

**CIRCULAR ECONOMY ADOPTION IN HIGHER EDUCATION INSTITUTIONS:
IMPLICATIONS FOR SUSTAINABLE FINANCIAL GROWTH AND
INSTITUTIONAL RESILIENCE**

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Abstract:

Higher education institutions face the dual challenge of environmental stewardship and long-term financial sustainability in an environment of scarce resources and uncertainty. Within this context, the Circular Economy has come to be not only a plan for environmental stewardship but also a tool for the improvement of resource efficiency, governance and resilience. As higher education institutions have come to be the focus of greater policy initiatives for sustainability, a surprising absence of research has been found on the potential for the acceptance of circular economy principles to contribute to sustainable financial growth and resilience. This study aims to address this knowledge gap by examining the way higher education institutions implement circular economy principles and its potential for financial sustainability and resilience. The study was conducted using quantitative and an exploratory approach, utilizing secondary data and text data analyses, including topic modelling, to investigate institutional documents, sustainability reports and scholarly works that reflect engagement with the circular economy. The findings suggest that circular initiatives in universities extend beyond environmental management practices and increasingly intersect with financial planning, procurement systems and innovation-oriented academic activities. These developments specify that Circular Economy practices may contribute to sustainable financial growth through improved resource utilization, operational efficiency and broadened opportunities for collaborative research and external funding. At the same time the inclusion of circular principles appears to support institutional resilience by encouraging adaptive governance and strategic sustainability planning. However, these results also suggest that many circular initiatives remain embedded primarily in institutional discourse rather than fully operationalized practices, indicating the necessity for further empirical research integrating financial and operational performance indicators.

1.1 Introduction:

Universities are progressively faced with a dual imperative advancing environmental responsibility while sustaining long-term financial viability in era of institutional uncertainty. Within this context, the circular economy presents not merely an environmental framework but

a strategic governance approach capable of reconfiguring resource flows, operational efficiency and value creation in higher education institutions. Examining how circular principles intersect with financial sustainability and institutional resilience therefore becomes critical for understanding the evolving role of universities in a resource constrained and volatility- prone global landscape.

Scholarly discussions on the acceptance of circular economy principles, within higher education institutions were where theoretically informed by several interrelated perspectives that clarified how organizational transformation could influence financial sustainability and institutional durability. The Resource-Based View suggested that universities that reconfigured internal resources such as infrastructure, knowledge systems and material flows toward circular practices were able to strengthen unique capabilities that supported long-term financial performance and strategic adaptability (Jay Barney,1991). Complementing this perspective, Institutional Theory explained how regulatory pressures, normative expectations and cultural-cognitive influences encouraged universities to incorporate sustainability- oriented operational models, including circular resource management (Walter W. Powell, Paul J. Dimaggio, 1983). In addition, insights from Dynamic Capabilities Theory indicated that institutions capable of sensing environmental and economic shifts, reconfiguring assets and institutionalizing circular strategies were more likely to maintain financial stability and organizational resilience under of uncertainty (David J. Teece, Pisano, Shuen, 1997). Taken together, these theoretical foundations had reshaped the analytical lens through which circular economy adoption in higher education was interpreted, positioning it not simply as an environmental initiative but as a strategic pathway through which universities could enhance financial sustainability while strengthening their capacity to withstand structural and economic disruptions.

Higher education institutions increasingly incorporated Circular Economy (CE) principles into teaching, research activities, campus operations and community engagement as part of broader sustainability agendas. This transition had been reflected in the development of methodological approaches for sustainable campus management, including iterative planning cycles designed to improve resource efficiency and operational monitoring across university systems (Mendoza et al., 2019) At the same time, many institutions introduced experimental initiatives such as, circular laboratories, zero-waste programs and net-zero campus strategies, that encouraged technological experimentation and association with industry partners, thereby expanding the institutional role of universities within emerging circular innovation ecosystems (ICCE, 2025). Universities have started to redesign their processes of buying and managing wastes by reorienting their waste contracts to reduce landfills and reorganize their supply chains, according to the concepts of circular resources. The processes and procedures adopted by MIT are an example in this context. However, the transition to the circular economy has not been smooth. There have been challenges such as gaps in awareness and different levels of understanding about the Circular Economy among the staff and management. The transition was also affected by the complex governance structure and the hierarchical structure of the universities. The fragmented policy landscape is another challenge which has affected the transition to the circular economy. Time and financial constraints have affected the development of inter-disciplinary curricula that cover the concepts of circular economy.

