universities need to put institutional policies that instil the principles of the circular economy in all facets of the management and operations of the institutions. These models should be the ways of waste minimizing, sustainable resources management, recycling and eco-innovation. The management of the university is also supposed to harmonize these policies with the national sustainability programs and international programs like the United Nations Sustainable Development Goals (SDGs). A specific policy direction would give a sense of direction on how to be implemented, who will be held accountable and performance assessment at departmental levels. Universities ought to establish concepts of CE in academic courses in different fields such as engineering, business, environmental sciences, and social sciences. This collaboration will contribute to the development of the sustainability-based mentality among students and personnel. Also, the institutions are to encourage waste valorization, sustainable product design, renewable energy, and green technologies research and innovation. The practical implementation and interdisciplinary collaboration may be supported additionally by the creation of CE research centers or hubs. Universities ought to introduce effective waste segregation, recycling and composting measures to reduce land fill disposal. An audit of waste should be periodically done to come up with the significant waste streams and come up with measures of recovering the material. Collaborations with recycling companies and local community can strengthen collection, processing and reuse activities. Furthermore, universities can serve as models by demonstrating zero-waste campus initiatives and creating incentives for departments that effectively manage their waste streams.

INTRODUCTION

In recent years, the concept of the circular economy (CE) has emerged as a transformative approach to achieving sustainability by minimizing waste, optimizing resource use, and promoting environmental responsibility. Incorporating the concept of a circular economy in the management of universities suggests a strategic direction towards the progress of sustainable development, especially in the context of Nigeria, where the problem of resource inefficiency, failure to manage waste, and the unsustainable pattern of consumption are still acute. As institutions and cauldron of learning, research and innovation, university institutions in Nigeria are very important in setting an example of sustainability practices that have the potential of impacting the society in general. Universities can also make a huge impact on controlling

environmental footprints by incorporating the principles of the circular economy, including recycling, reusing, eco-design, and sustainable procurement in their administrative, academic, and infrastructural activities, which will result in higher cost efficiency and institutional resilience [1].

In addition, the adoption of the practices of the circular economy is compliant with world frameworks, including the United Nations Sustainable Development Goals (SDGs), particularly, Goal 4 (Quality Education), Goal 11 (Sustainable Cities and Communities), and Goal 12 (Responsible Consumption and Production). In the case of Nigeria, where the higher learning sector is having escalating student populations, scarce funding, and environmental pollution, it is not only an environmental need but an economic and educational one that the institution of university should incorporate the principles of CE in its management [2].

Thus, this paper examines ways in which the universities in Nigeria can integrate the practice of the circular economy into their management systems to ensure sustainable development and act as leverages toward a wider societal shift towards sustainability.

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. 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[3]. 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.

Ellen MacArthur Foundation Viewed circular economy as a system where materials never become waste and nature is regenerated. Products and materials are kept in circulation through maintenance, reuse, refurbishment, remanufacture, recycling and composting. "The 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, thereby extending the life cycle of products and minimizing waste (European Commission / European Union, n.d)." The circular economy is a multi-dimensional concept most commonly framed around the 4R/3R practices (reduce, reuse, recycle, recover) but requiring a systemic shift in production-consumption systems; it aims to preserve material value, decouple economic activity from raw-material consumption, and promote environmental and (ideally) socio-economic benefits. (Summary based on their comparative analysis of 114 CE definitions[4].

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)[5]. 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, Ukozor, & Ayoko)[6].

In the context of China's policy approach, the circular economy is presented as a closed-loop material flow system that integrates resource-oriented, production-oriented, and life-cycle-oriented measures to improve resource productivity and eco-efficiency across industrial and regional systems (Geng & Doberstein)[7]. Circularity is a transformative approach that reduces, reuses, refurbishes and recirculates products and materials across value chains, emphasizing closing, slowing and narrowing material loops to promote sustainable consumption and production (United Nations Environment Programme (UNEP, n.d.). A circular economy is a system where materials never become waste and nature is regenerated. Products and materials are kept in circulation through maintenance, reuse, refurbishment, remanufacture, recycling and composting (Ellen MacArthur Foundation. (n.d.).

