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Assessment of the Impacts of the Circular Economy in the South African Construction Industry: Professionals' Perspective

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Abstract

The construction industry is increasingly adopting circular economy principles to improve sustainability, reduce construction waste, and enhance resource efficiency. However, there remains a limited understanding of the impacts of circular economy practices in the South African construction industry, particularly from the perspective of construction professionals. Therefore, this study assessed the impacts of the circular economy in the South African construction industry from professionals' perspectives. A qualitative research approach was adopted, with data collected through semi-structured interviews with construction professionals. The collected data were analyzed using thematic analysis to identify key themes and patterns relating to the impacts of circular economy adoption. The findings revealed that implementing circular economy practices improves resource efficiency, reduces construction waste, enhances sustainability performance, yields cost savings, and increases innovation in construction projects. The study further identified that circular economy practices support environmental protection and promote long-term economic and social benefits within the industry. The study concludes that the circular economy has the potential to positively transform the South African construction industry by promoting sustainable construction practices and improving project performance. The study provides practical insights for construction stakeholders and contributes to the growing body of knowledge on sustainable construction and the adoption of the circular economy in developing economies.

Keywords
Circular economy; Sustainable construction; Resource efficiency; Construction professionals; South African construction industry.

1. Introduction
Globally, the construction industry is one of the most resource-intensive sectors, consuming large quantities of raw materials, energy, water, and land while generating significant volumes of construction and demolition waste (Alghamdi, 2025). The traditional linear economic model of "take, make, use, and dispose" has increased pressure on natural resources and contributed to environmental degradation, carbon emissions, and waste accumulation (Vanaraj et al. 2025). In response, Almusaed et al (2024) assert that the circular economy has emerged as a sustainable development approach that promotes resource efficiency, waste reduction, reuse, recycling, material recovery, and the extension of the life cycles of buildings and infrastructure. Within the construction sector, circular economy practices encourage the design of buildings for durability, adaptability, disassembly, and reuse,

thereby reducing dependence on virgin materials and supporting more sustainable construction processes (Bertino et al. 2021).

In Africa, rapid urbanization, population growth, infrastructure deficits, and increasing demand for housing and public facilities have intensified the need for sustainable construction practices (El-Bouayady and Radoine 2023). Many African countries continue to face challenges such as poor waste management systems, limited recycling infrastructure, high material costs, and weak enforcement of environmental regulations. These conditions make the circular economy particularly relevant, as it offers opportunities to reduce construction waste, improve material efficiency, create green jobs, support local enterprises, and strengthen environmental sustainability (Purchase et al. 2021). In the South African construction industry, the adoption of circular economy principles is becoming increasingly important due to rising construction costs, landfill pressures, resource scarcity, and the need to align construction practices with national sustainability and waste management goals. Therefore, this study assesses the impacts of circular economy practices in the South African construction sector.

2. Literature Review

2.1 Background to Circular Economy

The linear approach exposes organizations and businesses to their limited disregard for the fate of discarded products (Steuer 2026). According to Mohsin et al. (2026), the linear economy assumes an unlimited supply of resources for product manufacturing, with no concern about depletion. Given the alarming indicators of climate change driven by mass-production models within a linear economy, there are mounting concerns about the sustainability of these practices (Mwabvu et al. 2026). This has led to the emergence of new ideas focused on more regenerative and environmentally sensitive manufacturing and consumption patterns, which we now refer to as the Circular Economy model. Tığlı and Tuna (2026) assert that the Circular Economy (CE) offers an alternative to addressing the sustainability challenge by shifting the focus from take-make-use-dispose in the linear economy to a closed-loop system that includes product reuse, waste management, resourcing, and refurbishing. CE supports sustainable practices through industrial ecology and cradle-to-cradle design.