Operationally, there have been challenges in the transition to the circular economy. For example, persisted challenges in managing wastes effectively. The reports suggest that nearly 60% of the materials generated in the campus of MIT have traditionally gone to landfills. Therefore, there are still inefficiencies in the management of resources in the campus. It is also difficult to make a financial case for the circular economy. The economic benefits have not been well articulated and there are challenges in developing performance metrics and decision support systems.

Universities everywhere face unprecedented pressures to balance their commitment to sustainability with increasingly tight budgets, uncertain funding streams and heightened expectations of accountability. The circular economy is hailed as a solution to disengage resources and create long-term value, but its implementation in universities is inconsistent and its concepts underdeveloped. Most studies have focused narrowly on environmental outcomes, campus initiatives around waste, or modifications to course content. There is much less exploration of how a commitment to circular economy principles could impact financial sustainability and resilience in higher education. That is a significant gap in analysis, given the challenges of increasing operating expenses, aging infrastructure and ensuring long-term resilience in the face of economic and institutional change. Therefore, it is theoretically significant and pragmatically pressing to better understand how circular economy practices could drive sustainable financial growth in higher education. Addressing this gap is therefore essential for identifying whether circular strategies represent merely symbolic sustainability initiatives or whether they can function as viable institutional mechanisms for enhancing long-term financial stability and organizational resilience within contemporary higher education systems.

1.2. Objectives of the study:

1. To explore circular economy adoption patterns in higher education institutions using quantitative text analytics.
2. To examine the relationship between circular economy adoption and sustainable financial growth in higher education institutions.
3. To develop metrics and measurement indicators using text analytics to assess circular economy implementation and its financial and resilience outcomes.

The previous section introduced the objectives that are guiding the present study: the adoption of the circular economy concept in higher learning institutions, the implications for sustainable financial growth and the implications for the resilience of higher learning institutions. Although the objectives provide an overview of the direction that the study will take, the present study cannot adequately situate itself within the larger discourse without an examination of the extant literature on the circular economy practices in higher learning institutions, the integration of sustainable practices within the system and the emerging trends that are connecting the circular economy, financial sustainability and resilience within higher learning institutions.

2. Literature review:

2.1. Circular economy adoption patterns in higher education institutions using quantitative text analytics:

Recent research has begun to examine how patterns of Circular Economy adoption within higher education institutions can be traced through quantitative text-based analysis of institutional documents and academic outputs. Large amounts of written content, including policy frameworks, strategic plan and sustainability reports, are regularly produced by universities. These materials frequently contain implicit signals about institutional priorities and sustainability orientations. Scholars have tried to discover how circular economy concepts are articulated and incorporated into institutional discourse by using methods such as topic modelling, keyword frequency analysis and bibliometric text mining. According to empirical research, these analytical techniques can highlight recurrent themes related to resource efficiency, waste reduction and circular procurement strategies those are incorporated into university sustainability narratives (Khan et al., 2021). Universities are increasingly placing circular initiatives within larger sustainability and innovation agendas, which reflects a gradual shift in how institutional missions are articulated, according to parallel studies looking at research publications and institutional communications (Núñez-Cacho et al., 2021). However, because strategic documents may express aspirational commitments rather than fully implemented operational practices, researchers advise that textual representations should be carefully interpreted. Because of this, even though text analytics is a helpful tool for spotting new trends in university engagement with the Circular Economy, its results frequently need to be interpreted contextually when connecting institutional discourse to real sustainability outcomes (Velenturf & Purnell, 2021).

