

Fostering a Circular Economy in Zambia: Opportunities for Sustainable Development and Innovation

Dr Sidney Kawimbe

P O Box 35422, Lusaka, ,

ORCID: 0009-0006-1039-5757

Abstract: The global shift towards a circular economy offers a transformative approach to economic growth, emphasizing resource efficiency, waste minimization, and sustainability. Moving away from the linear "take-make-dispose" model, this regenerative system seeks to maximize the utility of resources, reducing environmental impact while fostering economic innovation. As climate change and resource scarcity pose escalating global challenges, the circular economy emerges as a strategic pathway to sustainable development. For Zambia, a country rich in natural resources yet vulnerable to environmental degradation, adopting a circular economy framework holds immense potential. The country's key sectors—mining, agriculture, and waste management—contribute significantly to the economy but also generate substantial waste. Mining tailings and agricultural residues, for instance, are often underutilized, while urban areas face growing challenges in managing waste. By embracing circular principles, Zambia can transform these challenges into opportunities, creating value from waste, reducing greenhouse gas emissions, and enhancing resilience. Despite notable efforts, such as the Eighth National Development Plan (8NDP) *Strategy 2: Improve Sanitation Services* and commitments under the Paris Agreement, Zambia's circular economy remains underdeveloped. Key barriers include inadequate infrastructure, policy gaps, and limited public awareness. Overcoming these challenges requires strategic investments, robust policies, and collaboration among government, private sector, and civil society. This study highlights actionable strategies to foster a circular economy in Zambia, including waste valorisation, biofertilizer production, and innovative recycling initiatives. It emphasizes the need for targeted policy reforms, improved infrastructure, and community engagement. By leveraging international partnerships and fostering local innovation, Zambia can redefine its economic growth, ensuring environmental sustainability, social equity, and economic resilience. This transition represents a critical step toward a sustainable and prosperous future.

Key Words: *Circular Economy, Sustainable Development, Resource Efficiency, Waste Management, Environmental Resilience*

I. Introduction

The global transition to a circular economy presents an opportunity to redefine economic growth, moving away from the traditional "take-make-dispose" linear model towards a regenerative system where resources are reused, recycled, and maintained at their highest utility for as long as possible. As the world grapples with the dual challenges of climate change and resource scarcity, the circular economy has emerged as a powerful strategy for sustainable development. By embracing principles of waste minimization, resource efficiency, and closed-loop systems, countries can simultaneously address environmental challenges and unlock new economic opportunities. For Zambia, a nation endowed with abundant natural resources and a growing population, the circular economy offers a promising pathway to sustainable growth and innovation. Zambia's economy is heavily reliant on natural resources, particularly in mining, agriculture, and forestry. While these sectors contribute significantly to national income, they also generate substantial waste and environmental degradation. For instance, the mining sector produces significant quantities of tailings and slag, while agricultural waste often remains underutilized. These challenges, coupled with increasing urbanization and waste generation, have put pressure on Zambia's ecosystems, exacerbating climate vulnerability and threatening long-term sustainability. The adoption of a circular economy framework can help Zambia transform these challenges into opportunities by creating value from waste, reducing environmental impact, and fostering innovation.

In recent years, Zambia has demonstrated a commitment to sustainable development through initiatives such as the Eighth National Development Plan (8NDP), which emphasizes green growth and resource efficiency. Additionally, the

country has signed international agreements, such as the Paris Agreement, underscoring its dedication to addressing climate change. Despite these efforts, the circular economy concept remains underexplored in Zambia, leaving room for greater policy alignment, stakeholder engagement, and investment in circular solutions. This paper seeks to explore the potential of fostering a circular economy in Zambia, focusing on the opportunities it presents for sustainable development and innovation. By examining key sectors such as mining, agriculture, and waste management, this paper highlights strategies for creating a more resource-efficient and resilient economy. It also discusses the policy and institutional frameworks needed to support this transition, as well as the role of private sector innovation and community engagement in driving change. Through this analysis, the paper aims to provide a roadmap for Zambia to harness the benefits of a circular economy, contributing to environmental sustainability, economic resilience, and social well-being.

II. Literature Review

The Concept and Global Context of Circular Economy

The circular economy (CE) is a systems-focused approach aimed at eliminating waste and maximizing resource efficiency through reuse, recycling, and sustainable design. Globally, this model is seen as an alternative to the traditional linear economy, which operates on a take-make-dispose principle.



Source: European Parliament Research Services

Figure 1: The circular economy model: less raw materials, less waste and fewer emissions

CE aligns with sustainable development goals (SDGs) especially SDG No 17 *Promotes collaboration among stakeholders, essential for achieving the balance between economic growth, environmental protection, and social equity*, particularly in addressing environmental sustainability, economic growth, and social equity.

Circular Economy in Zambia: Current Status

Zambia has immense potential for implementing CE due to its high levels of waste generation, particularly in urban centers. The country produces approximately 3.6 million tonnes of waste annually, of which a significant portion is unmanaged. Studies have identified key sectors for CE integration, including waste management, manufacturing, and agriculture.

