

EXPLORING SOUTH AFRICA AS A CIRCULAR ECONOMY: A PATHWAY TO SUSTAINABLE DEVELOPMENT

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Abstract: *The concept of circular economies is gaining prominence in political debate and corporate discourse globally as a sustainable development model that aims to improve resource productivity, promote sustainable consumption and production, and reduce environmental impacts. In South Africa, the adoption of circular economy principles is seen as a promising pathway to address environmental and resource management challenges while fostering economic growth and sustainability. This paper considers how South African organisations are using circularity to establish competitive advantage for their operations and the greater society.*

Keywords: *Circular economy. Circularity. South Africa. Sustainable development. Economic growth.*

I. Introduction

As our modern earth is rapidly and increasingly facing obstacles relative to environmental degradation and resource scarcity, the concept of a circular economy presents a transformative solution. A circular economy sets out to redefine growth and development by decoupling economic activities from the overconsumption of finite resources together with designing surplus waste from the system. This paper aims to explore South Africa's economic potential in circularity and the progress made by stakeholders toward attaining this. The objective of this paper is not only to delve into the applications of circularity by notable public and private organisations in South Africa, but it is also to dissect the intricacies of economic circularity and its impact on the greater society. This is done by addressing how circular economy aligns with laws and policies, as well as pinpointing any potential barriers to the stakeholders involved in circular practices. The relevance of this paper cannot be overstated; it is underpinned by the notion that a viable pathway in developing sustainable societies exists and requires favour. Moreover, for a nation like South Africa that is grappling with environmental challenges, high unemployment rates and resource-intensive industries, the prioritisation of circularity may offer opportunities in crafting and creating sustainable business practices, green jobs and improve environmental health.

II. Understanding Workplace Discrimination

Definition and Types:

Circular economy (CE) refers to the minimisation of waste and the promotion of resource efficiency by creating a closed-loop system (Oliveira et al., 2021). CE represents a regenerative model of production and consumption that aligns with the foundational premises of reduce, reuse and recycle. The model makes use of activities like sharing, leasing, repairing, and refurbishing products and materials that already exist, and the aim is to extend the life cycle of these products and materials to the point of waste reduction. CE management systems are underpinned by extended producer responsibility and the critical role of end users (Mativenga, 2017). There are, however, authors who argue that the definition of CE is unclear



and more a fragmented collection of societal ideas that make the concept difficult to understand (Korhonen et al., 2018). Nevertheless, the overarching principle of CE is to eradicate the traditional linear system of take-make-use-dispose, by transitioning systems to one which prioritises extracting the maximum value of resources by recovering and regenerating products and materials at the end of each service life stage (Mativenga, 2017).

Theoretical Frameworks:

Various theoretical frameworks form the basis for the pursuit of CE systems in a modern society. According to Lahti et al. (2018), several theories and models in modern literature help to explain the concept of CE. The Contingency Theory promotes the importance of aligning corporate firms with the environments in which they operate to exploit market opportunities that arise from CE practices. The Transaction Cost Theory underpins the contracting and collaboration between CE stakeholders with the aim to shed light on transaction cost structures and how it may be managed to optimise resource flows in CE systems. The Resource-Based Theory casts light on the existing disparities between corporates' resources and capabilities and how a shared system may contribute to circularity. The Theory of Network and Industrial Economics supports the examining of network positions and path-dependencies in logistics, underpinning how corporate players engage in CE from an industry perspective, and the Theory of Agency in CE looks toward the contractual design and consumer relationships relative to agency issues when systems and strategies of CE are implemented.

III. Dimensions of Circular Economy

Corporate Alignment and Relevant Statistics:

CE looks toward altering individual and organisational habits to reflect sustainable production, distribution and consumption, moreover, to align with the objectives of the 2030 Agenda of the United Nations and the Sustainable Development Goals (SDG). In recent years, a multivariant index was created as a measurement of CE to allow for estimations and predictions on how well organisations are committed to ecological transformation, by using a two-step CE Business Index (CEBIX) founded on the 17 environmental policies aligned with the SDGs (Garcia-Sanchez et al., 2021). The CEBIX assessed the levels of CE development at country and industry level based on the efforts of the respective firms. Overall, it was found that 26 percent of companies had a CE initiative already implemented, suggesting a rather limited commitment of companies to across the board toward CE (Garcia-Sanchez et al., 2021). Countries such as France, South Korea, Sweden and Taiwan presented the most intensive relationship with CE systems in the period 2014-2019, demonstrating commitment to eliminating toxic compounds, improve water efficiency and factoring eco-design products in their organisational processes (Garcia-Sanchez et al., 2021). The study demonstrated that, in terms of CE adoption predictions, Mexico, Hong Kong, Singapore, Kuwait, Canada and Ireland are gaining more sensitivity toward CE practices (Garcia-Sanchez et al., 2021). It was found that Central European countries and Japan are the foremost in leading circular transformation as it was demonstrated that these countries actively promote CE transformation throughout their institutional environments (Garcia-Sanchez et al., 2021).

