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**The Barriers and Enablers to South African SMEs
Entering the Circular Economy**

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by

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ABSTRACT

Purpose – In the linear economy (LE) natural resources are extracted, used to make products and services and are then discarded. This model has two key limitations: firstly, the LE relies on natural resources, which are finite, and the LE generates a significant amount of waste. The proposed solution is switching from a LE to a circular economy (CE), where energy and materials are used repeatedly. Small and medium-sized enterprises (SMEs) are significant contributors to the global economy and are faced with unique challenges. Understanding what factors are most influential in determining the successful transition of South African SMEs from the LE to the CE was the primary objective of the present study.

Methodology – The study adopted a quantitative research approach. Through the deployment an online survey, a questionnaire comprised of a series of 5-point Likert scale questions was completed by 62 respondents. The collected data was analysed using descriptive statistics and correlation analysis.

Findings – Insufficient government support & funding and a lack of regulatory incentives for CE adoption to be the two most significant barriers facing South African SMEs transition to the circular economy.

Conclusion – Until CE business models are viable enough for South African SMEs to transition from the LE to the CE without a reduction in their profitability levels, regulatory incentives will have to be provided by the South African government to make the transition financially viable.

Keywords: circular economy, linear economy, SMEs, South Africa, limitations, transition.

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LIST OF ABBREVIATIONS

LE	Linear economy
CE	Circular economy
EU	European Union
SME	Small and medium-sized enterprises
GDP	Gross domestic product
NWMS	National Waste Management Strategy
USA	United States of America

CHAPTER ONE: INTRODUCTION

1.1 RESEARCH BACKGROUND AND PROBLEM STATEMENT

The linear economy (LE) is the global status quo for economic production (Franklin-Johnson et al., 2016). The LE operates as follows: natural resources are extracted and used as inputs for the manufacturing of goods. These goods are then used by the consumer, after which they are disposed of (Esposito et al., 2018). The goal of the LE is to maximise economic productivity, and as a result, the LE has provided the global population with affordable goods and services at a mass scale (Sihvonen & Ritola, 2015).

The LE, however, has two significant limitations. The first limitation is that the LE relies on natural resources as the input for economic production (Franklin-Johnson et al., 2016), and the second limitation is that the LE generates large amounts of waste (Sohal et al., 2022). Both limitations are heavily correlated to population growth, meaning that as the global population grows, so will global natural resource consumption and global waste generation (Ababio & Lu, 2023).

It is believed that by 2050, the global population will exceed nine billion (Di Maio & Rem, 2015). At the global population's current rate of consumption, natural resources are being consumed twice as fast as they can be replaced. By 2050, natural resources will be consumed more than three times as fast as they can be replaced (Esposito et al., 2018).

In terms of waste generation, in 2020, the globe generated roughly 2.24 billion tonnes of solid waste; according to projections, the global solid waste in 2050 will equal approximately 3.88 billion tonnes, a 73% increase (World Bank Group, 2022). It can, therefore, be reasonably argued that, in order to sustain the growing global population, it is necessary to decouple population growth from natural resource consumption and waste generation (Mura et al., 2020).

The proposed solution to the limitations of the LE is the circular economy (CE) (Sihvonen & Ritola, 2015). The CE is defined as an economic system where materials flow in a circular loop, implying that energy and materials are used repeatedly, thus minimising environmental deterioration without restricting economic growth or inhibiting social progress. (Franklin-Johnson et al., 2016). Simply put, the goal of the CE is to decouple economic growth from natural resource usage and environmental impact (Sihvonen & Ritola, 2015). While the LE follows a take, make, use and dispose model of economic production, the CE follows a reduce, repair, reuse, recover,

remanufacture, and recycle framework, which facilitates the use of waste outputs from one process to be used as the resource input for another method, thus creating a self-sustainable economic production system (Ghisellini & Ulgiati, 2020).

Premised on its promising theoretical validity, the CE has become a prominent topic amongst those who are seeking to find sustainable solutions to our global society's collectively shared problems of natural resource depletion, environmental degradation, and waste generation (Kristoffersen et al., 2020). At the centre of this discussion are small and medium-sized enterprises (SMEs) (Ormazabal et al., 2018). The contributions of SMEs to the global economy are substantial. In the European Union (EU), they account for 99% of all businesses, employ more than 60 % of the private sector workforce, and are the creators of 85 % of all new jobs (Ormazabal et al., 2018).

While the economic contributions of SMEs are significant, their environmental impact is also substantial (Ormazabal et al., 2018). In the EU, SMEs account for 70% of industrial pollution and consume roughly 40% of the water and energy in the EU (Ormazabal et al., 2018). Based on the economic significance and environmental impact of SMEs, Ormazabal et al. (2018) argues that aiding SMEs transitioning from the LE to the CE is a fundamental step for global CE implementation.

Premised on the importance of SMEs being able to transition from the LE to the CE, a substantial amount of research has been conducted to investigate the barriers and enablers to SMEs entering the CE (Agyemang et al., 2019; Malik et al., 2022; Rizos et al., 2016). However, the overwhelming majority of this research has been conducted within the EU, with minimal research investigating the barriers and enablers of SMEs in the global south seeking to transition to the CE (Malik et al., 2022).

Recent studies (Mura et al., 2020; Ormazabal et al., 2018) investigated the enablers and barriers to Spanish and Italian SMEs operating in the CE. The authors recommended replicating their studies in other geographical regions in both studies. Within the South African context, CE research is still in its infancy (Tahulela & Ballard, 2019), with no prior research investigating South African SMEs operation within the CE.

South African SMEs account for almost 99% of all businesses in South Africa and contribute significantly to the South African economy, accounting for 40% of the country's gross domestic product (GDP) and employing more than 25% of its private sector workforce (Rajagopaul, Magwentshu & Kalidas, 2020). The South African economy operates as a LE. (Tahulela & Ballard, 2019). In 2017, South Africa generated approximately 108 million tons of waste, of which only 7% was recycled, while the remaining 93% was landfilled (Department of Environmental Affairs, 2018).

According to Godfrey and Oelofse (2017), South Africa's CE transition is not progressing at a sufficient rate. Therefore, premised on South Africa's waste generation figures and the fact that the global economy possibly needs to transition from a LE to a CE (Ormazabal et al., 2018), the present study expanded on the work of Ormazabal et al. (2018), within the South African context. Ormazabal et al. (2018) used quantitative surveys to evaluate the barriers and enablers to Spanish SMEs seeking to enter the CE. Premised that South Africa's CE transition is not progressing sufficiently (Godfrey & Oelofse, 2017), the study provided an overview of the factors that impact this transition for South African SMEs. Thus, providing the various stakeholders involved in this transition with reliable data can facilitate a more seamless transition for South African SMEs.

Based on the discussion above, the following problem statement has been identified: Despite South Africa only recycling 7% of its 108 million tons of waste and the hypnotised need for the South African economy to transition from a LE to a CE, the barriers, and enablers to South African SMEs, who account for 40% of South Africa's GDP, entering the circular economy have not been adequately researched or documented.

1.2 RESEARCH AIMS AND OBJECTIVES

1.2.1 PRIMARY RESEARCH QUESTION

What are the barriers and enablers to South African SMEs entering and successfully operating within the circular economy situated in a South African context?

1.2.2 RESEARCH QUESTIONS

RQ₁: What are the economic barriers and enablers that affect South African SMEs ability to participate in the circular economy, and how influential are these barriers and enablers?

- RQ₂: What are the societal barriers and enablers that affect South African SMEs ability to participate in the circular economy, and how influential are these barriers and enablers?
- RQ₃: What are the governmental factors that affect South African SMEs ability to participate in the circular economy, and how influential are these barriers and enablers?

1.3 THE SCOPE OF THE STUDY

The focus of the present study is to investigate the barriers and enablers that facilitate or inhibit South African SMEs from entering the circular economy. As noted in the research background and problem statement, Despite South Africa only recycling 7% of its 108 million tons of waste and the hypnotised need for the South African economy to transition from a LE to a CE, the field of circular economy transitioning has not been sufficiently research in the South African context, and even less to when explicitly focussing on the CE transitioning of South African SMEs (Tahulela & Ballard, 2019). Given that the purpose of the present study was to research the barriers and enablers that affect South African SMEs ability to enter the circular economy, the scope of the present study is limited to the views of the owners and leaders of South African SMEs during the collection period of August to November 2024.

CHAPTER TWO: LITERATURE REVIEW

2.1 THE LINEAR ECONOMY

This first section of the literature review will provide a contextual overview of the linear economy (LE). Understanding the LE is an essential part of understanding the circular economy (CE), which will be discussed in a later section of this literature review. The first sub-section will introduce the LE and its origins, and it will also explore the general philosophy of the LE and how the LE measures success. The second sub-section will provide an overview of the limitations of the LE. This sub-section is of particular importance, as overcoming the identified limitations of the LE is the express goal of the CE, which will be discussed later. The third sub-section will provide an overview of the LE in South Africa to establish sufficient context before discussing the CE in South Africa later in the literature review. The fourth sub-section will give the reader a brief conclusion of this first section of the literature review and will serve as a transition point for the reader to continue with the rest of the literature review.

2.1.1 INTRODUCTION TO THE LINEAR ECONOMY AND ITS ORIGINS

The LE is the global status quo for the manufacturing and consumption of goods and is defined as a one-directional model of economic production (Esposito et al., 2018). The LE operates as follows: natural resources are extracted and then used as the inputs for the manufacturing of goods; these goods are then used by the consumer, after which they are discarded (Esposito et al., 2018). The LE can, therefore, be summarised as the take, make, use and dispose model of economic production (Ormazabal et al., 2018). Key aspects of the LE are mass production, mass consumption and mass discarding of products at the end of their product life cycle (Michellini et al., 2017).

The LE draws its origins back to the onset of the Industrial Revolution (Franklin-Johnson, Fige, and Canning 2016). The technological advancements during the Industrial Revolution made it possible for manufacturers to provide the global population with affordable goods and services on a mass scale (Sihvonen & Ritola, 2015). The LE aims to facilitate maximum economic prosperity (Govindan & Hasanagic, 2018). Therefore, success in the LE is measured by how much an economy can produce, i.e., GDP, and how fast an economy can grow (Ghisellini & Ulgiati, 2020). Govindan and Hasanagic (2018) add that the LE does not concern itself with societal or

environmental-related factors to measure success; economic production and growth are all that count.

Sariatli (2017) states that although the entire global population benefited from the Industrial Revolution and the subsequent LE, it was and still is the societies in the globe's Western hemisphere that are the most prominent beneficiaries of the Industrial Revolution and the subsequent LE model that followed. Sariatli's (2017) argument is based on the belief that the natural resources used by the societies of the globe's Western hemisphere as inputs for their manufacturing are sourced from the global arena. This has created an environment where Western societies have an abundance of resources at their disposal that facilitate the manufacturing and consumption of goods and services on a mass scale.

Sariatli's (2017) position is supported by figures from Eurostat (2022), which reported that the EU's material consumption was equal to roughly 14 tonnes per person in 2021, while Africa's material consumption was equal to only 6 tonnes per person (Baninla et al., 2020). India's material consumption was equal to only 5 tonnes per person (International Resource Panel, 2019). While no definitive conclusions can be made from these figures, they do add context to the argument presented by Sariatli (2017).

2.1.2 THE LIMITATIONS OF THE LINEAR ECONOMY

The LE has two significant limitations. The first limitation is that the LE is dependent on natural resources as the input for the manufacturing of goods (Franklin-Johnson et al., 2016). Secondly, the LE generates an excessive amount of waste (Sohal et al., 2022). As a result of these limitations, Sihvonen and Ritola (2015) argue that the LE's viability as a model of economic production is steadily decreasing.

In terms of the LE's dependence on natural resources, Geissdoerfer et al. (2017) state that the LE would only be feasible in a reality where the globe had infinite natural resources that could indefinitely sustain the growing human population. Ghisellini and Ulgiati (2020) point out that under the LE model, the growth of the global population is directly correlated to the globe's demand for natural resources, resulting in an acceleration of natural resource depletion.