University Management refers to the systematic process of planning, organizing, directing, and controlling the human, financial, and material resources of a university to achieve its academic, research, and community service goals effectively and efficiently. It is a set of administrative and strategic actions of running a higher education institution to guarantee the quality service delivery, institutional sustainability, and the unceasing development (Middlehurst, 1999; Mainardes, Alves, and Raposo)[8]. Its fundamental aspects include university management that incorporates a number of dimensions academic governance, administrative coordination, financial management, staff development, student affairs, infrastructure maintenance and external relations. It runs a well-organized hierarchy that incorporates governing councils, vice-chancellors, heads of department, deans, administrative officers who all contribute in policy making, decision-making and performance monitoring (UNESCO, Knight, Okebukola)[9]. The main aim is to bring the institutional activities in line with the mission, the vision and the national higher education mission of the university. The management of the university is pegged on three broad pillars: 1.Strategic Planning and Policy Formulation: This is where the long term vision of the university is to be established, objectives are formulated and strategic policies are created that will govern the academic programs, research priorities and growth of the institution. Strategic management is one that keeps the universities competitive and responsive to needs of the society. 2. Resource Management: This includes financial planning, budgeting, procurement and the human resource management. Allocation and use of these resources are very important in universities that should uphold academic standards, fund research and maintain infrastructure. Through good management, there is transparency, accountability and value of money in everything that is done in the institutions. 3.Academic and Administrative Coordination: The University management has the responsibility of ensuring that the academic and non-academic departments are functioning smoothly. It involves curriculum development, quality assurance and accreditation, student support services and performance monitoring. Good co-ordination of administrative and academic entities promotes institutional performance. Moreover, the university management reaches the external relations, such as the partnerships with the government, industries and international organizations. These partnerships ease funding, innovation and the

exchange of knowledge that are essential in institutional development. In management, it is also important to adopt digital transformation by having e-administration and e-learning systems to make the whole administration and learning to be more efficient and accessible.

RESEARCH METHOD

The study is a position paper that depend on secondary data to support the points raised. The secondary data were collected via online and print resources. The print sources includes; Circular Economy (CE) Practices publication, journals, book chapter, documentary by professional institutions and abstract proceeding. The study employed content analysis and systematic review methods to identify and streamlined the literatures to the topic content.

RESULTS AND DISCUSSION

Results

Circular Economy (CE) Practices

Recycling is the process of collecting, sorting, and processing waste materials to create new products, thereby reducing the consumption of fresh raw materials, energy use, and environmental pollution. It plays a vital role in promoting sustainability by diverting waste from landfills and reducing greenhouse gas emissions associated with raw material extraction and manufacturing (Al-Salem, Lettieri, & Baeyens) [10].

The recycling process takes more than one stage which includes collection, segregation, cleaning, processing, and remanufacturing. Some of the materials that are used commonly and can be recycled are paper, glass, metals, and plastics (European Commission). Within an institutional environment like in the case of universities, recycling programs can be adopted to handle the problem of waste through waste segregation bin facilities, sensitization reminders, and collaborating with recycling companies. This is not only useful in lowering the cost of running the school but also enhances environmental awareness among the students and members of staff. One of the pillars of Circular Economy (CE) practice that should help to reduce waste, save resources, and ensure environmental sustainability is recycling. Recycling in the context of universities can be said to refer to the systematic collection, segregation, processing and transformations of waste materials, which include paper, plastics, metals, glass and electronic waste into new useful products. It is an important measure to making the campus operations more resource- loop and can be used as a model of sustainable consumption and production trends among students, faculty, and the community at large (Kirchherr, et al)[11]. Teaching, research, administrative, and residential activities in universities produce a lot of waste as it is a hub of learning and innovation. By embracing recycling as a CE practice, institutions can use the same waste to generate useful resources and hence lessening the environmental footprints and saving on operational expenditures. The recycling programs also help to achieve the overall sustainability of the universities as they support the resource efficiency and circle cycle principles via harmonization of the waste management systems (Jambeck, Geyer, and Wilcox)[12].