A 2023 market study of South Africa as a CE, as commissioned by the Netherlands Enterprise Agency, established South Africa as only 7 percent circular which is 0.2 percent lower than the global average (Govender et al., 2023). As a primarily extractive economy, South Africa's resources are largely exported abroad for further processing and this influences the country's circularity revolving more around post-consumer packaging,

especially in the informal settlements (Govender et al., 2023). While ecological cycling exists to an extent, there is more concern over forestry practices and industrialised agriculture that fall short of regenerating ecosystems (Govender et al., 2023). While the CE transition in South Africa is still evolving, many aspects are at matured level already such as systems of paper and plastic recycling, with a whopping 82 percent of recycled waste collected by informal pickers (Godfrey et al., 2021). South Africa further showcases potential in the CE transition as demonstrated by the country implementing Extended Producer Responsibility requirements in carbon and packaging tax regulations for corporations (Govender et al., 2023). As such, a plethora of policies, multilateral agreements and corporate legislature are developed to hold organisations to account when it comes to implementing CE management toward attaining 2030s SDG objectives.

IV. Impacts Circular Economy

On Individuals, Organisations and Society:

Albeit that CE commitment is difficult task when considering much of the ambiguity there is in its application, it cannot be doubted that the implementation of CE has a profound impact on individuals, organisation and the broader society. South African organisations are making an active effort in bringing youth, women and persons with disabilities into the waste sector through job creation, particularly in informal settlements (Govender et al., 2023). This is particularly important considering the exacerbated levels of unemployment facing millions of South Africans. The informal waste sector may expect greater opportunity for employment in the future as their efforts in the CE value chain are becoming more acknowledged and applauded. Organisations are increasingly looking to endorse waste pickers or waste reclaimers (of which an estimate 215 000 have been recorded) to include them in their practices for corporate social responsibility waste management practices (Govender et al., 2023). This suggests a direct and profound impact of CE on the potential future of many South Africans creating a livelihood under less hazardous conditions and fairer compensation. For South African organisations, embracing CE principles may result in enhanced corporate sustainability and more resilient competitiveness above others. Organisations who opt to look beyond basic circular flows of recycling toward wholly implemented systems that prioritise CE holistically have shown double-growth compared with competitors that do not do so, and this in turn may mean a strengthened market position that could peak the interests of investors (Wijnberg, 2024). What is more, CE management and integration ushers unbridled potential to organisations in respect of operational impacts such as with resilient supply chain mechanisms leading to cost saving in resource efficiency, social impacts such as with skills development and corporate social responsibility strengthening, and economic impacts such as with innovative business models culminating in market differentiation (Genovese et al., 2017; Hahladakis & Lacovidou, 2019; Murray et al., 2017; Moreno et al., 2016). For the greater society, the transition to CE means that South African communities may expect greater prospect in addressing national priorities like ensuring food security, national manufacturing competitiveness, energy and water security and efficient logistic systems, all the while creating resilient cities and a decarbonised economy (Godfrey et al., 2021).

V. Combating Circular Economy Pitfalls

Legal Frameworks, Organisational Policies and Practices:

While South Africa boasts some of the world's most progressive legislature in waste management, many setbacks in practical application of CE mechanisms persist, with some