It is believed that by 2050, the global population will exceed nine billion and reach 10 billion by the year 2050 (Di Maio & Rem, 2015). Esposito et al. (2018) add context to those figures by suggesting that natural resources are being consumed 50% faster than can be replaced at the

global population's current consumption rate. Esposito et al. (2018) further suggest that by 2030, the global population's demand for natural resources will require more than two Earth's worth of natural resources, increasing to three by 2050. Munaro and Tavares (2023) add to this discussion by stating that the globe's rapidly growing middle class and rate of urbanisation will lead to an additional increase in the consumption of natural resources. Mura et al. (2020) thus conclude that premised on the correlational relationship between global population growth and natural resource usage, to sustain its growing global population, it is necessary to decouple population growth from natural resource consumption.

In terms of waste generation, Sohal et al. (2022) explain that waste generation occurs constantly at every point in the LE value chain. Sohal et al. (2022) argue that the point of natural resource extraction, waste is often generated, and the natural environment is degraded; during the manufacturing process of goods, greenhouse gases are emitted; and once the product is no longer valid, it is disposed of, leading to the creation of a tremendous amount of waste all over the globe.

Ababio and Lu (2023) explain that global population growth and global waste generation are heavily correlated. Figures from the World Bank Group (2022) support the notion that population growth and waste generation are correlated. In 2020, the global population was roughly 7.9 billion people, and the globe generated 2.24 billion tonnes of solid waste. By 2050, the global population is expected to reach approximately 10 billion (Di Maio & Rem, 2015), resulting in 2050's projected solid waste generation to equal roughly 3.88 billion tonnes, an increase of 73% (World Bank Group, 2022). Sohal et al. (2022) further add to this discussion, stating that the generated waste is often toxic and damages the Earth's natural environment.

2.1.3 THE LINEAR ECONOMY IN SOUTH AFRICA

The South African economy operates as a LE (Tahulela & Ballard, 2019). According to a report by the South African Department of Environmental Affairs (2018) titled, *The State of Waste*, South Africa generated approximately 108 million tons of waste in 2017. South Africa's waste is comprised of three categories, namely: general waste, which equals roughly 42.7 million tons; hazardous waste, which equals approximately 38 million tons; and unclassified waste, which equals approximately 28 million tons (Department of Environmental Affairs, 2018).

To put these numbers in perspective, When comparing South Africa's solid waste generation of 42.5 million tons in 2017 (Department of Environmental Affairs, 2018) to the global solid waste generation of 2.24 billion tons in 2022 (World Bank Group, 2022), assuming both numbers are accurate, which is highly debatable since the South African figures for solid waste generation are from 2017 (Department of Environmental Affairs, 2018), and are 5 years older than the figures presented by the World Bank Group, (2022). Using the formula $\frac{\text{South African solid waste (2017)}}{\text{Global solid waste (2022)}} \times 100$, it can be loosely determined that South Africa accounts for approximately 1.9 % of global solid waste generation.

The above calculation must, however, be put into context. When comparing the population figures presented by the same two reports, i.e., the South African Department of Environmental Affairs (2018) and the World Bank Group (2022), using the formula $\frac{\text{South African population (2017)}}{\text{Global population (2022)}} \times 100$, South Africa's population, which equalled roughly 56 million in 2017 (Department of Environmental Affairs, 2018), would equate to 0.71 % of the global population of roughly 7.9 billion in 2022 (World Bank Group, 2022).

Premised on these calculations, South Africa's contribution to solid waste generation is roughly 2.68 times greater than its contribution to the global population. While comparing these figures, which are separated by 5 years, is not ideal, the consistency in using figures from the same two reports gives the calculations a degree of legitimacy, as both institutions, i.e., the South African Department of Environmental Affairs (2018) and the World Bank Group (2022) are reputable organisations.

According to Nyika et al. (2019), waste generation in South Africa is on an upward trajectory. This statement is corroborated by the Department of Environmental Affairs (2018), which explains that there are several factors driving waste generation in South Africa. The Department of Environmental Affairs (2018) cite South Africa's growing population, economic growth, and rate of urbanisation as the primary drivers leading to South Africa's increase in waste generation.

As previously mentioned, the correlation between population growth and waste generation growth is one of the key limitations of the linear economy (Ababio & Lu, 2023). The waste generation figures presented by the Department of Environmental Affairs (2018) and the drivers they cite suggest that the linear economy in South Africa is given the same limitations in terms of waste generation as the global economy.

2.1.4 CONCLUSIONS

To conclude, from the onset of the Industrial Revolution, the LE has been the global model for economic production (Esposito et al., 2018). The LE has provided great utility to the global population by producing goods and services for consumption at affordable prices (Sihvonen & Ritola, 2015). However, premised on the fact that the LE is entirely dependent on the consumption of natural resources (Esposito et al., 2018), which are being consumed at a rate which is 50% greater than can be replenished (Esposito et al., 2018), and that the LE generates an extreme amount of waste, which increases in correlation with the growth of the global population (Ababio & Lu, 2023). The South African LE is not immune to these limitations, as the South African Department of Environmental Affairs (2018) cites population growth, economic growth, and increased urbanisation rates as the drivers that cause increased waste generation in South Africa. Arguments questioning the long-term viability of LE as the global model for economic production are reasonable (Sariatli, 2017).

2.2 THE CIRCULAR ECONOMY

The second section of the literature review will provide an overview of the CE. The first sub-section will introduce the circular economy and its origins. The first sub-section aims to define the CE and explain its fundamental differences compared to the LE. The second sub-section will explain the principles of the CE. Understanding these principles is important as they facilitate the operation of the CE.

The third sub-section will present an overview of the factors influencing CE implementation. Within each distinct category of factors, there are both factors which drive and enable the implementation of the CE and factors which challenge & act as barriers. Sub-section four will present the reader with an overview of the multiple system levels of the CE. The penultimate sub-section will present an overview of the status of the circular economy in South Africa. The reader will be provided with figures relating to South Africa's waste generation and management and South Africa's national approach to implementing CE initiatives. The final sub-section will give a short conclusion to this section of the literature review and serve as a transition point to the section of the literature review.

2.2.1 INTRODUCTION TO THE CIRCULAR ECONOMY AND ITS ORIGINS

The CE is the proposed solution to the limitations of the LE (Sihvonen & Ritola, 2015). The CE's primary goals are to facilitate the decoupling of economic growth from natural resource usage

and environmental impact (Sihvonen & Ritola, 2015). Mura et al. (2020) add additional context to the goals of the CE by stating that the CE seeks to remove natural resources as inputs for economic productivity and eradicate waste to sustain our global society.

In the previous section, it was mentioned that LE follows a take, make, use and dispose model of economic production, which includes clear resource inputs that generate waste outputs (Ormazabal et al., 2018). The CE follows a reduce, repair, reuse, recover, remanufacture, and recycle framework, where the waste outputs of one process are used as the inputs for another, creating a self-sustainable closed-loop economic production system (Ghisellini & Ulgiati, 2020).

According to Govindan and Hasanagic (2018), there is an abundance of CE definitions. However, the most acclaimed definition is provided by Franklin-Johnson et al. (2016) who state that the CE represents a system where materials flow in a closed loop, where multiple systems repeatedly use raw materials and energy. Thus, it minimises environmental deterioration without restricting economic growth or inhibiting societal progress.

Nasir et al. (2017) explain that the CE can be further defined as an economic paradigm where resources are used as long as possible to extract the maximum utility for the least damage. Murray et al. (2017) provide some additional context by stating that the CE can be defined as an economic model where the sourcing of resources, purchasing activity, and reusing operations are designed to preserve the natural environment and humanity. The CE can be regarded as a paradigm shift in the way humankind is affecting nature and aims to prevent the further depletion of resources by closing resource and material loops (Prieto-Sandoval et al., 2018).

The origins of the CE can be traced back to 1966 when ecological economist Kenneth Boulding suggested that the global economy should operate as a circular system as opposed to a linear system (Ghisellini & Ulgiati, 2020). Boulding's cyclical economic system then catalysed researcher Walter Stahel to introduce the concept of a closed-loop self-replenishing economic model in 1982 (Sariatli, 2017). Then, in 1989, David Pearce and Kerry Turner presented the idea of the circular economy (Govindan & Hasanagic, 2018). In the following subsection, the operation of the CE will be discussed, and each principle will be explained.

2.2.2 PRINCIPLES OF THE CIRCULAR ECONOMY

To facilitate the operation of the CE and to ensure that waste generation is minimised, natural resources are used most effectively, and the natural environment can regenerate itself, resource usage and waste management must follow what is referred to as the R-framework (Ghisellini & Ulgiati, 2020)

The R-framework was initially comprised of three principles and was thus appropriately named the 3R-framework, consisting of the following principles: reduce, reuse, and recycle (Mura et al., 2020). Over time, additional principles started to be added to the R-framework; the first edition was the 'recover' principle (De Medici et al., 2018), which established the widely cited 4R-Framework (Ghisellini & Ulgiati, 2020). Two additional principles followed, namely, repair and remanufacturing (Jawahir & Bradley, 2016). It is believed that the collection of these six principles, known as the 6R framework, makes it possible for the dichotomous goals, economic growth and environmental protection, to seamlessly coincide through maximising resource efficiency whilst reducing the unsustainable depletion of natural resources and the degradation of the natural environment (Jawahir & Bradley, 2016; Rosa et al., 2019). The six principles of the CE are briefly defined below.

2.2.2.1 Reduce

The reduction principle is aimed at reducing the environmental impact of economic activity by lowering the usage of natural resources as a production input, thus simultaneously lowering greenhouse gas emissions and waste generation throughout the product life cycle (De Medici et al., 2018). Prieto-Sandoval et al. (2018) explain that product design is central to the success of the reduction principle due to the ability of manufacturers to address environmental impact at source by implementing effective resource management that will prevent resource depletion (De Medici et al., 2018).

2.2.2.2 Reuse

The reusing principle refers to the ability of a product or system to maintain its physical qualities, the integrity of its raw material inputs, and performance output beyond the product's first usage cycle (Jawahir & Bradley, 2016). In other words, a product must be able to be reusable, according to its original function, across several usage cycles to ensure that products do not become obsolete, resulting in their disposal (Jawahir & Bradley, 2016).

2.2.2.3 Recycle

The recycling principle refers to the returning of natural resources back into the economy after their product life cycle has been completed (Steinhilper & Weiland, 2015) to ensure that products that contain valuable resources are not simply disposed of, leading to the generation of waste and accelerating environmental degradation, but instead retaining their value within the economy (Steinhilper & Weiland, 2015).

2.2.2.4 Recover

The recovery principle is related to the collection of products that have reached the end of their product life cycle, disassembling, sorting, cleaning, and reassigning components for use in the following product life cycle (Jawahir & Bradley, 2016) The recovery principle is particularly focused on extracting the value from the components and parts that make up a product to ensure that their value extends through multiple product life cycles (Ghisellini & Ulgiati, 2020).

2.2.2.5 Repair

The repairing principle is focused on restoring products that have become redundant due to damage or decay to a state where they are once again in useable condition (Lieder & Rashid, 2016), thereby extending the product lifetime, reducing waste generation and resource depletion, and ensuring that the natural resource investment made in creating a product receives the highest amount of usage return (Rosa et al., 2019).

2.2.2.6 Remanufacture

The principle of remanufacturing refers to the process of restoring already used products to their original state or creating new products using only the parts of a remanufactured product without the product losing any sort of functionality (Jawahir & Bradley, 2016).

2.2.3 THE FACTORS THAT INFLUENCE CE IMPLEMENTATION

Whilst the CE presents great promise from a theoretical perspective, the implementation of the CE requires the overcoming of a series of barriers (Ormazabal et al., 2018). There are also a series of enabling factors that act as drivers for the implementation of CE (Sohal et al., 2022). The amount of available research investigating the barriers and enablers of CE is extensive (Rizos et al., 2016). Two separate bibliometric analyses support this statement. The first is from Ababio & Lu (2023), and the second is from Osei-Tutu et al. (2023).