Furthermore, the CE strives to balance economic growth and environmental conservation to create a better future. The Circular Economy movement has been shaped by pioneers like them through their cradle to cradle, advocating for sustainable design and waste minimization (Choudhury et al. 2026). CE promotes circular business models across sectors such as construction and manufacturing, emphasizing systemic change. Hassan et al. (2026) advocated designs inspired by natural processes to promote sustainable practices in circular systems. These pioneers call for good design solutions and zero waste, promoting a more sustainable future. There is a need for a comprehensive approach to resource management that emphasizes innovation, sustainability, and the regeneration of natural systems (Basile, 2026). Their combined efforts have produced fundamental values that institutions may embrace, offering a strong foundation for exploring the implementation and outcomes of Circular Economy concepts in the CI The resulting change not only aligns with sustainability goals but also significantly enhances the built environment's efficiency and resilience

2.2 Principles of Circular Economy

The construction industry generates significant waste throughout a building's lifecycle due to its long-standing reliance on the linear economy model of take, make, and dispose. Circular economy frameworks are a structured approach to moving away from the traditional linear economy models, "take-make-use-dispose" towards resources being reused, remanufactured, or recycled (Tığlı and Tuna 2026). The whole idea behind these frameworks is to make life more sustainable and reduce waste by optimizing existing materials. Furthermore, deviating from linear economy models provides a tangibly demonstrable and influential framework that promotes a restorative, regenerative system powered by the following three core principles (Ellen MacArthur Foundation, 2020):

1. Create a long-lasting product: Products are built to last and can be fixed or upgraded.
2. Preserve Value: Economic activities are re-circulated, and the value of products, components, or material is preserved in this economy using practices such as reuse/ refurbish.
3. Product-as Economic Business Models: Fundamental to any circular economic business model is a value proposition that provides substantial incentive for the product, interested in focusing on products as a matter of interest.

The concept of a circular economy has gained traction as a viable alternative to the traditional linear economic model due to ongoing concerns about resource depletion and environmental degradation. Rethinking our manufacturing processes, waste management techniques, and consumption habits are all part of the transition to a circular economy, which aims to establish a closed-loop system that maximizes resource utilization, reduces

waste, and promotes long-term ecological balance (Trabelsi and Masmoudi 2026). Building on the 3Rs concepts of reduce, reuse, and recycle, the circular economy introduces four new dimensions: rethink, revamp, refuse, and repurpose

To preserve the three bottom-line pillars, economic, social, and environmental, holistic balance and sustainable development are becoming increasingly important. The 7R principle, as indicated in *Table 1,* is fundamental to implementing the circular economy and sustainable development. Pursuing economic growth, social advancement, and environmental sustainability should be linked to both Corporate Social Responsibility (CSR) and Consumer Social Responsibility (another CSR). People may make a significant impact on environmental protection by regularly putting the 7R into practice in a wide range of contexts and manners.

Table 1. 7Rs Principles (Islam 2026)

R Strategy	**Definition**
Refuse	This involves avoiding unnecessary products and materials in construction. It involves making conscious decisions to minimize waste from start to finish by choosing sustainable, essential materials.
Repair	This method prioritizes repairing and maintaining existing structures above demolishing and rebuilding. It includes tasks such as fixing damaged components or adapting buildings to increase their longevity and performance.
Refurbish	This is the process of restoring and updating existing structures or materials to make them look as good as new. This can include building renovations, system upgrades (such as energy-efficient windows), and structural improvements.
Rethink	To enhance sustainability and efficiency, design and construction methods must be reevaluated. One way to reduce waste is to embrace modular design concepts or explore alternative construction methods that require less material.
Repurpose	The goal of this approach is to find new applications for parts or materials that have surpassed their intended usage. Reclaimed wood from a demolished building, for instance, can be used in interior design or new construction.
Recover	This is the process of taking discarded resources out of building debris. This can involve obtaining recyclable parts from structures into a new product with a different function.
Recycle	This is the process of turning waste from building into new products. Metals and other materials, for example, can be melted down and used again in manufacturing, while concrete and asphalt can be broken and utilised as aggregate for new construction.

3. Methodology

To achieve the study's objectives and aim, a qualitative mono-method was adopted, using semi-structured interviews to allow for an in-depth understanding of CE practices from participants' perspectives, as asserted by Creswell and Cresswell (2017). The study's population comprised construction sector professionals in SACI who were involved in project design, planning, and management and had at least 3 years of industry experience. This included architects, engineers, construction managers, and policymakers who shape or execute CE principles. This study adopted an interpretivist paradigm, which is appropriate for exploring how professionals in the CI understand and perceive the impacts of CE. The interpretivist approach supports qualitative methods by prioritizing subjective meaning, context-specific knowledge, and rich narrative accounts (Kvale and Brinkmann, 2009). A purposive sampling approach was used to select individuals with relevant experience and knowledge of CE principles and practices in the CI. The study's goal was to incorporate a range of perspectives by selecting participants from various project scales, organizations, and geographic locations in SA. This ensured that the findings represent a thorough understanding of the impacts of implementing CE concepts in the CI. A sample of 15 interviewees was selected to obtain sufficient information and ensure data saturation. A qualitative thematic analysis was applied to the responses, yielding rich, contextual insights that captured the challenges and obstacles of CE adoption. The analysis process involved three primary phases: data transcription, coding, and classification, with the coding scheme illustrated in Table 2. Ethical approval for this research was obtained from the University of Cape Town Faculty of Engineering and Built Environment Research Ethics Committee (Reference EBE 01123/2024). Informed consent, anonymity, and voluntary participation were maintained throughout the study.