2.2 The relationship between circular economy adoption and sustainable financial growth in higher education institutions:

The question is about to how the application of the Circular Economy within universities will lead to sustainable financial growth becomes an interesting concern in recent academic discussion. The execution of circular economy practices in universities through, for example, responsible procurement practices, reduction and efficient management of waste and resources, has shown to contribute towards lowering operational costs, while using campus resources in a more strategic way (Núñez-Cacho et al. 2021). It is argued that this can lead to opportunities for funding in fields like sustainability, joint research projects and innovation partnerships which can finally improve the institution's financial situation (Núñez-Cacho et al. 2021). Circular economy is also assumed to improve the institutions' reputations and the involvement with external parties through sustainability-related measures, which can potentially have an impact on the financial situation of HEIs, as per some related literature on sustainability transition (Leal Filho et al. 2021). Also, circular resource management investments in energy efficient buildings or close-loop waste management could give slow rate returns on investment while matching financial management goals and environmental ones according to studies on campus sustainability (Daddi et al., 2022). On the other hand, findings on financial returns are not equally distributed through these kinds of institutions given their own governance structure,

availability of resources and maturity level on their sustainability strategies, which makes circular practices have different economic outcomes.

2.3 Metrics and measurement indicators using text analytics to assess circular economy implementation and its financial and resilience outcomes.

Recently, researchers have started exploring the idea of developing indicators to measure the implementation of the CE at Higher Education Institutions (HEI) by systematizing textual analyses of institutions' texts. Universities generate huge amounts of texts - in the form of sustainability reports, strategic plans, policies and research papers - and these can be used to find signals of their sustainable intentions and operations. Through text analysis techniques like keyword frequency analysis, semantic clustering or topic modelling, researchers identified patterns that can be found on the different universities' written communication (e.g., Franco et al., 2021), related with resource efficiency and circular products, waste management, circular procurement and collaborative innovation that could be turned into indicators to signalize the extent to which circularity is part of their business model. At the same time, recent work in sustainability assessment points to the need for combining text-based indicators with institutional performance data to quantify how circular initiatives support financial sustainability through enhanced resource use, cost savings and innovation-based funding opportunities (Mies & Gold, 2021) and to explore how narratives about sustainability support learning processes and governance responses in universities facing environmental and financial pressures (Sassanelli et al., 2023). The author highlights the importance of validating textual indicators against institutional data, because official documents might reflect ambitions instead of factual practice.

3. Research gap:

Despite the fact that the Circular Economy (CE) has gained momentum in recent years in terms of its contribution to sustainable development, its institutionalization in Higher Education Institutions (HEIs) is still in its early stages. The majority of studies conducted in this area have focused on HEIs as drivers of sustainability awareness and education, as opposed to an organizational model that can institutionalize CE into its financial model. The relationship between CE adoption and financial sustainability is yet to be theorized (Geissdoerfer et al., 2017). The studies conducted in this area have been based on descriptive evaluation studies of sustainability initiatives in HEIs, without any clear understanding of the relationship between CE practices and financial sustainability (Kirchherr et al., 2017). In addition, existing studies in the European region suggest that the adoption of CE in resource-constrained higher learning institutions in the African context has not been adequately studied. This suggests that there exists a need to conduct integrative studies that investigate the relationship between the adoption of CE and financial growth in the university context.

4. Scope of the study:

The present research seeks to examine the adoption of the Circular Economy in higher education institutions, as well as the implications regarding the financial growth of the latter. In terms of the scope of the research, the latter is focused on higher education institutions that have adopted policies, strategic plans and communications regarding sustainability and the