Both above-mentioned bibliometric analyses investigated the factors that influence CE implementation and collectively analysed over 100 CE publications (Ababio & Lu, 2023; Osei-Tutu et al., 2023). The factors that influence CE implementation are placed in four distinct categories, namely: economic and financial factors, societal and cultural factors, governmental factors, and technological factors (Ababio & Lu, 2023; Mhatre et al., 2023; Osei-Tutu et al., 2023). Each of these factors will now be discussed.

2.2.3.1 Economic and Financial Factors

Economic and financial factors are regarded as any factor that has a direct and immediate impact on the profitability or expense of an organisation (Sohal et al., 2022). Researchers have argued that one of the profound benefits of CE implantation is a reduction in the operating cost of the business due to the usage of cheaper reclaimed materials as opposed to more expensive virgin materials, which will thus lead to increased profitability (Ormazabal et al., 2018; Rizos et al., 2016; Sohal et al., 2022). It was also argued that the adoption of CE initiatives would improve the economic sustainability of businesses (Ormazabal et al., 2018).

In contrast to the notion that implementing CE practices will improve the profitability of a business, several researchers have argued that CE implementation would reduce profitability (Mhatre et al., 2023; Munaro & Tavares, 2023). It is argued that establishing the required infrastructure for CE business operations requires significant upfront costs. Therefore, it is one of the main economic and financial barriers to CE implementation (Mhatre et al., 2023). Other economic and financial factors deemed barriers to CE implementation include increases in operating expenses, the low cost and high availability of virgin materials, and the high cost of performing CE activities such as reduce, repair, reuse, recover, remanufacture, and recycle. (Ababio & Lu, 2023; Osei-Tutu et al., 2023).

2.2.3.2 Societal and cultural factors

Societal and cultural factors are regarded as any factor that represents society's attitudes, perceptions or knowledge of the circular economy (Sohal et al., 2022). Researchers have argued that implementing CE practices would improve a business's brand image and prestige, thus allowing the business to differentiate itself from competitors (Ormazabal et al., 2018; Rizos et al., 2016). This argument is challenged by the fact that a lack of interest from customers regarding CE-compliant products is one of the main barriers to CE implementation in businesses (Ababio & Lu, 2023; Osei-Tutu et al., 2023). Other widely cited societal and cultural barriers to CE

implementation in businesses include a low level of knowledge regarding CE business operations, an inadequate market of reclaimed materials, insufficient levels of supply chain integration, and a general lack of support for CE initiatives from business leaders (Ababio & Lu, 2023; Mhatre et al., 2023; Munaro & Tavares, 2023; Osei-Tutu et al., 2023).

2.2.3.3 Governmental Factors

Governmental factors are related to government policy or legislature regarding the CE. (Sohal et al., 2022). Mura et al. (2020) explain that government support for CE initiatives is a key driver in businesses' adoption of CE practices. At the same time, Sohal et al. (2022) state that the adoption of legislation requiring CE practices is a particularly strong driver for implementing CE practices in businesses.

There is a consensus that government support and comprehensive legislation would drive CE implementation in businesses (Rizos et al., 2016). According to Ababio & Lu (2023), however, bureaucracy, a lack of incentives for adopting CE practices in business, a lack of comprehensive legislation regarding circular business practices, and a lack of funding for the development of CE infrastructure are key barriers inhibiting the adoption of circular business practices.

2.2.3.4 Technological Factors

Technological factors are comprised of any factor that is related to the availability of technology or the technical skills required to implement technology for CE adoption by businesses (Ababio & Lu, 2023). Sohal et al. (2022) state that the availability of CE technologies to aid businesses is a strong driver for CE implementation. Implementation of CE technologies has reportedly resulted in a decrease in waste generation, increased energy efficiency, and a reduction in manpower requirements (Sohal et al., 2022).

The notion that CE technologies will aid in adopting CE is strongly supported (Rizos et al., 2016). However, CE technologies are expensive and require an upfront investment to implement into the business value chain (Rizos et al., 2016). Additionally, a sufficient degree of technical knowledge is required for CE technologies to be successfully implemented and then effectively utilised, which many organisations lack (Ababio & Lu, 2023; Mhatre et al., 2023; Osei-Tutu et al., 2023).

2.2.4 MULTIPLE SYSTEM LEVELS OF THE CIRCULAR ECONOMY

The factors which will determine the successful implementation of the six principles that comprise the 6R-Framework mentioned above do not all fall without the sphere of influence of individuals or businesses but governments (Kirchherr et al., 2018). The CE is comprised of three system levels, namely the micro, meso, and macro levels (Kirchherr et al., 2018).

Premised on the fact that the CE is centred around the circulation of resources, waste, and energy, cooperation and coordination between the three system levels is of paramount importance if the effective implementation of CE is to be achieved (Kirchherr et al., 2018). Each of the three system levels has its own unique set of barriers, which must be overcome collectively for sustainable change to occur (Prieto-Sandoval et al., 2018). Each of the three system levels will be briefly defined, and their barriers will be discussed.

2.2.4.1 *Micro-system level*

The micro-system refers to factors that are internal to a business, such as the products which a business sells and the internal processes which the business follows as a result of the attitudes and beliefs of the organisation's leadership (Malik et al., 2022). Therefore, the primary CE adoption barrier at this level is related to the perceptions and behaviours of the organisation's decision-makers; if organisational leaders are risk-averse or do not see CE adoption as a relevant objective for their organisation, the implementation of CE across the broader economy will be particularly challenging (Kirchherr et al., 2018) Thus making resistance to change a significant barrier to the universal implementation of the CE (Rizos et al., 2016).

2.2.4.2 *Meso-system level*

The meso-system level is related to the intra-business environment, specifically the practices of the region within which an organisation is located and the dynamics of business-to-business relationships (Kirchherr et al., 2018). One of the key barriers to CE implementation at this level is a lack of support and buy-in from other businesses in the supply chain, which makes it exceedingly challenging for an organisation to transition to the CE (Malik et al., 2022).

2.2.4.3 *Macro-system level*

The macro-system level is focused on the global or national level view of the CE, i.e., looking at national-level decision-making and the validity of the CE to sustain the global economy (Kirchherr et al., 2017). The key barrier at this level is a lack of government support (Rizos et al., 2016).

Transitioning from the LE to the CE is an expensive undertaking that organisations often cannot afford; therefore, organisations who make the transition often find themselves in isolation, as the other supply chain members still operate within the linear economy (Rizos et al., 2016).

2.2.5 THE CIRCULAR ECONOMY IN SOUTH AFRICA

An indicator of the state of South Africa's CE implementation can be found in South Africa's waste generation figures (Nyika et al., 2019). As was previously mentioned, in 2017, South Africa's waste generation was approximately 108 million tons, which consisted of 42.7 million tons of solid waste, 38 million tons of hazardous waste, and roughly 27.8 million tons of unclassified waste (Department of Environmental Affairs, 2018).

In terms of solid waste, in 2017, South Africa managed to successfully recycle 4.87 million tons of solid waste, equalling roughly 11% of their 42.7 million tons of solid waste in 2017, while the remaining 37.81 million tons or 89% was landfilled (Department of Environmental Affairs, 2018). Regarding hazardous waste, which equalled 38 million tons, 2.69 million tons or 7%, was successfully recycled, while the remaining 93% was landfilled. In terms of unclassified waste, South Africa recycled 25 thousand tons, equalling roughly 1% of their 27.8 million tons of unclassified waste (Department of Environmental Affairs, 2018). In total, South Africa successfully recycled 7.6 million tons, or 7% of the country's waste in 2017, while the remaining roughly 100 million tons, or 93%, ended up in landfills (Department of Environmental Affairs, 2018).

Nyika et al. (2019) explain that South Africa's struggles with waste management can be explained by the fact that 87% of South Africa's municipalities do not have the infrastructure or capacity to manage waste effectively or to engage in waste management strategies. Godfrey & Oelofse (2017) make the argument that South Africa's poor funding of waste management and the uncoordinated nature of South Africa's waste management operations place the country two to three decades behind the countries of the Western Hemisphere when it comes to waste management. Nyika et al. (2019) state that the South African government is aware of the country's waste management challenges and is therefore advocating for waste minimisation, reuse of materials, and recycling, per the National Waste Management Strategy (NWMS). It is hoped that with increased awareness, there will be a nationwide shift from the usage of landfill disposal towards the view that waste is a resource (Tahulela & Ballard, 2019).

As part of the NWMS, the Department of Environmental Affairs proposed introducing legislation that would make industries responsible for their products that have turned to waste (Tahulela & Ballard, 2019). As stated by Sohal et al. (2022), the implementation of legislation requiring the adoption of CE practices, such as the strategy suggested by the Department of Environmental Affairs, is a strong driver for the implementation of CE practices in businesses.

Unfortunately, no performance measures or implementation timelines have been presented to the local governments of each South African province, who have been responsible for overseeing the implementation of CE initiatives in their respective provinces. (Tahulela & Ballard, 2019). Resulting in South Africa's CE implementation being at a standstill (Godfrey & Oelofse, 2017).

At present, the South African government is trying to convince the private sector to change its production and operations processes so that it can operate within a CE. However, the government cannot provide any support to assist businesses with the financial costs associated with making this transition, thus placing the financial burden on individual businesses (Tahulela & Ballard, 2019). As previously mentioned, a lack of financial incentives for adopting CE practices in business and a lack of government funding for the development of CE infrastructure are key barriers inhibiting the adoption of circular business practices (Ababio & Lu, 2023). Premised on the above, Godfrey and Oelofse's (2017) statement that South Africa's CE implementation is at a standstill seems reasonable.

2.2.6 CONCLUSION

The CE is regarded as the proposed solution to the limitations of the LE (Sihvonen & Ritola, 2015) and is perhaps best defined as an economic system where materials flow in a closed loop, where raw materials and energy are used repeatedly through multiple systems, allowing for the minimisation of environmental deterioration without restricting economic growth or inhibiting societal progress (Franklin-Johnson et al., 2016).

The operation of the CE is facilitated by the R-framework, which consists of six principles, namely: reduce, reuse, recycle, recover, repair, and remanufacture (Jawahir & Bradley, 2016). These six principles ensure that waste generation is minimised, natural resources are used most effectively, and the natural environment can regenerate itself (Ghisellini & Ulgiati, 2020). Four main factors influence the implementation of the CE, namely economic and financial factors, societal and cultural factors, governmental factors, and lastly technological factors (Ababio & Lu,

2023; Osei-Tutu et al., 2023). Each category of factors contains factors that enable circular economy implementation, but some factors act as barriers to the implementation of the CE.

The factors that influence the successful implementation of CE do not all fall within one area of influence (Kirchherr et al., 2018). Some factors may occur at the micro-system level, i.e., within the sphere of influence of an individual business (Rizos et al., 2016). At the same time, other factors may fall within the mesosystem, i.e., the intra-business environment (Malik et al., 2022). Factors that influence the success of CE implementation can occur at the macro-system level, i.e., at the national and global decision-making level, which is entirely outside of the control of an individual business (Kirchherr et al., 2018).

In South Africa, CE implementation is not progressing sufficiently (Tahulela & Ballard, 2020). Of the 108 million tons of waste generated in 2017, South Africa only managed to recycle 7% of it, while the remaining 93% was landfilled (Department of Environmental Affairs, 2018). The government has presented a plan named the National Waste Management Strategy. However, due to ineffective implementation, there has been little progress concerning South Africa's CE implementation (Godfrey & Oelofse, 2017). A significant proportion of the responsibility of transitioning South Africa from an LE to a CE has been placed on South Africa's private sector businesses (Tahulela & Ballard, 2020). However, due to a lack of government support and incentives, South Africa's businesses are asked to carry a large part of the financial burden of transitioning the South African economy (Tahulela & Ballard, 2020).

2.3 SMALL AND MEDIUM-SIZED ENTERPRISES

The goal of the first section of the literature review was to tell the reader about the contributions of the LE while explaining that the LE has certain limitations. The goal of the second section of the literature review is to introduce the CE as a potential solution to the LE whilst explaining that the implementation of the CE may be challenging.