Table 2. Coding of the interview respondents (source: Authors)

No.	Code	Participant
1.	Pr CM 1	Construction Management Professional
2.	Pr QS 1	Quantity Surveying Professional
3.	Pr ENG ELE 1	Electrical Engineer Professional
4.	Pr ENG MECH 1	Mechanical Engineer Professional
5.	Pr PM 1	Project Management Professional
6.	Pr QS 2	Quantity Surveying Professional
7.	Pr QS 3	Quantity Surveying Professional
8.	Pr CM 2	Construction Management Professional
9.	Pr CM 3	Construction Management Professional
10.	Pr PM 2	Project Management Professional
11.	Pr PM 3	Project Management Professional
12.	Pr ENG ELE 2	Electrical Engineer Professional
13.	Pr QS 4	Quantity Surveying Professional
14.	Pr ENG MECH 2	Mechanical Engineer Professional
15.	Pr PM 4	Project Management Professional

4. Discussions of the findings

Theme 1: Implementation of Circularity Indicators in South African construction projects

Circular economy indicators play an important role in assessing and enhancing the implementation of circular economy principles in the built environment (Saidani, et al., 2019). Participants highlighted various Material Circularity Index indicators, such as waste reduction rates and energy efficiency, as instrumental in monitoring and improving the implementation of circular economy concepts within their organizations. "…there are metrics used to assess the degree to which circular economy principles are integrated into our everyday projects," Pr ENG MECH 2 noted. The first indicator is very impactful. The material security indicator, also known as MCI, compares the material recycled, reused, and renewable material used with virgin material. In most cases, we use materials so that the indicator is very, very crucial. And then, from there, we will move to the waste reduction and recycling rate, which will now assess the amount of waste generated during construction and operation, along with the percentage that is reused and recycled. The third indicator is the energy efficiency indicator, which evaluates the energy efficiency of the building, including the use of renewable energy sources and reduction in energy consumption, meaning that we must think about this at the design phase."(Pr QS 2). These indicators not only assist companies in assessing their performance, but they also promote ongoing improvement and a commitment to sustainability (Smol, et al., 2017). Participants also highlighted the diversity of project objectives, emphasizing the importance of adaptation when applying these concepts across contexts. This adaptive use of indicators enables companies to not only better analyze their performance but also to build a culture of sustainability at all levels of their operations.

Energy Efficiency emerged as a vital performance indicator among participants. Participants noted the need to include energy performance within the broader framework of circularity metrics, as it promotes a proactive approach to reducing energy use by analyzing energy efficiency through design elements such as window calculations and the use of renewable energy sources. Similarly, the literature emphasizes that reducing the flow of materials and energy is beneficial for CE; therefore, it is important that stakeholders and policymakers understand that energy-related initiatives affect how effectively circularity works in the industry (Martins et al., 2024). Even though participants displayed extensive knowledge of circular economy indicators, limitations were acknowledged in transitioning this knowledge into practice. Participant Pr PM 1 noted that "…energy consumption and energy efficiency, as well as the harvesting of stormwater water were implemented on specific projects. I know that there are probably other principles that could have been implemented, but the client's objective was not necessarily to obtain a Green Star rating". The gap between knowledge and implementation is highlighted in the literature by Munaro and Tavares (2023), who state that stakeholders often lack a clear understanding of how to implement CE and why it matters, as many reduce it to waste and environmental management alone, thereby limiting broader implementation. According to Kirchherr et al. (2017), inactivity and reluctance to change from traditional business practices suggest that the topic of CE is often confined to specific departments, such as a company's corporate social responsibility or environmental, rather than being embraced throughout the company. The transition to a CE requires active participation from stakeholders, together with awareness initiatives that encourage sustainable practices. This kind of approach encourages businesses to establish sustainable practices as part of their strategic mandate rather than a selective feature.