Role of Recycling in the Circular Economy Framework

Under the CE model, recycling ensures that materials remain in the value chain for as long as possible. Instead of disposing of waste in landfills, recyclable materials are recovered, reprocessed, and reintroduced into production cycles. This approach reduces dependence on virgin raw materials and mitigates environmental degradation associated

with extraction and manufacturing processes. In universities, the integration of recycling into management systems helps to create a closed-loop model where waste materials generated from offices, laboratories, hostels, and cafeterias are collected and repurposed through organized recycling programs.

Implementation of Recycling Practices in Universities

Universities can operationalize recycling through various structured initiatives:

- 1) **Waste Segregation Systems:** Introducing color-coded bins for paper, plastic, metals, and organic waste in strategic locations across campuses promotes proper waste sorting at the source.
 - 2) **Recycling Centers and Partnerships:** Creating recycling centers on campus or partnering with local recycling companies would facilitate the collection, sorting, and resale of the recycled materials, which would lead to the development of both environmental and economic advantages.
 - 3) **E-waste Management:** As more and more electronic devices are used in teaching and research, universities can embark on an agreement with qualified e-waste recyclers to safely recover and reuse parts of the devices including metals and circuit boards.
 - 4) **Paper Recycling and Digitalization:** Paper waste can be greatly limited by encouraging paper recycling schemes in the administrative offices and encouraging the digitalization of academic records.
 - 5) **Recycling research and laboratory:** The waste generated in laboratories, including plastics and glass containers, can be gathered and redeemed to undergo special recycling to make sure that the environment remains safe and not in violation of environmental laws.
- Ed. and Research Aspects of Recycling. Other than waste management, recycling in universities can be used as a learning and research platform. Recycling and CE can be introduced into the curricula, workshops and projects run by students in institutions, encouraging behavioral change and innovation [13]. Students have the opportunity to do research in new recycling technologies, characterization of wastes, and creation of sustainable materials. This learning model promotes the culture of sustainability and prepares graduates with knowledge applicable to green jobs and environmental management.

Economic and Environmental Benefits*

Recycling in universities generates multiple benefits:

- 1) **Cost Savings:** Reduced expenses on waste disposal and procurement of new materials.
- 2) **Revenue Generation:** Income from selling recyclable materials to recycling companies can support sustainability initiatives.
- 3) **Environmental Conservation:** Reduction in greenhouse gas emissions, pollution, and depletion of natural resources.
- 4) **Campus Aesthetics and Hygiene:** Proper recycling practices maintain a clean and healthy environment conducive to learning and research.

Reuse

Reuse refers to the repeated use of products or materials without significant reprocessing, thereby extending their life span and reducing the demand for new products and raw materials. Unlike recycling, which involves breaking down materials for remanufacturing, reuse maintains the integrity and functionality of items, conserving both energy and resources (Gharfalkar, Court, Campbell, Ali, & Hillier)[14]. Examples include reusing bottles, packaging, furniture, laboratory equipment, and electronic devices. Reuse contributes to waste prevention by minimizing the volume of materials entering the waste stream. In universities, initiatives such as furniture donation programs, equipment sharing platforms, and refillable containers for campus dining can significantly promote reuse. This practice not only conserves resources but also fosters a

culture of sustainability and cost-efficiency within educational institutions (Reike, Vermeulen, & Witjes)[15].