In the third section of the literature review, the reader is presented with a conceptual overview of SMEs. The goal is to convey to the reader the contributions of SMEs to the global economy while also highlighting the environmental impact of the linear nature in which SMEs are currently operating and why SMEs need to transition to a circular economy model, both globally and in South Africa.

2.3.1 INTRODUCING SMES: THEIR CONTRIBUTION AND IMPACT

The definition of SMEs is not universal and changes depending on the sector of business or jurisdiction (United States International Trade Commission, 2010). For example, in the United States of America (USA), the most applied definition states that SMEs are businesses that employ 500 people or less (United States International Trade Commission, 2010). In the EU, an SME is regarded as an organisation that has less than 250 employees whilst also generating equal to or less than EUR 50 million in revenue or has less than EUR 43 million in total assets.

The contributions of SMEs to the global economy are significant (Ormazabal et al., 2018). In the EU, SMEs account for 99% of all enterprises (Mura et al., 2020); amongst the OECD member states, they account for 95% of all companies (Ormazabal et al., 2018), and among the world's free economies, SMEs account for roughly 90% of all business. (Rizos et al., 2016). In the EU, SMEs account for a substantial amount of private-sector employment, with 85 % of all new being created by SMEs and more than 60% of the entire private-sector workforce being employed by SMEs (Mura et al., 2020).

Ormazabal et al. (2018) explain that while the contributions of SMEs are significant, their impact is also substantial. In the EU, SMEs account for 70% of the industrial population and 45 % of industrial air emissions whilst being responsible for roughly 40% of the water and energy consumption within the EU (Ormazabal et al., 2018). Premised on the economic contributions and environmental impact of SMEs, Ormazabal et al. (2018) argue that aiding SMEs transitioning from the LE to the CE is one of the most important prerequisites for global CE implementation.

2.3.2 THE FACTORS INFLUENCING CE IMPLEMENTATION IN SMES

Sohal et al. (2022) explain that the adoption of CE practices in SMEs is influenced by the same factors affecting larger businesses but at differing intensity levels. As previously mentioned, the factors that influence CE implementation can be placed into four distinct categories, namely: economic and financial factors, societal and cultural factors, governmental factors, and technological factors (Ababio & Lu, 2023; Mhatre et al., 2023; Osei-Tutu et al., 2023).

Ormazabal et al. (2018) argue that SMEs are faced with a unique challenge in comparison to larger organisations concerning CE implementation. SMEs have fewer financial resources, technical resources, and human resources relative to larger organisations (Mura et al., 2020).

Sohal et al. (2022) add additional context to this topic by stating that SMEs are often simply trying to stay alive, citing that many SMEs are constantly faced with cash flow and working capital problems. Rizos et al. (2016) state that transitioning from the LE model towards a CE model requires extensive logistical planning, inventory management, the development of circular manufacturing infrastructure, and an extensive reverse logistics network. The combination of limited financial resources, high upfront costs, and the uncertainty that SMEs will benefit from transitioning to the CE makes it challenging for SMEs to transition to a CE model (Sohal et al., 2022).

2.3.3 SMES IN SOUTH AFRICA

In South Africa, an SME is defined as any organisation that employs less than 250 people (Department of Small Business Development, 2019). South African SMEs account for almost 99% of all businesses in South Africa and contribute significantly to the South African economy (Rajagopaul, Magwentshu & Kalidas, 2020). South Africa's SMEs account for South African SMEs contribute significantly to the South African economy, accounting for 40% of the country's GDP, and employ more than 25% of its private sector workforce (Rajagopaul et al., 2020)

2.3.4 CONCLUSION

In conclusion, SMEs contribute significantly to the global economy, accounting for 99% of all businesses in the EU, account for 57% of the EU's GDP (Rajagopaul et al., 2020), and are responsible for 85% of all new job creations in the EU (Ormazabal et al., 2018). SMEs contributions are significant, but so is their impact, as they account for 70% of the industrial population in the EU and account for roughly 40% of the water and energy consumption within the EU (Ormazabal et al., 2018).

Premised on their resource consumption and waste generation, Mura et al. (2020) argue that transitioning SMEs from the LE to the CE is one of the most important aspects of global CE implementation. SMEs adoption of the CE is influenced by the factors affecting larger businesses but at differing levels of intensity (Sohal et al., 2022). SMEs have fewer financial resources, technical resources, and human resources relative to larger organisations (Mura et al., 2020), making the transition from the LE to CE especially challenging.

In South Africa, SMEs account for almost 99% of all businesses and contribute significantly to the South African economy (Rajagopaul, Magwentshu & Kalidas, 2020). South Africa's SMEs account

for South African SMEs contribute significantly to the South African economy, accounting for 40% of the country's GDP, and employ more than 25% of its private sector workforce (Rajagopaul et al., 2020)

Premised on the importance of SMEs in the South African economy and wider society, South Africa's adoption of the CE depends on the ability of South African SMEs to make the transition from the LE to the CE (Tahulela & Ballard, 2020). Therefore, understanding the factors that enable or inhibit South African SMEs from entering the CE is paramount to ensure that South Africa's goal of universal adoption of the CE is achieved.

CHAPTER THREE: RESEARCH DESIGN AND METHODOLOGY

3.1 RESEARCH STRATEGY AND APPROACH

3.1.1 RESEARCH STRATEGY

A research strategy is defined as the plan which researchers use to answer their specified research question (Dubey & Kothari, 2022). The research strategy chosen for a study connects the research philosophy selected for the study and the methods used for data collection and analysis (Saunders et al.,2023). According to Saunders et al. (2023), eight research strategies can be used in a study: experiments, surveys, archival research, case study, ethnography, action research, grounded theory, or narrative inquiry.

The survey method is an effective research strategy in scenarios where a researcher is seeking to collect standardised data from a large number of respondents in an economically practical manner to allow for effective and accurate comparison between respondents (Dubey & Kothari, 2022). Premised on the fact that the present study investigated the barriers and enablers to South African SMEs entering the circular economy (CE), which entailed collecting data from SME owners employing a quantitative questionnaire, the survey research strategy was deemed the most appropriate strategy for the present study.

3.1.2 APPROACH TO THEORY DEVELOPMENT

Saunders et al. (2023) explain that a researcher can select one of three approaches to theory development: abductive, inductive, and deductive. When a researcher is attempting to evaluate the validity of a proposed hypothesis related to an already existing theory through data collection, the deductive approach to theory development is most appropriate (Dubey & Kothari, 2022). Premised on the fact that the present study evaluates the theory that barriers and enablers exist that facilitate or inhibit the entry of South African SMEs into the CE using quantitative data collection, the deductive approach has been deemed the most appropriate approach to theory development in the present study.

3.1.3 METHODOLOGICAL CHOICE

A researcher's methodological choice is related to whether the researcher has adopted a quantitative, qualitative, or mixed-method research design (Saunders et al.,2023). Premised on the selection of the research design, the researcher can select one of three possible

methodological choices, namely the mono-method, multi-method, and mixed methods (Dubey & Kothari, 2022). Premised on the fact that the purpose of the present study was to investigate the barriers and enablers of South African SMEs entering the CE and that the sole method of data collection for the present study was primary data collected from quantitative questionnaires, the mono method quantitative was deemed the most appropriate methodological choice for the present study.

3.1.4 ONTOLOGY AND EPISTEMOLOGY APPROACH

Ontology refers to a researcher's assumptions regarding the nature of reality, i.e., a researcher's ontology will have a direct influence on how the researcher perceives reality (Saunders et al.,2023). Premised on the fact that the present study seeks to investigate the barriers and enablers of South African SMEs entering the circular economy, the researcher has assumed that South African SMEs are influenced by barriers that inhibit their entrance into the circular economy and enablers that facilitate their entrance into the circular economy.

Epistemology refers to the assumptions a researcher makes about knowledge and what constitutes valid or legitimate knowledge (Dubey & Kothari, 2022). In a multi-disciplinary environment such as business, several types of knowledge can all be considered legitimate, such as present in numerical, textual, or visual form (Saunders et al.,2023). Premised on the present study utilising a quantitative questionnaire to investigate the barriers and enablers of South African SMEs entering the CE, numerical and textual data was regarded as legitimate knowledge types for the present study. Therefore, primary data from previous research containing quantitative questionnaires and qualitative interviews was deemed valid and legitimate for the present study.

3.2 RESEARCH DESIGN AND TIME HORIZON

3.2.1 RESEARCH DESIGN

Research design is regarded as the general plan to be followed by the researcher to answer a study's research questions (Dubey & Kothari, 2022). A quantitative research design is employed to examine the relationships between variables numerically and is usually associated with the deductive approach to theory development and the survey research strategy (Saunders et al.,2023). Premised on the fact that the present study investigated the barriers and enablers of

South African SMEs entering the CE, employing a quantitative questionnaire utilising the survey strategy, a quantitative research design has been deemed most appropriate for the present study

3.2.2 TIME HORIZON

When conducting a study, the researcher must decide whether they would like their study to be a “snapshot” of a specific moment in time or if they would like their study to be a series of snapshots or an extended period (Dubey & Kothari, 2022). The single snapshot approach is known as a cross-sectional study, whilst the series of snapshots is known as a longitudinal study (Saunders et al.,2023). Premised on the fact that the present study investigated the barriers and enablers to South African SMEs entering the CE, the cross-sectional time horizon has been deemed the most appropriate for the present study.

3.3 DATA COLLECTION METHODS AND RESEARCH INSTRUMENTS

3.3.1 DATA COLLECTION

When conducting research, a researcher must decide in what manner the data for their study will be collected (Dubey & Kothari, 2022). There are two main categories of data: secondary and primary. Secondary data refers to data that a different researcher has already collected and that will be further analysed and interpreted by the researcher to provide additional or differing conclusions in their present study (Saunders et al.,2023). Primary data, however, refers to data that is newly collected to answer the particular study's research questions (Saunders et al.,2023). Premised on the fact that the present study investigated the barriers and enablers to South African SMEs entering the CE while employing a quantitative questionnaire, primary data collection was deemed for the present study.

3.3.2 RESEARCH INSTRUMENTS

As previously discussed, the present study attempted to expand on the work of Ormazabal et al.(2018), who utilised a quantitative questionnaire to investigate the barriers and enablers to Spanish SMEs entering the CE. Therefore, the present study made use of quantitative questionnaires, as has been previously mentioned. Saunders et al. (2023) explain that a researcher can select either a self-completed questionnaire, where the respondent is asked to complete the questionnaire without the researcher's involvement, such as an internet, text, or mail questionnaire. Alternatively, the researcher can complete a questionnaire, which involves the researcher being present during the respondent's completion of the questionnaire, such as

telephonic or face-to-face questionnaires. Premised that the present study is seeking to gather the responses of a considerable number of South African SME owners, a self-completed internet questionnaire was deemed the most appropriate research instrument for the present study due to its ease of distribution and convenience of completion.

3.3.3 QUESTIONNAIRE DESIGN

The questionnaire was divided into four sections. The first section, titled "*Demographic Information*," consists of questions about the respondents' backgrounds and the organisations they are members of. Sections two, three and four comprised 5-point Likert scale questions about the factors influencing CE initiatives' implementation in South African SMEs.

Section two of the questionnaire focused on economic factors influencing CE adoption in South African SMEs. Questions 7, 9, 11, and 13 measured the respondents' perceptions regarding the state of each measured factor, while questions 8, 10, 12, and 14 measured the perceived degree of influence of each measured factor. Section three of the questionnaire focused on societal factors influencing CE adoption in South African SMEs. Questions 15, 17, 19 and 21 measured the respondent's perceptions regarding the state of each societal factor, while questions 16, 18, 20 and 22 measured each factor's perceived degree of influence. Section four of the questionnaire focused on governmental factors influencing CE adoption in South African SMEs. Questions 23, 25, and 27 measured the respondent's perceptions regarding the state of each measured factor, while questions 24, 26 and 28 measured the perceived degree of influence of each measured factor.