principles of the Circular Economy. In terms of the methodology of the research, the latter is focused on the analysis of the data in the form of text regarding the adoption of the Circular Economy in higher education institutions. Specifically, the research is focused on the analysis of the data in the form of text regarding higher education institutions that have adopted sustainability policies, strategic plans, communications and publications. Regarding the methods used in the present research, the present research is focused on quantitative text analysis. Moreover, the present research is focused on exploring the relationship between the adoption of the Circular Economy in higher education institutions and sustainable financial growth. Specifically, the present research is focused on exploring the relationship between the adoption of the Circular Economy in higher education institutions and sustainable financial growth in terms of resource efficiency, cost optimization, innovation-driven funding opportunities, or the potential contribution of the Circular Economy in terms of the resilience of higher education institutions. As far as the limitations of the present research are concerned, the present research is focused on the analysis of textual data regarding the adoption of the Circular Economy in higher education institutions. Specifically, the present research is focused on the analysis of textual data regarding the adoption of the Circular Economy in terms of the adoption of the Circular Economy in universities or higher education institutions that have included sustainability policies, strategic plans, communications and publications. It is worth mentioning that the present research is not focused on the analysis of the practices of the Circular Economy in higher education institutions. As far as the contribution of the present research is concerned, the present research is focused on the contribution of a structured framework based on the relationship between the adoption of the Circular Economy in higher education institutions, sustainable financial growth and the resilience of higher education institutions.

5. Research methodology:

This study is based on secondary data and it has employed an exploratory quantitative research design in investigating the adoption of the Circular Economy in higher learning institutions and the implications of the adoption of the Circular Economy for financial growth and resilience. An exploratory research design was considered appropriate for this study since the adoption of the Circular Economy in higher learning institutions is a dynamic concept, especially in relation to financial growth and resilience. A deductive research approach was employed in this study and it has employed different theoretical perspectives, including the Resource-Based Theory, Institutional Theory and Dynamic Capabilities Theory.

6. Discussions:

6.1 Topic Modelling Method:



These results in the topic modelling reveal ten different themes, each falling into one of the three pillars that were set out in the aims.

First pillar: Circular Economy & Sustainability Operations. This includes waste management, waste reduction, education, governance, financial resources, procurement practices and funding. So, in short, the university is making the circular economy work by managing waste, reducing waste, educating the university population about it, governing it, providing financial support, procuring in line with it and funding it.

Second pillar: Institutional Resilience & Strategy. This includes resilience, stability, operational initiatives, strategic performance, the gradual integration of sustainability, along with the circular economy, into the university. The circular economy is becoming an important part of the university's overall strategy.

Third pillar: Academic & Data-Driven Growth. This includes scholars, publications, metrics, indicators, innovation, economic efficiency, the gradual integration of the circular economy into the university and using it as a tool to help the university grow academically.

These results reveal that the adoption of the circular economy in higher education is not just multidimensional but also includes financing in terms of budgeting and budgetary allocation, policy-driven governance and efficiency in reducing waste in creating resilience. They reveal that the adoption of the circular economy in universities is not just about the environment but is becoming an important part of the overall financial, operational and strategic direction of the university.

7. Conclusion:

The results of this study show that the adoption of the Circular Economy (CE) in higher education institutions is slowly but surely developing into a strategic practice that goes beyond environmental sustainability and embraces financial and organizational transformation. The results of the topic modelling revealed that the discourse of the circular economy in higher education institutions revolves around three interconnected aspects: operational sustainability practices, institutional resilience strategies and academic/innovation-driven development. This indicates that higher education institutions are not only implementing the circular economy through operational practices such as waste management and resource efficiency but have also begun to integrate the circular economy within the institutional structures and financial management of the organization. From the interpretative perspective, this shows that the developments in the adoption of the circular economy in higher education institutions are in line with the Resource-Based Theory, which states that institutions that have the ability to reorganize their internal resources have the potential to develop long-term competitive advantages (Barney, 1991) and the Institutional Theory, which emphasizes the role of sustainability norms in shaping organizational change (Powell & DiMaggio, 1983). On the other hand, themes such as resilience, strategic performance and innovation suggest that circular practices may have an impact on enhancing adaptive institutional capacities and are in line with Dynamic Capabilities Theory (Teece et al., 1997). However, it is evident that circular practices in HEIs often fail to transcend beyond the level of narratives and are not fully implemented. The findings of this study suggest that there is an emerging trend in HEIs towards adopting

circular economy concepts that transcend beyond symbolic sustainability and move towards a multi-dimensional governance paradigm that not only enables sustainable financial growth but also increases the resilience of the institution.

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