One of the core principles of the Circular Economy (CE) is reuse whereby products and materials can be reused, mended or refurbished instead of disposed of once their lifespan is reached. Reuse practices in the universities are important in enhancing sustainability, cutting down on production of wastes, saving resources and lowering the environmental impact of the activities carried out in the institutions. Through the reuse-oriented strategies, universities are able to save money, as well as instill a culture of environmental responsibility among students, faculty, and staff. Within the Circular Economy framework, reuse involves maintaining the functionality of products and materials without significant reprocessing. Unlike recycling which transforms materials into new products reuse preserves the original structure and value of items, reducing the energy and resource input required for production [16].

Reuse aligns with the waste hierarchy, which prioritizes prevention and reduction before recycling and disposal. Reuse of materials in university setting can be made on a very broad base, such as furniture, electronics, laboratory, office supplies, books and even water or building materials. The use of reuse can assist universities in moving away from a linear model of take- make-dispose closed-loop to the reuse of resources in the institution, which can be used over a period of time. The method will decrease the need of virgin materials, decrease carbon emissions, and improve institutional efficiency.

Implementation of Reuse Practices in Universities

Universities can operationalize reuse through structured policies, innovative programs, and campus-wide initiatives. Common reuse strategies include:

- 1) **Reuse of Furniture and Equipment:** Many universities refurbish office furniture, laboratory benches, and classroom desks instead of purchasing new ones. Slight repairs, repainting, or reupholstering can extend their usability and reduce procurement costs.
- 2) **Book and Stationery Reuse Programs:** University libraries and student unions can organize book exchange initiatives, where students donate used textbooks for others to borrow or purchase at lower prices. Similarly, reusing stationery and printing materials helps reduce paper waste.
- 3) **IT Equipment and Electronic Reuse:** Computers, printers, and laboratory devices can be refurbished and reassigned to less resource-intensive departments, reducing electronic waste (e-waste). Universities can also partner with IT refurbishing firms for proper maintenance and redistribution of old equipment.
- 4) **Reusable Containers and Cutlery:** University cafeterias can encourage the use of reusable food containers, cups, and utensils instead of single-use plastics. Introducing deposit-return systems for reusable items fosters behavioral change and minimizes plastic pollution.
- 5) **Reuse in Construction and Facilities Management:** During campus renovations, construction materials such as bricks, tiles, and timber can be reused in other projects. This reduces waste and the environmental cost of sourcing new materials.

Educational and Research Opportunities

The reuse principle provides an excellent opportunity for universities to integrate sustainability education into academic programs and campus culture. Through environmental studies, engineering, design, and management courses, students can learn about the environmental and economic benefits of reuse. Research projects can also

explore innovative reuse solutions, such as material recovery technologies, product life extension, and sustainable design for reusability (Ogunode, Ukozor, & Ayoko)[17].

Student-led initiatives, such as sustainability clubs and “Green Campus” programs, can organize swap events, donation drives, and repair workshops that promote reuse awareness. Embedding these practices in the academic and social life of universities fosters long-term behavioral change toward sustainable living.

Environmental and Economic Benefits

Implementing reuse practices yields multiple benefits for universities and the wider community:

- 1) **Waste Reduction:** Reusing items significantly reduces the volume of waste sent to landfills and incinerators.
- 2) **Resource Conservation:** Reuse minimizes the need for raw materials, lowering energy consumption and reducing environmental degradation from resource extraction.
- 3) **Cost Efficiency:** Universities save substantial funds by refurbishing and reusing equipment and materials rather than purchasing new ones.
- 4) **Community Engagement:** Donation of reusable items such as furniture, electronics, or books to local schools and organizations strengthens university-community relations.
- 5) **Carbon Footprint Reduction:** By avoiding new production, reuse reduces greenhouse gas emissions associated with manufacturing and transportation.

Eco-Design

Eco-design, also known as ecological or sustainable design, involves integrating environmental considerations into the design and development of products and services throughout their life cycle. The main goal is to minimize environmental impact during production, usage, and disposal by optimizing material selection, reducing energy consumption, and enhancing recyclability. Eco-design encourages innovation by promoting design for durability, disassembly, and resource efficiency (Bovea, & Pérez-Belis)[18]. For instance, designing electronics that are easy to repair or products made from renewable or biodegradable materials reduces waste and facilitates recycling. In higher education institutions, adopting eco-design principles can influence campus infrastructure, teaching materials, and research innovations aimed at sustainability. It also prepares students for careers in green industries by incorporating sustainability concepts into design curricula (Pigosso, & McAloone)[19].