The design of the questionnaire was based heavily on the questionnaire used by Ormazabal et al. (2018) for their study, which investigated the challenges and opportunities for Spanish SMEs entering the circular economy. These items were deemed to be appropriate for use in this study since Ormazabal et al. (2018) specifically investigated the challenges and opportunities for SMEs. The items were: support from top management for CE adoption; knowledge of circular economy business operations; government support for the development of CE infrastructure; customer demand for circular economy compliant products or services; financial resources required to establish circular economy infrastructure; and financial performance of the business.

The questionnaire also benefited from including items from Mura et al. (2020), who investigated the barriers and enablers of CE implementation of Italian SMEs. Mura et al. (2020) investigated

the barriers and enablers of CE implementation of specifically Italian SMEs. Therefore, these items were deemed appropriate to the present study. The items were: comprehensiveness of environmental laws and regulations, regulatory incentives related to CE adoption, maturity of reclaimed material markets, and financial resources required to establish CE infrastructure.

Two additional items were added to the questionnaire based on the work of Ababio & Lu (2023) and Osei-Tutu et al. (2023). These two studies conducted bibliometric analyses of the barriers and enablers of CE adoption in the construction industry. While these studies did not specifically focus on SMEs, these items were deemed appropriate due to their strong connection to the identified items. These items were the cost difference between using reclaimed materials relative to virgin materials for production and the cost difference between performing CE initiatives relative to the cost of disposing of waste.

3.4 SAMPLING

Sampling procedures can be placed in two distinct categories. Firstly, probability sampling refers to sampling where all members of the target population have an equal probability of being selected, thus allowing for comprehensive statistical inferences to be made about the target population (Dubey & Kothari, 2022). Secondly, non-probability sampling refers to sampling where the probability of a participant being selected is unknown (Saunders et al., 2023). There are four main non-probability sampling methods, namely quota sampling, purposive sampling, volunteer sampling, and convenience sampling.

The present study benefited from the learnings of Ormazabal et al. (2018), who, during their study, investigated the barriers and enablers to CE adoption in Spanish SMEs using a Likert-scale questionnaire and encountered significant challenges during their first attempt at data collection. During their initial data collection attempt, Ormazabal et al. (2018) sent their survey via email to roughly 3500 companies, achieving a response rate of less than 1%. During their second attempt at data collection, Ormazabal et al. (2018) employed a convenience sampling approach and sent their questionnaire to an additional 710 companies via LinkedIn over six months. They achieved a response rate of roughly 13 %, with 95 responses. Ormazabal et al. (2018) stated that messaging potential respondents on LinkedIn allowed for a relationship of trust to be developed with the survey respondents, increasing the likelihood of their participation in the study.

The present study, which investigated the barriers and enablers to South African SMEs entering the circular economy, was heavily based on the work of Ormazabal et al. (2018). Therefore, it was deemed appropriate for the present study to adopt the same sampling approach as Ormazabal et al. (2018), namely the non-probability sampling approach in the shape of convenience sampling. Additionally, this study also utilised purposive sampling and snowball sampling.

Convenience sampling involves selecting cases due to their ease of availability. In contrast, purposive sampling requires the researcher to use their judgement to choose adequately knowledgeable cases, thus allowing the researcher to answer their specific research questions best (Saunders et al., 2023). Snowball sampling entails respondents providing the researcher with potential candidates whom the researcher could also approach to participate in the present study (Dubey & Kothari, 2022).

The sampling process for this study consisted of several steps. As per the above-mentioned learnings of Ormazabal et al. (2018), the researcher utilised the LinkedIn platform to contact potential candidates. The sampling process was initiated by the researcher conducting searches for business owners and senior leaders using the LinkedIn platform; the phase is related to convenience sampling, as the researcher's existing LinkedIn network and activity likely influenced the results of the above-mentioned LinkedIn search.

Once a profile of a potential candidate was identified, the researcher evaluated the potential candidate's LinkedIn profile to ensure the authenticity of the profile; this phase is related to the use of purposive sampling. The authenticity evaluation criteria used were the following: all potential candidates must have a LinkedIn profile picture, have at least 100 LinkedIn connections, and have their position and organisation listed on their profile. A connection request was sent once a potential candidate passed the authenticity evaluation. If this connection request was accepted, the potential candidate was sent a message containing a link to the present study's online survey. The final phase of the sampling process came by asking participants if they were aware of any potential candidates they would recommend for this study. The researcher then used their discretion to determine if the recommended candidate would suit the present study. This phase is related to the use of snowball sampling.

By employing the above sampling process, this study collected 62 responses from roughly 1200 participation invitations sent, equalling an approximately 5% response rate. This was a

disappointing outcome, as the researcher had expected a response rate closer to 10%, as was achieved by Ormazabal et al. (2018). Due to time constraints and an increased difficulty in finding willing participants, the researcher proceeded with 62 responses. To place this sample size in perspective, Ormazabal et al. (2018) collected 95 responses over six months, while the present study collected 62 responses over four months.

A summary of the background of the 62 respondents for the present study is provided in *Table 1* below. Based on the anonymous nature of this study, the background information is limited to the business's geographic location, operating sector, annual revenue, number of employees, and lastly, the leadership position held by the respondent.

Table 1: Sample Overview

	Number of Companies	percentage
Province		
Western Cape	22	35%
Eastern Cape	15	24%
Gauteng	12	19%
KwaZulu-Natal	12	19%
North-West	1	2%
Number of Employees		
<10	29	47%
10-29	16	26%
30-49	3	5%
50-99	5	8%
>100	9	15%
Revenue in millions (ZAR)		
<5	24	39%
5-20	10	16%
21-35	2	3%
36-50	4	6%
51-65	7	11%
66-80	4	6%
81-95	2	3%
>95	9	15%
Position		
Owner	32	52%
General Manager	18	29%
Managing Director	8	13%
Chief Officer Position	4	6%
Sector		
Wholesale and Retail Trade	15	24%
Construction	10	16%
Information and Communication	8	13%
Manufacturing	6	10%
Administrative and Support Services	3	5%
Financial and Insurance Activities	3	5%
Human Health and Social Work	3	5%
Transport and Storage	3	5%
Other	11	18%

3.5 DATA ANALYSIS

All data collected was analysed using quantitative data analysis methods. The present study made use of a Likert-scale questionnaire. Therefore, the data collected from the questionnaire was ordinal or ranked (Saunders et al., 2023). This study was an expansion of the work previously done by Ormazabal et al. (2018) and Mura et al. (2020). Utilising a similar approach to their respective data analyses was deemed appropriate. The data set was initially analysed through descriptive statistics to provide the researcher with a foundational overview of the data set. After that, the data set was analysed through inferential statistics to identify if any relationship exists between the data set's measured factors.

Table 2: Interpretation of mean scores for factor states

Mean Scores	Category
1,00	Significant Enabler
2,00	Enabler
2,50	Moderate Enabler
2,75	Slight Enabler
3,00	Neither Barrier nor Enabler
3,25	Slight Barrier
3,50	Moderate Barrier
4,00	Barrier
5,00	Significant Barrier

*Mean score to be rounded up to the nearest category value

Premised on the 5-point Likert scale, which was employed as the research instrument for the present study, the grading of the descriptive statistics of the 'factor state' is as follows: On a scale of 1-5, the closer the response is to 'one' the greater the enabling power of the factor. Conversely, the closer the response is to 'five', the greater the significance of the factor as a barrier, with 'three' being the middle point of the 5-point Likert Scale, which denotes a factor being viewed as neither a barrier nor a threat. *Table 2* above is an overview of the interpretation of the mean scores of the factor states.

The degree of influence for each respective factor was also measured through a 5-point Likert Scale. The grading of the descriptive statistics for the 'factor degree of influence' is as follows: on a scale of 1-5, the closer the mean score is to 'one', the less the degree of influence of the factor in determining CE adoption by an SME. Conversely, the closer the mean score is to 'five', the greater the degree of influence of the factor in determining CE adoption by an SME. *Table 3* below provides an overview of the interpretation of the mean scores for the degree of influence.

Table 3: Interpretation of mean scores for degree of factor influence

Mean Scores	Category
1,00	Not influential at all
2,00	Slightly Influential
3,00	Moderately Influential
4,00	Very influential
5,00	Extremely Influential

*Mean score to be rounded up to the nearest category value

3.6 VALIDITY AND RELIABILITY

Validity refers to the effectiveness of a research instrument in measuring what it claims to measure (Dubey & Kothari, 2022), while reliability refers to the level of consistency at which the research instrument performs. (Saunders et al.,2023). The validity of the research instrument deployed in the present study is ensured by the adoption of items from the questionnaires deployed by Ormazabal et al. (2018) and Mura et al. (2020). Their respective studies investigated the barriers and enablers of Spanish and Italian SMEs entering the circular CE. To ensure the reliability of the present study, Cronbach's Alpha was used to determine the reliability coefficients for each investigated factor in the data set (Hair et al.,2019).

The agreed lower limit for Cronbach's Alpha is 0.70 (Dubey & Kothari, 2022). However, when conducting exploratory research, the lower limit of Cronbach's Alpha is lowered to 0.60 (Hair et al.,2019). A key shortcoming of Cronbach's Alpha is its sensitivity to the number of items comprising a research scale; the higher the number of items, the higher the reliability score and the lower the number of items, the lower the reliability score (Hair et al.,2019). A summary of the reliability coefficients for the present study is provided in *Table 4* below.

Table 4: Cronbach's Alpha (Reliability Coefficient)

	Items	Cronbach's Alpha
Measured Factors		
Economic	4	0,67
Societal	4	0,62
Governmental	3	0,77
Measured Influence		
Economic	4	0,81
Societal	4	0,79
Governmental	3	0,76

As shown in *Table 4*, 4/6 factors measured contained four items while the remaining 2/6 contained three items. Therefore, premised on the exploratory nature of the present study and the small number of items used in each factor that was evaluated (Hair et al.,2019). The present

study deemed 0.60 as the appropriate lower limit for Cronbach's Alpha (reliability coefficient) for the present study.

CHAPTER FOUR: RESEARCH FINDINGS, ANALYSIS AND DISCUSSION

4.1 INTRODUCTION

To achieve the primary research objective of determining the barriers and enablers to South African (SA) SMEs entering and successfully operating within the circular economy (CE) situated in a South African context, the results of the study address the three distinct sub-questions that examine the state of the factors which could impact CE adoption amongst South African SMEs, and the corresponding degree of influence of each of these factors in determining CE adoption. This chapter focuses on presenting the analysis and interpretation of the study's main data findings. These main data findings will then be compared to the literature previously discussed in Chapter 2.

4.2 DESCRIPTIVE STATISTICS

In this section, the findings derived from the descriptive statistical analysis of the research results will be presented. The section is divided into three sections, namely economic factors, societal factors, and governmental factors. Each factor contained within the three sections will be analysed based on the views of the respondents in terms of the 'state' of the factor and the perceived 'degree of influence' that the factor has in determining the respondent's decision-making process in adopting CE business practices.

4.2.1 ECONOMIC FACTORS

In the present study, economic and financial factors are regarded as any factor that has a direct and immediate impact on the profitability or expense of an organisation (Sohal et al., 2022). *Table 5* below is a summary of the perceived state of the four economic and financial factors evaluated in the present study. As previously mentioned, the minimum value of one indicates a factor being perceived as a strong enabler. In contrast, the maximum value of five would represent the factor being regarded as a significant barrier.

Table 5: Economic Factors – Descriptive Statistics

Code	Description	Min. value	Max. Value	Mean	Std. deviation
EF1	CE business infrastructure establishment cost	1,00	5,00	3,35	0,96
EF2	Cost of performing CE activities (R-framework)	1,00	5,00	3,13	1,21
EF3	Price difference between reclaimed materials and virgin materials	1,00	5,00	2,58	0,93
EF4	Impact of CE business models on operating expenses	1,00	5,00	3,77	0,88

The influence of these factors on the respondent’s decision-making process to adopt circular economy practices is summarised in *Table 6* below. As has been previously explained, the minimum value of one indicates a factor that is not influential in determining the adoption of CE practices in South African SMEs. In contrast, the maximum value of five signifies that a factor is extremely influential in determining the adoption of CE business practices.