arguing the reason for this being over-regulation and indecisiveness. The SDGs as part of the UNs 2030 Agenda for Sustainability has primary linkage to and underpins the dire need for CE transitions in South Africa. Waste management and circularity in itself is directly associated with the attainment of SDG 3, 6, 7, 5, 9, , 12, 13, 14, and 15 (Govender et al., 2023), in that waste management directly affects citizens health, the quality of water, clean energy, economic growth potential, industry infrastructure and climate action initiatives to name a few. The National Development Plan (NDP) of South Africa sees the articulation of the country's CE initiatives, particularly toward the attainment of reduced volumes of landfill waste disposal, the expansion of recycling infrastructure, investments in citizen education and awareness, as well as the implementation of targeted tariffs and penalties that aim to reduce the high demand of water and electricity usage (Govender et al., 2023). Additionally, Circular South Africa, the country's central hub for CE initiatives hosts annual conferences and seminars with the intention to bridge the gap between businesses, government and civil society to accelerate South Africa's CE transition (Govender et al., 2023). Some of these knowledge sharing and partnership events include the International Association of Hydrogeologists (IAH) Congress, International Conference on Civil and Environmental Engineering, The Science, Technology & Innovation for a CE Congress, and Africa's Conscious Brands & CE Summit above others. Furthermore, the Constitution of the Republic of South Africa (Act 108 of 1996) promotes several clauses that hold bearing on the CE transitions in South Africa such as Section 24 (Environment) which mandates the activities of the Department of Forestry, Fisheries and Environment (DFFE) (Govender et al., 2023). In itself, the DFFE promotes an array of CE relevant Acts which hold private and public enterprises to account, such as the National Environmental Management Act, Waste Classification and Management Regulations Act, Environment Conservation Act, National Norms and Standards for Assessment of Waste for Landfill Disposal Act, and The South African Economic Reconstruction and Recovery Plan above others (Govender et al., 2023).

VI. Case Study Analysis

84 Harrington Street is a Residential Multi-unit establishment in the heart of Cape Town that has perfectly illustrated the principles of a circular economy. The 12-storey, 50-apartment complex was built using hempcrete blocks and hemp construction materials, making it the world's first hemp skyscraper (World Green Building Council, 2024). Hemp is a plant in the botanical class of *Cannabis sativa*. It grows quickly and contributes to the purification of contaminated soils, requires minimal water, pesticides or herbicides and is inherently pest-resistant, making its cultivation virtually toxin-free. Not to mention Hempcrete is a carbon negative material that is CO₂ absorbing. The remnants of hemp matter are further allocated to the production of textiles, cosmetics and plastic alternatives (World Green Building Council, 2024).

Sustainable Heating is a B2B organisation that provides heating solutions which involve the burning of biomass instead of oil or coal. Biomass is any residual carbon-based waste such as wood, sawdust, bagasse, grain husks, maize, sisal (Sustainable Heating, 2024). The heat from the combustion is used to feed local industries with steam, hot water, hot air or thermal oil. The byproduct is ash from the combustion which through circulation is then given back to local farmers to enrich their soils through sustainable agriculture (Sustainable Heating, 2024).

The Western Cape Industrial Symbiosis Programme (WISP) in Cape Town is Africa's first industrial symbiosis programme. WISP uses a resource efficiency model where unused or residual resources of one company are used by another, and this includes materials,

energy, water, assets, logistics and expertise. The organisation connects companies, helping them identify opportunities to exchange unused or residual resources from one company's manufacturing processes to become raw materials for another (O'Carroll et al., 2014). While the service is free of charge, companies are asked to provide information about the impact of the synergies, which WISP stores securely in an online database and uses to track impacts and publish case studies. WISP has contributed towards innovative waste management practices by creating new pathways for waste resources (O'Carroll et al., 2014). The programme was initiated in 2013 to address challenges around the continued viability of businesses. Today, WISP is tasked to address landfill diversion as well as the need to reduce the carbon intensity of production processes and improve resource efficiency within production processes (O'Carroll et al., 2014). There are over 2000 companies in the WISP network.

VII. Challenges and Limitations

Barriers to Circular Economy transition:

Despite having received global recognition for CE associated legislation, several challenges continue to hinder the implementation of policies for waste management which consequently has a direct bearing on CE transition. Where organic waste is concerned, there is a lack of national strategy affecting the national waste collection standards and allocation of appropriate competitive tariffs for green energy (Govender et al., 2023). Stakeholders report substantial bureaucracy involved with the certification of e-waste (discarded mobiles, laptops, televisions et cetera) as a hazardous waste, leaving little to no direction on appropriate methods for discarding (Govender et al., 2023). South African stakeholders commonly struggle with the implementation of regulations and the policing of transgressions arguably due to poor inter-authority coordination and limited resources for CE transition. In fact, studies reflect that collaboration from the private sector is lacking due to claims of over-policing and over-regulation of a system that is vague in what it wants or how it wants it (Govender et al., 2023). Claims from the private sector maintain that South African organisations need not be held to additional regulations, but rather that the current regulations be properly integrated and streamlined to better manage circularity (Govender et al., 2023). Furthermore, as a developing country with an emerging market, South Africa continues to grapple with uncontrollable variables that hinders the progress in investment, some of which include operational limitations due to loadshedding, national over-reliance on fossil fuel affecting the markets for alternative energy sources, the current international grey-listing of the South African financial markets, as well as the longstanding battles faced with regard to corruption and bribery in the processes for tenders, certification and policy development (Govender et al., 2023).