Eco-design aims to embed environmental considerations at the earliest stages of the design process, addressing aspects such as material selection, energy consumption, product durability, modularity, reparability, and end-of-life management. In the CE context, eco-design ensures that products and services are created to be reusable, recyclable, and less resource-intensive, contributing to a closed-loop system. For universities, eco-design involves a holistic approach, where every resource—from building materials to laboratory equipment—is designed to reduce waste generation and environmental degradation. The concept also extends to administrative and operational processes, such as designing energy-efficient campus buildings, digitalized workflows to minimize paper use, and sustainable procurement strategies aligned with environmental standards (Ogunode)[20].

Universities can implement eco-design practices across multiple domains:

- 1) **Campus Infrastructure:** Buildings and facilities can be designed for energy efficiency, incorporating renewable energy sources, natural lighting, water-saving systems, and green materials. Modular and flexible designs allow for easy renovation and adaptation without generating excessive waste.

- 2) **Laboratory and Classroom Equipment:** Eco-design encourages the use of durable, repairable, and recyclable equipment. For instance, lab glassware, electronics, and furniture can be designed for disassembly, enabling parts to be reused or recycled at the end of their lifecycle.
- 3) **Curriculum and Educational Resources:** Teaching and research materials can be designed digitally to reduce paper consumption. Eco-design can also be embedded into course structures, encouraging students to develop sustainable solutions and environmentally conscious innovations.
- 4) **Administrative Processes:** Office workflows, including procurement, document management, and IT systems, can be designed to minimize environmental impact. For example, designing digital platforms for administrative tasks reduces paper waste and optimizes energy usage.
- 5) **Research and Innovation:** Universities can promote eco-design research, encouraging students and faculty to develop products, prototypes, and solutions that follow CE principles, such as biodegradable materials, energy-efficient devices, or modular technologies.

Educational and Research Opportunities

Eco-design provides a rich platform for experiential learning and research in sustainability. Students and faculty can engage in projects that explore sustainable product design, resource efficiency, and lifecycle assessments. Integrating eco-design into curricula not only imparts technical knowledge but also instills a sustainability mindset. Universities can establish innovation hubs, maker spaces, or labs dedicated to prototyping eco-friendly solutions, which also encourage entrepreneurial initiatives aligned with circular economy goals (Ogunode, Edinoh, & Olatunde-Aiyedun)[21].

Environmental and Economic Benefits

The adoption of eco-design practices offers multiple benefits for universities:

- 1) **Resource Efficiency:** Eco-designed products and infrastructure consume fewer raw materials and energy, reducing environmental pressures.
- 2) **Waste Reduction:** Designing for durability, modularity, and recyclability minimizes waste generation and facilitates material recovery.
- 3) **Cost Savings:** Efficient designs reduce long-term operational and maintenance costs, e.g., energy-efficient buildings and reusable lab equipment.
- 4) **Innovation and Competitiveness:** Eco-design encourages innovation and enhances the institution's reputation as a leader in sustainability, attracting partnerships, funding, and environmentally conscious students.
- 5) **Regulatory Compliance:** Universities adopting eco-design are better prepared to meet national and international sustainability standards and environmental regulations[22].

Sustainable Procurement

Sustainable procurement is the process of acquiring goods, services, and works in ways that consider environmental, social, and economic impacts across their entire life cycle. It promotes responsible purchasing decisions that prioritize products that are energy-efficient, durable, recyclable, ethically produced, and locally sourced (United Nations Environment Programme (UNEP)[23]. The goal is to minimize the ecological footprint of institutional operations while supporting fair labor practices and local economies. In the context of universities, sustainable procurement could involve purchasing eco-friendly office supplies, renewable energy systems, recycled paper, and green laboratory equipment. By embedding sustainability criteria into procurement policies, universities can influence market demand for sustainable goods and demonstrate leadership in responsible resource management. This approach contributes

to cost savings, improved institutional reputation, and the achievement of broader sustainability goals (Walker, & Brammer).