For instance, transitioning to CE in the waste sector could involve separating waste streams like plastics, textiles, and organic materials, which present opportunities for recycling and energy recovery. Prioritizing these sectors aligns with Zambia's broader developmental goals of reducing environmental degradation and creating green jobs (ACEN Foundation, 2023; Sustainable Inclusive Business, 2024).

Key Opportunities for CE Adoption in Zambia

Waste Management: Improved waste collection and separation are critical. Around 55% of waste is uncollected annually, posing health and environmental risks. Properly managed waste could be converted into biogas or recycled into valuable products. For example, biogas production from food waste could supply energy to over 500,000 households (Finland Abroad, 2023). **Agriculture:** CE practices in agriculture include using organic waste as biofertilizers and promoting sustainable farming practices. These initiatives can increase productivity while reducing environmental impacts, such as soil degradation. **Manufacturing and Innovation:** Leveraging local resources to manufacture recycled products can reduce dependence on imports, stimulate local industries, and foster innovation. For example, recycling textile waste into fibers has the potential to generate products like t-shirts, substituting imported goods. **Policy and Infrastructure Development:** A supportive policy framework and investment in infrastructure are necessary for a successful transition. The government, in collaboration with stakeholders, has initiated the development of roadmaps, such as those targeting plastics, to enhance CE practices (Sustainable Inclusive Business, 2024).

Challenges and Barriers

Despite these opportunities, Zambia faces several challenges in transitioning to a circular economy. These include inadequate infrastructure for waste processing, limited public awareness, and policy gaps. Collaboration with international partners, such as Finland and the Netherlands, has been instrumental in identifying these challenges and developing strategies to address them, such as policy reforms and capacity building (ACEN Foundation, 2023; Sustainable Inclusive Business, 2024). In summation, Zambia's transition to a circular economy represents a strategic avenue for sustainable development. With its abundant resources and increasing stakeholder interest, the country is well-positioned to harness the economic, social, and environmental benefits of CE. Continued investment, policy support, and stakeholder collaboration are crucial for overcoming barriers and fostering innovation in CE practices.

For further insights, references include recent studies and initiatives highlighted by the ACEN Foundation (2023), Sustainable Inclusive Business (2024), and Finland Abroad (2023).

III. Discussion

The global transition toward a circular economy (CE) offers a reimagined approach to economic development, addressing critical challenges such as climate change, resource scarcity, and waste management. This model shifts the focus from traditional linear production systems to a regenerative framework that emphasizes resource efficiency, waste reduction, and the continuous use of materials. For Zambia, the circular economy presents a unique opportunity to foster sustainable development, promote innovation, and mitigate the environmental degradation associated with key economic sectors like mining, agriculture, and manufacturing.

Opportunities for Circular Economy in Zambia

Zambia's abundant natural resources, coupled with its growing waste generation, provide fertile ground for implementing CE strategies. For instance, the mining industry, a cornerstone of Zambia's economy, produces substantial waste materials such as tailings and slag. These byproducts, often perceived as liabilities, could be reprocessed into usable materials for construction or other industrial applications. This aligns with global practices where mining waste is recycled into road aggregates or industrial raw materials, reducing environmental impact while creating economic value. Similarly, agriculture in Zambia contributes significantly to GDP but generates large volumes of organic waste. By adopting CE principles, this waste could be transformed into biofertilizers or biogas, enhancing soil fertility and providing renewable energy. Such practices not only address resource scarcity but also support climate adaptation by reducing greenhouse gas emissions from organic waste decomposition. Waste management, a critical aspect of CE, also holds vast potential in Zambia. With over 3.6 million tonnes of waste generated annually, much of which is unmanaged, there is an urgent need for enhanced collection and recycling systems. Prioritizing waste streams such as plastics and textiles could lead to the creation of sustainable industries focused on recycling and repurposing, generating employment and reducing environmental pollution.

Challenges in Transitioning to a Circular Economy

Despite its potential, Zambia faces significant challenges in transitioning to a CE framework. Infrastructure gaps in waste collection and processing remain a primary barrier. For example, an estimated 55% of waste in Zambia is uncollected, leading to environmental and public health risks. Addressing these gaps requires substantial investment in infrastructure, such as recycling plants and waste-to-energy facilities, as well as the development of efficient logistics networks. Policy and regulatory frameworks also need strengthening. While Zambia has demonstrated commitment

through initiatives like the Seventh National Development Plan (7NDP) and its alignment with the Paris Agreement, there is a need for more targeted policies promoting CE. Incentives for businesses adopting sustainable practices, along with penalties for excessive waste generation, could catalyze the transition. Public awareness and stakeholder engagement are equally crucial. Limited understanding of CE principles among communities and businesses often hampers adoption. Educational campaigns, capacity-building programs, and collaborations with international organizations could play a pivotal role in bridging this gap.