Table 6: Influence of Economic Factors on CE Adoption in SA SMEs - Descriptive Statistics

Code	Description	Min. value	Max. Value	Mean	Std. deviation
EF1_INF	Influence of CE business infrastructure establishment costs	1,00	5,00	3,26	0,89
EF2_INF	Influence of costs associated with performing CE R-framework	1,00	5,00	3,26	0,89
EF3_INF	Influence of price difference between reclaimed and virgin materials	1,00	5,00	3,23	0,91
EF4_INF	Influence of CE business models on operating expenses	1,00	5,00	3,15	0,96

4.2.1.1 Circular economy business infrastructure establishment costs

Respondents were asked to rate their perception of the upfront cost of establishing CE business infrastructure. 50% of respondents viewed the establishment cost of circular economy business infrastructure as either high or very high. In comparison, 31% of respondents viewed the costs associated with establishing CE business infrastructure as moderate. The remaining 19% viewed these development costs as very low. Resulting in a mean score of 3.35 (*Table 5*). As per the categorisation scale (*Table 2*), the upfront cost of establishing CE infrastructure is a slight barrier to South African SMEs adopting the circular economy. The standard deviation of 0.96 (*Table 5*) indicates a moderate agreement among the responses, which is clear when considering that 81% of respondents agree that establishing CE business infrastructure would incur, at minimum, a moderate upfront cost.

When asked how the upfront costs associated with developing CE business infrastructure would influence their likelihood of adopting CE business practices, 42% of respondents viewed the upfront costs associated with CE business infrastructure development as either highly influential or extremely influential in determining if they would adopt CE business practices. Another 40 % of respondents viewed the upfront establishment cost of CE business infrastructure as moderately influential to their decision to adopt CE practices in their organisation. Meanwhile, the remaining 18% of respondents viewed the costs associated with developing CE business infrastructure as either not influential at all or slightly influential. These responses resulted in a mean score of 3.26 (*Table 6*), thus placing the upfront cost of establishing CE infrastructure as ‘moderately influential’ in determining the likelihood of South African SMEs adopting the CE, as

per the categorisation scale (*Table 3*). A standard deviation of 0.89 (*Table 6*) reflects a moderate level of consensus among the respondents.

4.2.1.2 Cost of performing Circular economy activities (R-framework)

Participants were asked to indicate their perception of the cost of performing CE activities; 48% viewed it as either high or very high. While 12% of respondents viewed the cost of performing CE activities as moderate, and 39% viewed the costs as either low or very low. The responses yielded a mean score of 3.13 (*Table 5*). As per the categorisation scale (*Table 2*), the cost of performing the CE activities entailed in the R-framework is a slight barrier. The standard deviation of 1.21 (*Table 5*) indicates a high degree of variability in the responses.

When asked how the cost of performing CE activities would affect their decision to adopt CE practices, 38% of respondents rated the costs of performing CE activities as either highly or extremely influential. Another 45% found the costs of performing CE activities to have a moderate influence, while the remaining 16% rated them as having little to no influence. These responses averaged a mean score of 3.26 (*Table 6*). As per the degree of influence categorisation scale (*Table 3*), the cost associated with performing CE business activities is regarded as 'moderately influential' in determining the likelihood of CE adoption among South African SMEs. The standard deviation of 0.89 (*Table 6*) suggests a reasonable level of consensus among the respondents.

4.2.1.3 Price difference between reclaimed materials and virgin materials

Respondents were asked about the price difference between reclaimed materials and virgin materials. 52 % of the respondents considered the cost of reclaimed materials to be either lower or much lower than virgin materials. Meanwhile, 31% perceived reclaimed materials and virgin materials to be roughly the same price. The remaining 19% viewed the cost of reclaimed materials to be either higher or much higher than virgin materials. These responses yielded a mean score of 2.58 (*Table 5*). According to the categorisation scale (*Table 2*), the price difference between reclaimed and virgin materials is a 'moderate enabler' for South African SMEs entering the CE. A standard deviation of 0.93 (*Table 5*) suggests a moderate level of consensus among the respondents.

When asked how a price difference between reclaimed materials and virgin materials would influence their decision to adopt CE practices, 40% of respondents deemed a price difference between reclaimed materials and virgin materials to be either highly influential or extremely

influential. Another 42% regarded a price differential between reclaimed and virgin materials as moderately influential in their decision-making process. The remaining 18% felt a price difference between virgin and reclaimed materials, only slightly influential or not influential in their decision-making process to adopt CE practices. In total, these responses resulted in a mean score of 3.23 (Table 6). As per the degree of influence categorisation scale (Table 3), the price difference between reclaimed and virgin materials is regarded as 'moderately influential' in impacting the decision-making of South African SMEs entering the CE. The standard deviation of 0.91 (Table 6) indicates moderate agreement among respondents.

4.2.1.4 Impact of CE business models on operating expenses

Respondents shared their perspective on the impact of CE business models on operating expenses; 74% perceived CE business models as moderate to have a high or very high impact on the operating expenses of businesses. 18% of respondents perceived CE business models to have a low or very low impact on operating expenses, and the remaining 8% perceived CE business models as having little to no impact on operating expenses. These responses produced a mean of 3.77 (Table 5). According to the categorisation scale (Table 2), the impact of CE business models on the operating expenses of SMEs is regarded as a 'barrier'. A standard deviation of 0.88 (Table 5) reflects a moderate degree of consensus.

In terms of how operating expenses influence the adoption of CE practices among South African SMEs, 34% described an impact on operating expenses as either high or extremely influential in shaping their decision-making. 47% rated an impact on operating expenses as moderately influencing. The remaining 19% viewed impacts on operating expenses as slightly influential or not influential regarding the likelihood of adopting CE practices. The responses yielded a mean score of 3.15 (Table 6); thus, the operating expenses impact of CE business models are regarded as 'moderately influential' (Table 3) factor in impacting SMEs' CE adoption decisions. A standard deviation of 0.96 (Table 6) suggests moderate agreement among respondents.

4.2.2 SOCIETAL FACTORS

In the present study, societal factors are regarded as any factor that represents society's attitudes, perceptions or knowledge of the circular economy (Sohal et al., 2022). Table 7 below is a summary of the perceived state of the four societal factors evaluated in the present study. The influence of these factors on the respondent's decision-making process to adopt circular economy practices is summarised in Table 8 below.

Table 7: Descriptive statistics – Societal Factors

Code	Description	Min. value	Max. Value	Mean	Std. deviation
SF1	Client demand for CE-compliant products or services	1,00	5,00	3,16	1,01
SF2	Knowledge of CE business operations within South African SMEs	1,00	5,00	3,89	0,81
SF3	Availability of reclaimed materials for CE manufacturing	1,00	5,00	3,35	0,89
SF4	Support for CE adoption among the top management of SA SMEs	1,00	5,00	3,42	0,76

4.2.2.1 Client demand for circular economy compliant products and services

The survey asked respondents to share their perspectives on the level of client demand for CE-compliant products and services; 26% of respondents rated the level of client demand to be either high or very high, while another 35% of respondents perceived the level of client demand for CE compliant products and services to be moderate. The remaining 39% of respondents rated the level of client demand for CE-compliant products and services to be either low or very low. The question resulted in a mean score of 3.16 (Table 7). The level of client demand for CE-compliant products or services is therefore regarded as a ‘slight barrier’ to CE adoption by South African SMEs, as per Table 2. The amount of variability in the sample is evidenced by the standard deviation of 1.01 (Table 7).

Table 8: Influence of Economic Factors on CE Adoption in SA SMEs - Descriptive Statistics

Code	Descriptive	Min. value	Max. Value	Mean	Std. deviation
SF1_INF	Influence of client demand for CE-compliant products or services	1,00	5,00	2,98	1,02
SF2_INF	Influence of CE business operations knowledge within SA SMEs	1,00	5,00	2,92	1,08
SF3_INF	Influence of reclaimed materials availability for CE manufacturing	1,00	5,00	3,27	1,06
SF4_INF	Influence of SA SMEs Top management support of CE Adoption	1,00	5,00	3,29	1,00

The respondents were asked a follow-up question regarding the influence of client demand for CE-compliant products and services on their decision-making process to adopt CE business practices. Among the respondents, 29% felt that the level of client demand would only influence them slightly or not at all. Conversely, 29% of the respondents perceived client demand as highly or extremely influential. The remaining 42% of respondents rated the influence of client demand on their decision-making process as moderately influential. This question produced a mean of 2.98 (Table 8). Thus, client demand for CE products or services is regarded as ‘moderately influential’ in impacting SMEs CE adoption decisions, as per the categorisations in Table 3. The variability in responses is evident through the standard deviation of 1.01 (Table 8).

4.2.2.2 Knowledge of circular economy business operations with South African SMEs

Respondents shared their perspectives on the level of knowledge CE knowledge within SMEs. 79% of respondents perceive the level of CE knowledge within SMEs to be either low or very low. In comparison, 15% of the respondents viewed the level of CE knowledge within SMEs to be moderate. The remaining 6% felt the level of CE knowledge within SMEs was either high or very high. This results in a mean score of 3.89 (Table 7), which places a significant barrier to the implementation of CE in South African SMEs, as per the mean score categorisation explained in Table 2.

Regarding the influence of CE business operations knowledge with South African SMEs on the likelihood of adopting CE practices, 37% of respondents perceived CE knowledge within SMEs to have a slight influence or no influence at all in determining whether their businesses would adopt CE practices. Conversely, 34% of respondents reported that CE knowledge within SMEs is either highly influential or extremely influential in their decision-making process to adopt CE practices in their organisations. The remaining 29% of respondents felt that knowing CE business operations would moderately influence their decision to adopt CE practices. The question yielded a mean of 2.92 (Table 8), indicating that the sample perceived CE business operations knowledge to be 'moderately influential' in determining CE adoption (Table 3). The standard deviation for this question is 1.08 (Table 8), indicating a sizeable amount of variance in the responses, as discussed above.

4.2.2.3 Reclaimed material availability for manufacturing

The respondents perceived the availability of reclaimed materials for manufacturing to be slightly scarce; 47% of respondents perceived the availability of reclaimed materials for manufacturing to be either low or very low. 39% of respondents stated that reclaimed materials were moderately available, while the remaining 15% stated that there is either a high or very high availability. The question yielded a mean score of 3.35 (Table 7). The slight scarcity of reclaimed materials for manufacturing places this factor as a 'slight barrier' to CE adoption, as per the categorisations made in Table 2. The standard deviation of 0.89 (Table 7) points to moderate agreement among respondents.

When considering how the availability of reclaimed materials impacts the likelihood of SMEs adopting CE practices, 45% of respondents felt that reclaimed material availability is either highly or extremely influential in their decision-making process for CE adoption. In contrast, 19% of respondents stated that reclaimed material availability was only slightly influential or not

influential at all in determining their CE adoption. The remaining 36% of respondents perceived the influence of reclaimed material availability on their decision to adopt CE practices as moderate. The mean score of 3.27 (*Table 8*) indicates that the overall perception of the respondents is that reclaimed material availability is moderately influential in determining CE adoption in South African SMEs, as per the categorisations *Table 3*. A sizeable amount of variance was detected in the responses, as is evident through the standard deviation of 1.08 (*Table 8*).

4.2.2.4 Top management support for CE adoption in South African SMEs

Respondents perceived the level of top management support for CE adoption to be moderate to low, with 48% of respondents reporting either low or very low levels of top management support for CE adoption in South African SMEs. In comparison, 40% of respondents felt that the top management of South African SMEs have moderate levels of support for CE adoption. The remaining 11% of respondents felt that the top management of South African SMEs presented high or very high levels of support for CE adoption. These responses resulted in a mean of 3.42 (*Table 7*). The recorded moderate to low levels of management support for CE adoption place this factor in the category of a 'moderate barrier' to CE adoption among South African SMEs (*Table 2*). The standard deviation of 0.76 (*Table 7*) reflects a moderate level of consensus

Regarding the influence of top management support on CE adoption, 44% of respondents felt that top management support was either highly influential or extremely influential in determining an SME's adoption of CE practices. Conversely, 19% of respondents perceived top management support's influence as slight or insignificant in determining CE adoption. The remaining 37% of respondents stated that the top management of SMEs has a moderate impact in determining the adoption of CE practices within South African SMEs. The mean score of 3.27 (*Table 8*) suggests that top management support is perceived to have a moderate influence on the adoption of CE practices in South African SMEs, as per the mean score categorisation in *Table 3*. The mean score of 1.0 (*Table 8*) suggests a noticeable variability in the respondents' views.