Gaps in Research and Policy:

South Africa is highly invested in various CE initiatives and research efforts focused on implementing CE systems to address resources and environmental management challenges. In fact, South Africa is recognised as the African frontrunners of CE research and the foremost producers of the continents most relevant publications by CE experts (Nijman-Ross et al., 2023), but just as with any multifaceted concept, several gaps in the existing research and policies require attention. There is currently a limited body of knowledge pertaining to sector-specific challenges, namely the potential tailored strategies that may aid different sectors in their CE transition. It is claimed by some academics that CE frameworks take on more of a blanket approach and this is detrimental to different sectors that generally face their own unique challenges and opportunities when considering CE policy integration (Bocken et al., 2016). Continued research in the scope of industry



sophistication can help address the imbalances and disparities of the shortcomings of industry requirements. Considering that South Africa as an emerging market is still evolving on the front of the Fourth Industrial Revolution, many industries lack the technological advancements to adapt their processes for circularity (Tahulela & Ballard, 2019).

There is also a significant gap in the policies regarding financial mechanisms and economic incentives. This is particularly important for the promotion and engagement of circularity at grassroot level, in essence, with individuals in civil society (Korhonen et al., 2018). This is seen with the large-scale waste retrievers in the informal settlements who have for long played a significant role in the CE of South Africa without the adequate facilities and incentives. A possible solution and point of encouragement on this front may present as tax incentives, social grants and subsidies (Singh & Ordenez, 2016). Finally, more effort may be placed on the importance of awareness and education. While the frameworks for awareness and education exists, there is an evident gap in the knowledge of whether practical applications in creating circularity awareness exist beyond the concept of recycling (Schroeder et al., 2018). This is a problematic area to track since no standardised metric exists for its measurement, however, further research into the dynamics of CE awareness may assist with the adoption of CE practices by creating a cycle of responsibility of the consumer holding the market sector to account through demands for circular products and services (Whalen et al., 2018).

VIII. Future Directions

Innovative Approaches and the Call to Action:

The future of circularity in South Africa, albeit multifaceted and complex and often volatile, is bright. Successes in the scope of CE, however, will not be without its challenges and to transition to a CE would mean to strategically leverage opportunities and overcoming a multitude of environmental, technological and socio-political barriers. In future, the South African economy can expect to reap benefits from strategic collaborations and shared value creation in several sectors including biomass treatment, sustainable landfilling, eco-friendly housing development and city cleaning (Govender et al., 2023). In the scope of innovative approaches, South African institutions are progressing in waste-to-energy technologies where scientists are developing technologies to convert industrial by-products, municipal and agricultural waste into electricity as a solution for landfill crises and fossil fuel dependency (Ngcobo & Mokoena, 2020). All South African provinces will likely see a greater integration of industrial symbiosis as seen in the Western Cape province. Additionally, as South African policymakers and authoritative bodies are working toward addressing the lack of policy clarity on e-wastage, South Africa may anticipate a future streamlined by urban mining; the recovering of valuable materials from electronic waste (Wäger & Hischer, 2015). A last example but not in the slightest bit the least, South Africa is steering toward the implementation of sustainable building methods in circular construction practices (Adams et al., 2017). As seen with the 84 Harrington case example, circularity in construction presents opportunities for greater development capacity in a manner where materials are sustainably sourced thereby minimising construction waste and the environmental footprint of the construction industry as whole, all the while helping social housing crises (Adams et al., 2017).

IX. Conclusion

There are experts who maintain that the CE model will likely remain a utopian concept. This is underpinned by the idea that there will always be an element of wastage in any

process. It is also said that CE does not accurately reflect economic realities since CE interactions are often oversimplified and reflective of current economies, suggesting that it neglects to communicate how possible changes in one variable may impact the flow of circularity overall. One also cannot deny that CE requires the technical support and training as well as adequate infrastructure in order to recycle and reuse diverse types of materials. Needless to say, it is clear that South Africa is making significant strides in adopting and implementing circular economy principles across various sectors, including waste management, renewable energy, and bioeconomy through innovative approaches such as industrial symbiosis and sustainable agriculture. The country's leadership in CE research and its commitment to sustainable development models highlight the potential for further advancements. Additionally, South Africa's CE efforts offer valuable insights and opportunities for sustainable growth which many other countries may learn from. Through ongoing and enhanced research efforts, South Africa can further improve its circular economy practices, leading to increased environmental sustainability, economic resilience, and overall social well-being. It can thus not be overstated that South Africa, through its application and integration of circularity, is indeed creating a pathway toward sustainable development.

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