The Role of Innovation and Collaboration

Innovation is at the heart of the circular economy, driving the development of new technologies and business models. In Zambia, fostering partnerships between academia, industry, and government can spur innovation tailored to local challenges. For example, research into low-cost recycling technologies or the use of agricultural residues in bio-based industries could yield solutions adapted to Zambia's context. International collaboration is also vital. Partnerships with countries like Finland and the Netherlands, which have advanced CE practices, can provide technical expertise, funding, and policy insights. Initiatives such as the EU-funded waste stream roadmap for plastics in Zambia exemplify the benefits of such collaborations, offering a blueprint for scaling CE practices across other sectors.

IV. Conclusion

The discussion underscores that Zambia's transition to a circular economy represents both an opportunity and a challenge. While the country has inherent strengths, such as abundant resources and growing stakeholder interest, addressing infrastructure, policy, and awareness gaps is critical. By leveraging innovation, fostering partnerships, and investing in targeted solutions, Zambia can pave the way for sustainable growth, transforming waste into wealth and fostering resilience in the face of environmental and economic challenges.

Conclusions and Recommendations

The transition to a circular economy represents an invaluable opportunity for Zambia to redefine its growth trajectory, addressing environmental, economic, and social challenges.

By shifting away from the linear "take-make-dispose" model, Zambia can unlock the potential of its abundant natural resources while mitigating the negative impacts of waste and environmental degradation. The principles of resource efficiency, waste minimization, and closed-loop systems provide a framework for sustainable development, enabling Zambia to create value from waste, reduce greenhouse gas emissions, and foster economic resilience. However, the path to achieving a circular economy is fraught with challenges, including inadequate infrastructure, policy gaps, and limited public awareness. Overcoming these barriers will require strategic investments, targeted policy reforms, and a collaborative approach involving government, private sector, academia, and civil society. With its existing commitments, such as the Seventh National Development Plan (7NDP) and adherence to international agreements like the Paris Agreement, Zambia is positioned to advance its circular economy agenda. Continued innovation, stakeholder engagement, and international partnerships are essential for transforming challenges into opportunities and building a more sustainable future.

Recommendations

In an era marked by growing environmental concerns and finite natural resources, the concept of a circular economy has emerged as a powerful strategy for achieving sustainable development. Unlike the traditional linear economic model, which follows a "take-make-dispose" approach, a circular economy emphasizes resource efficiency, waste reduction, and the continuous use of materials through innovative design, recycling, and reuse. By shifting towards this model, countries can unlock significant economic, social, and environmental benefits. For Zambia, a resource-rich nation with a diverse economy spanning mining, agriculture, and manufacturing, fostering a circular economy presents a timely opportunity. The country faces challenges such as environmental degradation, high levels of waste generation, and dependency on raw material exports. However, these challenges also open pathways for innovation, job creation, and sustainable growth through circular practices. From leveraging its abundant natural resources to tapping into global trends in green technology and sustainable consumption, Zambia stands poised to become a regional leader in circular economic transformation.

This paper explores actionable recommendations for fostering a circular economy in Zambia. It examines the potential opportunities across key sectors, highlights the role of policy and innovation, and emphasizes the importance of multi-stakeholder collaboration to drive long-term sustainability and inclusive growth.

Strengthen Policy Frameworks

- i) Develop and implement comprehensive policies that incentivize circular economy practices, such as tax benefits for businesses adopting sustainable production methods and penalties for waste mismanagement.
- ii) Align national policies with international best practices and integrate CE principles into existing development strategies like the 7NDP.
- iii) Invest in Infrastructure Development
- iv) Establish waste processing and recycling facilities to manage urban waste effectively, particularly in high-impact sectors such as plastics, textiles, and organic waste.
- v) Improve waste collection systems to increase efficiency and coverage, focusing on urban and peri-urban areas.
- vi) Enhance Public Awareness and Education
- vii) Launch nationwide campaigns to educate communities and businesses about the benefits of the circular economy, emphasizing practical ways to reduce waste and adopt sustainable practices.
- viii) Include CE principles in educational curricula to foster a culture of sustainability among future generations.
- ix) Promote Innovation and International Collaboration
- x) Support research and development in circular economy solutions tailored to Zambia's unique challenges, such as low-cost recycling technologies and bio-based products.
- xi) Foster partnerships with international organizations and countries with advanced CE systems to gain technical expertise, financial support, and insights for policy and infrastructure development.

These recommendations can act as a roadmap for Zambia to harness the full potential of a circular economy, ensuring a sustainable and prosperous future for its citizens

References

- [1] ACEN Foundation (2023) *Circular Economy Market Study in Zambia*. African Circular Economy Network. Available at: <https://acenfoundation.org/project/circular-economy-market-study-in-zambia> (Accessed: 5 December 2024).
- [2] Finland Abroad (2023) *Strengthening the Circular Economy in Zambia Through Finnish Partnerships*. Available at: <https://finlandabroad.fi/> (Accessed: 5 December 2024).
- [3] Sustainable Inclusive Business (2024) *Assessment of the Current Status of the Circular Economy in Zambia*. Available at: <https://sustainableinclusivebusiness.org/> (Accessed: 5 December 2024).