4.2.3 GOVERNMENTAL FACTORS

Governmental factors are any factors that are related to government policy or legislature regarding the CE (Sohal et al., 2022). *Table 9* below is a summary of the perceived state of the three governmental factors evaluated in the present study. The influence of these factors on the respondent's decision-making process to adopt CE practices is summarised in *Table 10* below.

Table 9: Descriptive statistics – Governmental Factors

Code	Description	Min. value	Max. Value	Mean	Std. deviation
GF1	Regulatory incentives provided to SMEs for adopting CE practices	1,00	5,00	3,94	0,88
GF2	Comprehensiveness of laws and regulations to promote CE adoption	1,00	5,00	3,55	1,05
GF3	Government support and funding for the development of CE infrastructure	1,00	5,00	3,98	0,91

Table 10: Influence of Governmental Factors on CE Adoption in SA SMEs - Descriptive Statistics

Code	Description	Min. value	Max. Value	Mean	Std. deviation
GF1_INF	Influence of regulatory incentives for SMEs adopting the CE	1,00	5,00	3,60	1,15
GF2_INF	Influence of comprehensive laws that promote CE adoption	1,00	5,00	3,03	1,19
GF3_INF	Influence of government support for the development of CE infrastructure	1,00	5,00	3,05	1,34

4.2.3.1 Regulatory Incentives

The respondents perceive regulatory incentives for adopting CE practices as weak, with 82% stating that the regulatory incentives are either weak or weak. Meanwhile, only 10% of respondents stated that regulatory incentives for CE adoption were strong or very strong. The remaining 8% of respondents perceived regulatory incentives to be moderate. With a mean score of 3.94 (*Table 9*), regulatory incentives are placed in the category of a barrier to CE adoption in South African SMEs, as per the mean score categorisations in *Table 2*. A standard deviation of 0.88 (*Table 9*) reflects a degree of consensus among the respondents.

Respondents perceived regulatory incentives as very influential (*Table 3*), as reflected by the mean score of 3.60 (*Table 10*); 65% of respondents perceived the regulatory incentives as very or extremely influential in determining their decision to adopt CE business practices. Conversely, 19 % of respondents viewed regulatory incentives as only slightly influential or not influential at all in determining their adoption of CE practices. The remaining 16% of respondents viewed regulatory incentives as moderately influential in adopting CE activities. The standard deviation of 1.15 points (*Table 10*) to a noteworthy level of variability among the responses.

4.2.3.2 Comprehensiveness of environmental laws and regulations

Respondents viewed the comprehensiveness of South Africa’s environmental laws and regulations aimed at promoting CE adoption among South African SMEs as uncomprehensive, as indicated by the mean score of 3.55 (*Table 9*). More than half of respondents, 56%, viewed South Africa’s environmental laws and regulations as neither comprehensive nor comprehensive. In contrast, 15% of respondents viewed South Africa's environmental laws and regulations as comprehensive or very comprehensive. At the same time, the remaining 29% of respondents

perceived South Africa's environmental laws and regulations as moderately comprehensive. The mean score of 3.55 (*Table 9*) categorises the comprehensiveness of South African environmental laws and regulations as a 'moderate barrier' (*Table 2*) to South African SMEs entering the CE. The difference in the views of respondents is identifiable through the standard deviation score of 1.05 (*Table 9*).

The perceived influence of comprehensive laws and regulations on CE adoption yielded a large variability among the respondents, as is evident through the standard deviation of 1.19 (*Table 10*). 39% of respondents viewed the influence of comprehensive laws and regulations as either very influential or extremely influential in determining their decision to adopt CE practices. In comparison, 32% of respondents conversely stated that comprehensive laws and regulations would slightly influence or not influence their decision-making process at all to adopt CE business practices. The remaining 29% of respondents perceived comprehensive laws and regulations to have a moderate influence on their decision to adopt CE business practices. The mean score of 3.03 (*Table 10*) places this factor as 'moderately influential' (*Table 3*) in determining CE adoption among South African SMEs.

4.2.3.3 Government support and funding

The respondents perceived government support and funding for the development of CE infrastructure to be low, reflected in the mean score of 3.98 (*Table 9*) and echoed by 76% of respondents that government support and funding for CE development is either low or very low. Conversely, only 6% of respondents felt that government support and funding for CE infrastructure development was either high or very high. The remaining 18% perceived government support and funding to be moderate. The standard deviation of 0.91 (*Table 9*) indicates a moderate degree of consensus among the respondents. Based on the mean score of 3.98, this factor is deemed a barrier to CE adoption among South African SMEs, as per the mean score categorisation in *Table 2*.

When asked how the level of government support and funding for the development of CE infrastructure would influence their decision-making in adopting CE practices, the respondents answered with a high degree of variability, as is evident through the standard deviation of 1.34 (*Table 10*). 40% of respondents perceived the level of government support and funding to be either very or highly influential to their decision-making process. In comparison, 34%, in contrast, viewed the level of government support and funding only to be slightly influential or not influential

at all. The remaining 26% of respondents viewed the level of government support and funding to be moderately influential in determining whether they would adopt CE business practices. Overall, the influence of government support and funding yielded a mean score of 3.05 (*Table 10*), placing it in the category of moderately influential in determining CE adoption in South African SMEs, as per the interpretation of the mean scores indicated in *Table 3*.

4.3. SUMMARY OF DESCRIPTIVE STATISTICS

In summary of the descriptive statistics sub-section, *Table 11* below is an overview of the mean scores for each measured factor of the present study. These factors have been ranked according to their mean score, and their categorised factor state has been listed.

Table 11: Summary of factor states

Code	Description	Mean	Factor State
GF3	Government support and funding for the development of CE infrastructure	3,98	Barrier
GF1	Regulatory incentives provided to SMEs for adopting CE practices	3,94	Barrier
SF2	Knowledge of circular economy business operations within South African SMEs	3,89	Barrier
EF4	Impact of CE business models on operating expenses	3,77	Barrier
GF2	Comprehensiveness of environmental laws to promote CE adoption	3,55	Moderate Barrier
SF4	Support for circular economy adoption among the top management of SA SMEs	3,42	Moderate Barrier
EF1	CE business infrastructure establishment cost	3,35	Slight Barrier
SF3	Availability of reclaimed materials for circular economy manufacturing	3,35	Slight Barrier
SF1	Client demand for circular economy-compliant products or services	3,16	Slight Barrier
EF2	Cost of performing CE activities (R-framework)	3,13	Slight Barrier
EF3	Price difference between reclaimed materials and virgin materials	2,58	Moderate Enabler

Table 12: Summary of factors degree of influence

Code	Description	Mean	Factor Influence
GF1_INF	Influence of regulatory incentives for SMEs adopting the CE	3,60	Very influential
SF4_INF	Influence of SA SMEs top management support of circular economy adoption	3,29	Mod. Influential
SF3_INF	Influence of reclaimed materials availability for circular economy manufacturing	3,27	Mod. Influential
EF1_INF	Influence of CE business infrastructure establishment costs	3,26	Mod. Influential
EF2_INF	Influence of costs associated with performing CE R-framework	3,26	Mod. Influential
EF3_INF	Influence of price difference between reclaimed and virgin materials	3,23	Mod. Influential
EF4_INF	Influence of CE business models on operating expenses	3,15	Mod. Influential
GF3_INF	Influence of government funding for the development of CE infrastructure	3,05	Mod. Influential
GF2_INF	Influence of comprehensive environmental laws that promote CE adoption	3,03	Mod. Influential
SF1_INF	Influence of client demand for circular economy-compliant products or services	2,98	Mod. Influential
SF2_INF	Influence of circular economy business operations knowledge within SA SMEs	2,92	Mod. Influential

4.4 CORRELATION ANALYSES

This section represents the findings from the correlation analyses performed during the present study. *Table 13* below provides an overview of the correlational relationships between all measured factors of the present study.

Among the factors evaluated, the strongest correlation relationship exists between ‘GF1 - regulatory incentives for CE adoption’ and ‘GF3 - government support and funding for the development of CE infrastructure’ with a correlation coefficient of 0,70 (Table 13). The strong correlation between these two factors is understandable due to both factors being heavily related to regulatory support related to CE adoption.

The second strongest correlational relationships exist between ‘SF2 - CE business operations knowledge’ and ‘SF4 - top management support for CE adoption’ with a correlation coefficient of 0,56 (Table 13). One could make a strong argument for the logical validity of this correlation. It would be reasonable to assume that the more top management supports CE adoption, the higher the levels of CE knowledge within the organisation, with the same being applied to the inverse.

The third strongest correlation is between the ‘EF1 - CE business infrastructure development cost’ and ‘EF4 - Impact of CE business on operating expenses’, yielding a correlation coefficient of 0,51 (Table 13). Both factors are labelled as economic factors and are, therefore, highly associated with the respondents’ perceptions of cash flow and profitability.

Table 13: Correlation Analysis of all measured factors

	EF1	EF2	EF3	EF4	SF1	SF2	SF3	SF4	GF1	GF2
EF1										
EF2	0,45									
EF3	0,26	0,21								
EF4	0,51	0,38	0,24							
SF1	0,06	0,17	0,26	0,19						
SF2	0,03	0,03	0,11	0,06	0,26					
SF3	-0,07	-0,13	-0,25	-0,02	0,08	0,37				
SF4	0,04	0,10	0,07	0,12	0,32	0,56	0,29			
GF1	0,16	0,05	0,01	0,11	0,14	0,33	0,32	0,24		
GF2	0,11	0,32	0,05	0,39	0,24	0,29	0,31	0,22	0,46	
GF3	0,17	0,15	0,01	0,12	0,13	0,40	0,25	0,34	0,65	0,50

- EF1 CE business infrastructure establishment cost
- EF2 Cost of performing CE activities (R-framework)
- EF3 Price difference between reclaimed materials and virgin materials
- EF4 Impact of CE business models on operating expenses
- SF1 Client demand for circular economy-compliant products or services
- SF2 Knowledge of circular economy business operations within South African SMEs
- SF3 Availability of reclaimed materials for circular economy manufacturing
- SF4 Support for circular economy adoption among the top management of SA SMEs
- GF1 Regulatory incentives provided to SMEs for adopting CE practices

GF2 Comprehensiveness of environmental laws and regulations to promote CE adoption

GF3 Government support and funding for the development of CE infrastructure

Other notable correlations include; ‘GF2 - *Comprehensiveness of environmental laws and regulations to promote CE adoption*’ and ‘GF3 - *government support and funding for the development of CE infrastructure*’ with a correlation coefficient of 0.50; ‘GF1 - *regulatory incentives for CE adoption*’ and ‘GF2- - *Comprehensiveness of environmental laws and regulations to promote CE adoption*’ with a correlation of 0.46 (Table 13).

CHAPTER FIVE: DISCUSSION OF THE RESULTS

5.1 INTRODUCTION

This chapter will discuss the results from the previous chapter to achieve the primary research objective of the present study, as stated in Chapter One, which reads as follows: The primary objective is to investigate the barriers and enablers to South African (SA) SMEs entering and successfully operating within the circular economy (CE) situated in a South African context. This discussion will seek to link the findings from the present study with the literature, highlighting similarities and differences between the findings and the literature.

5.2 DISCUSSION OF MEASURED FACTORS

This section is divided into three sub-sections, namely economic factors, societal factors, and governmental factors. Each factor contained within the three sub-sections will be discussed in terms of how the findings from the present study compare to the scholarly literature and what impact these findings have on CE adoption among South African SMEs.