Discussion

The study revealed that cycling, reuse, eco-design, and sustainable procurement are some of the circular economy (CE) practices that university management can adopt to ensure sustainable environment development in the universities across Nigeria

CONCLUSION

The study examined circular economy (CE) practices that university management should adopt to enhance sustainable university education in Nigeria. The study concluded that cycling, reuse, eco-design, and sustainable procurement are some of the circular economy (CE) practices that university management can adopt to ensure sustainable university education across Nigeria. Based on these findings, the paper recommends the following:

The universities in Nigeria should come up with institutional policies that would entrench the principles of the circular economy to the entire arena of its management and operations. These frameworks ought to put in place waste minimization strategies, sustainable use of resources, recycling and eco-innovation. The management at the university must as well align the policies to national sustainability efforts and international frameworks like the United Nations Sustainable Development Goals (SDGs). An articulated policy direction would offer a guideline on implementation, accountability as well as performance evaluation among the departments.

Colleges need to introduce the idea of CE into the academic curriculum of different courses such as engineering, business, environmental sciences, and social sciences. Such integration will contribute to the development of a sustainability-oriented attitude among students and employees. Also, the facilities must encourage research and innovation in waste valorization, product design that is sustainable, renewable energy, and green technologies. The creation of CE research centers or hubs might also contribute to the interdisciplinary collaboration and practice.

Universities are to introduce effective waste segregation, recycling and composting systems so that the landfill disposal could be reduced. Waste audits need to be carried out frequently in order to recognize the key waste streams and create strategies to recover the materials. Cooperation with recycling companies and local communities should be improved to increase the collection, processing, and reuse. In addition, universities should become examples such that they display the zero-waste campus programs and provide incentives to departments that are successful in their waste streams management.

They should introduce sustainable procurement policies to make sure that the goods and services that are bought by universities do not have a significant environmental impact at all stages of their life cycles. Universities ought to also focus on products that have eco-labels, are durable, and recyclable and also on vendors who adhere to environmental requirements. Renewable energy sources including solar power, installation of energy saving devices and efficient water management systems can also help in improving resource efficiency. Such ventures would help not only in cutting down the cost of operation but also the ecological footprint of the institutions. 5. Practices on the circular economy should be sensitized by organizing awareness activities and capacity building workshops to train university employees, students and management. The issues of waste minimization, sustainable consumption, eco-design, and lifecycle thinking are to be included in the staff development and student orientation programs.

The lifelong learning will guarantee a shift in behavior, promote innovation, and promote the involvement of all stakeholders in the university community.

Universities are expected to collaborate with the government, non-governmental organizations (NGOs) and industries as well as other international development partners in order to support knowledge exchange, funding and technical support on CE initiatives. Local industries can be co-developed into collaborative projects like recycling centers, clean energy research centers, and waste-to-wealth projects. Such alliances also have the capacity to increase the employability and entrepreneurship prospects of green economy students.

It should have a strong monitoring and evaluation system that monitors the developments of CE activities in different universities. operations. Key performance indicators (KPIs) such as waste reduction rates, energy efficiency levels, and recycling outcomes should be periodically assessed. Regular audits and sustainability reporting will ensure transparency, promote accountability, and guide continuous improvement. Benchmarking with other institutions both locally and internationally can further strengthen performance and inspire innovation.

Universities should create incentive schemes to reward departments, researchers, and students who propose or implement innovative CE solutions. Competitions, innovation grants, and sustainability awards can motivate the university community to actively engage in circular practices. Establishing student-led sustainability clubs or circular economy committees can further embed CE values in campus culture and extend their impact to surrounding communities.

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