Theme 2: Impacts of the Circular Economy in the South African Construction Industry
The findings revealed that the adoption of circular economy (CE) practices positively impacts the South African construction industry by improving resource efficiency, reducing construction waste, and enhancing sustainability performance across projects. Participants indicated that CE encourages the reuse, recycling, and recovery of materials, thereby reducing dependence on virgin resources and minimizing waste sent to landfills. For instance, Pr CM 1 stated that "circular economy practices help construction projects use materials more efficiently because waste can be reduced, reused, or recycled rather than discarded." Similarly, Pr QS 2 noted that "the main impact is cost saving because when materials are reused or recovered, projects can reduce unnecessary purchasing and disposal costs." These views align with Mushtaq, Halog, and Hussain's (2026) argument that the circular economy is not only about waste and recycling but also about sustainable resource management and the creation of development opportunities in resource-intensive sectors. Circular economy practices reduce costs by lowering demand for virgin materials, minimizing waste-disposal expenses, and extending infrastructure service life through reuse, recycling, and maintenance. Life-cycle costing research further shows that these savings can offset higher initial investment costs and reduce total ownership costs over the project life cycle (Jansen et al., 2020; AlJaber et al., 2023). Similarly, Schützenhofer et al. (2022) highlight that circular economy practices for construction and demolition waste can keep products, components, and materials at their highest value for longer. Therefore, the study confirms that CE practices can improve project efficiency, reduce environmental pressure, and support more responsible material use within South African construction projects.

The study further found that CE practices contribute to environmental protection and promote long-term economic and social benefits in the construction industry. Participants linked CE to innovation, improved sustainability outcomes, and the development of new ways of designing, procuring, and managing construction materials. Pr ENG MECH 1 explained that "circular economy creates room for innovation because professionals are forced to think differently about material selection, maintenance, reuse, and the full life cycle of buildings." In support of this, Pr PM 3 added that "the benefit is not only environmental; circular economy can create long-term value for clients, contractors, communities, and the industry as a whole." These findings are supported by recent literature on the built environment, which shows that the construction sector remains highly resource-intensive and that circular approaches are needed to address resource depletion, construction and demolition waste, and unsustainable linear practices (Ghufran et al. 2022; El Hafiane et al. 2025; Cervantes Puma et al. 2024). Furthermore, South African literature supports this finding, arguing that improved construction and demolition waste management requires circular-economy approaches to achieve more sustainable outcomes (Mangoro et al. 2025; Otasowie et al. 2023; Aboginije et al. 2020). Thus, the findings suggest that CE can assist the South African construction industry to move beyond short-term waste reduction towards a broader sustainability model that integrates environmental protection, cost efficiency, innovation, and socio-economic value creation.

5. Conclusions
This study assessed the impacts of the circular economy in the South African construction industry from the perspective of construction professionals. The key conclusion drawn from the study is that circular economy practices positively influence construction performance by improving resource efficiency, reducing construction waste, enhancing sustainability performance, encouraging innovation, and supporting cost savings. The findings show that the circular economy provides a practical alternative to the traditional linear model of "take, make, and dispose" by promoting reuse, recycling, recovery, sustainable procurement, and life-cycle thinking. However, an alternative conclusion is that these benefits are not automatic or evenly experienced across all projects, as their success depends on organisational readiness, client commitment, technical capacity, stakeholder collaboration, availability of circular materials, and supportive policy frameworks. Therefore, while the circular economy offers a strong pathway for improving sustainability in the industry, its effectiveness depends on the conditions under which it is implemented.

Theoretically, the study contributes to circular economy and sustainable construction knowledge by providing evidence from the South African construction context and showing that circular economy impacts should be understood through environmental, economic, and social dimensions. Practically, the findings are important for construction professionals, clients, contractors, and policymakers, as they highlight the need to integrate circular principles into project planning, design, procurement, material selection, and waste management. The study was limited to the South African construction industry and to professionals' perceptions at a specific point in time; therefore, the findings may not be fully generalizable to all countries, sectors, or project types. Based on these limitations, the study recommends that practitioners promote material reuse, recycling, design for disassembly, life-cycle costing, and sustainable procurement, while future research should examine the actual long-term cost, environmental, and social performance of circular economy practices across different construction projects in South Africa.

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