5.2.1 ECONOMIC FACTORS

5.2.1.1 *Circular economy business infrastructure establishment costs*

Mhatre et al. (2023) made the argument that establishing the required infrastructure for CE business operations is a significant hindrance to CE adoption among SMEs due to the upfront costs required. Mhatre et al. (2023) explain that without the financial capability to invest in CE infrastructure, there is very little that businesses can do to transition to the CE successfully. These views are echoed by Sohal et al. (2022), who state that SMEs are constantly battling against cash flow and capital management problems; SMEs also often have very limited short-term financing options available to develop infrastructure. These arguments are supported by Ormazabal et al. (2018), who reported '*insufficient financial resources*' as a key barrier to CE adoption. The present study found that the upfront cost of establishing CE business infrastructure is perceived as a slight barrier to South African SMEs CE entry, with a mean score of 3.35 (*Table 11*). The CE establishment costs are influential; however, respondents perceive them as the fourth least influential factor in determining their adoption of the CE (*Table 12*).

5.2.1.2 Cost of performing Circular economy activities (R-framework)

Many researchers state that the cost of performing CE business activities, i.e., the R-framework, exceeds the costs of linear economy business operations, thus making CE adoption financially unattractive (Govindan & Hasanagic, 2018; Mhatre et al., 2023; Munaro & Tavares, 2023). In contrast, other researchers claim that CE adoption will reduce costs as a result of more effective resource optimisation (Ormazabal et al., 2018; Sohal et al., 2022). The most frequently used objection to the cost of performing CE activities is that disposing of waste materials at landfills is cheaper than performing the actions of the R-framework (Ababio & Lu, 2023; Govindan & Hasanagic, 2018; Mhatre et al., 2023; Munaro & Tavares, 2023; Osei-Tutu et al., 2023; Rizos et al., 2016).

As per *Table 11*, the respondents perceived the cost of performing CE business activities as a slight barrier to South African SMEs entering the CE, with a mean score of 3.13, the second lowest mean score of all the measured factors. The respondents did, however, perceive the cost of performing CE business activities as the fifth most influential factor in determining their adoption of the CE (*Table 12*). The respondents, therefore, share the sentiments of those researchers who view the cost of performing CE business activities as a barrier (Ababio & Lu, 2023; Govindan & Hasanagic, 2018; Mhatre et al., 2023; Munaro & Tavares, 2023; Osei-Tutu et al., 2023; Rizos et al., 2016), however, to a lesser extent.

5.2.1.3 Price difference between reclaimed materials and virgin materials

It has been widely cited that the purchasing costs of reclaimed materials are too expensive relative to virgin materials (Campbell-Johnston et al., 2019; Hart et al., 2019; Kirchherr et al., 2018; Mahpour, 2018). Virgin materials have low costs and are highly available, making it difficult to entice businesses to adopt using reclaimed materials (Hart et al., 2019; Mahpour, 2018). Despite the position of the scholarly literature, the study's respondents perceived reclaimed materials to be sufficiently lower than virgin materials, rating the price difference as a moderate enabler of CE adoption for South African SMEs, with a mean score of 2.58 (*Table 11*). While the price difference between reclaimed and virgin materials is an enabler, it only ranked sixth out of 11 factors in terms of degree of influence in determining CE adoption (*Table 12*).

5.2.1.4 Impact of CE business models on operating expenses

Sohal et al. (2022) explain that SMEs are regularly faced with cash flow and working capital problems. Therefore, protecting their profitability is a matter of survival for many SME owners

(Sohal et al., 2022). Several researchers (Mhatre et al., 2023; Mura et al., 2020; Osei-Tutu et al., 2023; Rizos et al., 2016) argue that adopting CE business models increases the operating expenses of SMEs and decreases profitability. Researchers cite the following reasons: CE business often requires a more complex and expensive management and planning system (Rizos et al., 2016) and increased human resource expenditure (Mhatre et al., 2023). Conversely, other researchers believe adopting CE business models will decrease operating expenses and increase profitability (Ormazabal et al., 2018; Sohal et al., 2022), citing reduced material costs (Ormazabal et al., 2018) and optimised resource usage (Sohal et al., 2022).

The respondents of the present study perceived the impact of CE business models on operating expenses as a barrier to South African SMEs entering the CE (*Table 11*), with a mean score of 3.77, the fourth-highest mean score recorded. The respondents are, therefore, in agreement with those researchers who view the impact of CE business models on SMEs operating expenses as a barrier (Mhatre et al., 2023; Mura et al., 2020; Osei-Tutu et al., 2023; Rizos et al., 2016)

5.2.2 SOCIETAL FACTORS

5.2.2.1 Client demand for circular economy compliant products and services

Researchers assert that a lack of customer interest in CE-compliant products or services is a major barrier to CE adoption (Gupta et al., 2020; Hart et al., 2019; Huang et al., 2021; Ormazabal et al., 2018; Ranta et al., 2018). Researchers cite a lack of interest in the protection of the natural environment (Ormazabal et al., 2018), customers' preference for products made from virgin materials (Ranta et al., 2018), and a lack of customer awareness of the benefits of CE products and services (Rizos et al., 2016). Resulting in a lack of customer market demand (Gupta et al., 2020).

Despite the consensus among researchers that client demand for CE-compliant products and services is a major barrier to CE adoption, the respondents of the present study perceived client demand as a slight barrier, with a mean score of 3.16, which is the third lowest mean score of all measured factors (*Table 11*). Additionally, client demand for CE-compliant products was perceived as the third least influential of the measured factors in determining CE adoption among South African SMEs (*Table 12*).

The perceptions of the respondents are, therefore, generally aligned with the scholarly literature. However, this factor is perceived as a much less significant barrier in the case of CE adoption for

South African SMEs than in other geographic regions, as indicated by the academic literature (Gupta et al., 2020; Hart et al., 2019; Huang et al., 2021; Ormazabal et al., 2018; Ranta et al., 2018).

5.2.2.2 Knowledge of circular economy business operations with South African SMEs

A lack of knowledge and experience is a widely cited barrier to CE adoption (Garcés-Ayerbe et al., 2019; García-Quevedo et al., 2020; Mhatre et al., 2023; Ormazabal et al., 2018). Researchers cite a lack of qualified personnel (Ormazabal et al., 2018), a lack of experience in CE business operations (García-Quevedo et al., 2020), a shortage of the skills required to implement CE initiatives (Garcés-Ayerbe et al., 2019). The respondent's perceptions are strongly aligned with the findings of previous research conducted in other geographic regions. Knowledge of CE business operations is ranked as the third most significant barrier of all measured factors, with a mean score of 3.89 (*Table 11*). Interestingly, whilst the factor is ranked as the third most significant barrier, it is ranked as the least influential factor in determining CE adoption among the respondents (*Table 12*). This suggests that while a lack of CE business operations knowledge is a major barrier, the barrier could be addressed effectively by hiring skilled personnel with the knowledge and experience required to execute a transition to the CE effectively. This implies that access to financial resources to acquire qualified and experienced personnel could resolve this issue.

5.2.2.3 Reclaimed material availability for manufacturing

The sufficient availability of reclaimed materials for manufacturing is a fundamental prerequisite to the widespread adoption of CE business practices (Kirchherr et al., 2018). Huang et al. (2021) state that an under-developed reclaimed material market without the necessary market mechanisms to facilitate the R-framework would limit the supply of reclaimed materials for manufacturing. These views are shared by García-Quevedo et al. (2020). The respondents of this study perceived the reclaimed material availability for manufacturing as a slight barrier, reflected in the mean score of 3.35 (*Table 11*), the fourth lowest mean score recorded of all measured factors. Notably, respondents viewed the availability of reclaimed materials as the third most influential factor in determining CE adoption among South African SMEs (*Table 12*). Indicating that the respondents perceive the availability of reclaimed materials as important; however, they believe that reclaimed material availability is only a slight barrier to their transition to the CE. The scholarly literature suggests that collaborative intra-business relationships would allow for more effective coordination throughout supply chains to ensure that reclaimed materials are available

for manufacturing (Malik et al., 2022). The perception of the respondents could perhaps indicate a level of optimism that the establishment of collaborative intra-business relationships for the purpose of CE transitioning is viable for South African SMEs.

5.2.2.4 Top management support for CE adoption in South African SMEs

There is a consensus among researchers that the support of businesses' top management is required to adopt the CE (Govindan & Hasanagic, 2018; Sihvonen & Ritola, 2015). Kirchherr et al. (2018) assert that many business leaders have negative feelings or perceptions of the CE and are, therefore, hesitant to transition towards it. Shahbazi et al. (2016) present a slightly different argument, stating that business leaders often prioritise growing their business and increasing their profitability more than protecting the natural environment. Regardless of the reason, it has been widely cited that a lack of support from top management is a significant barrier to CE adoption (Kirchherr et al., 2018; Mehmood et al., 2021; Ormazabal et al., 2018; Shahbazi et al., 2016). The respondents of this study regarded top management support for CE adoption in South African SMEs as a moderate barrier, with a mean score of 3.42 (*Table 11*), making it the sixth of the 11 factors measured and placing it in the middle of the distribution. However, the respondents perceived top management support as the second most influential factor in determining CE adoption for South African SMEs (*Table 12*). While top management support is highly influential, it isn't regarded as a significant barrier to South African SMEs adoption of the CE.

5.2.3 GOVERNMENTAL FACTORS

5.2.3.1 Regulatory Incentives

The presence of regulatory incentives has been widely cited as an enabler of CE adoption (Bilal et al., 2020; Mura et al., 2020), while their absence is viewed as a significant barrier (Osei-Tutu et al., 2023; Salmenperä et al., 2021). Mura et al. (2020) argue that offering businesses incentives such as tax benefits, loans, or subsidies would aid businesses in their attempt to transition to the CE. These views are shared by Aslam et al. (2020), who advocate that those businesses that adopt CE initiatives should be incentivised while those who continue operating in a linear model should be penalised. However, several researchers assert that most governmental and regulatory bodies do not provide businesses with sufficient incentives to make transitioning to the CE financially viable (Campbell-Johnston et al., 2019; Huang et al., 2021; Osei-Tutu et al., 2023; Ranta et al., 2018; Salmenperä et al., 2021).

The respondents of the present study echo the views of those researchers who perceive the regulatory incentives for CE adoption as insufficient. This is evident through the mean score of 3.94 (*Table 11*), the second-highest score recorded for all measured factors, while simultaneously perceived as the single most influential factor in determining CE adoption for South African SMEs (*Table 12*). These findings indicate that the absence of regulatory incentives for CE adoption serves as the second largest barrier to South African SMEs entering the CE and has the highest degree of influence in determining CE adoption, thereby suggesting that much of the effort surrounding CE adoption in the South African business environment should be focussed on this issue.

5.2.3.2 Comprehensiveness of environmental laws and regulations

Govindan and Hasanagic (2018) explain that a key driver of CE adoption is the presence of comprehensive laws and policies. Bilal et al. (2020) assert that when comprehensive laws and regulations are in place, businesses are fully aware of their legal responsibilities and the consequences of their inaction, which motivates businesses to act by the law to avoid legal penalties or face prosecution. Despite the potential of comprehensive environmental laws and regulations as a driver of CE adoption, several researchers (Cruz Rios et al., 2021; Hart et al., 2019; Huang et al., 2021; Kirchherr et al., 2018; Munaro & Tavares, 2023; Wilts et al., 2016) have found a lack of consistency across environmental regulations and that policies are often not comprehensive enough to stop the exploitation of loopholes. The respondents of this study perceived South Africa's environmental laws and regulations as insufficient in terms of comprehensiveness, resulting in the respondents rating South Africa's environmental laws and regulations as a moderate barrier to CE adoption, indicated by the mean score of 3.55 (*Table 11*). Interestingly, despite being perceived as a moderate barrier, the respondents regarded South Africa's environmental laws and regulations as the third least influential factor in deciding to transition to the CE (*Table 12*). Perhaps indicating that the respondents would consider CE adoption, even if it wasn't legally required, if it was financially beneficial to their businesses, as was previously explained by Kirchherr et al. (2018).

5.2.3.3 Government support and funding

Researchers have cited a lack of government support and funding as a major barrier to CE adoption (Kharola et al., 2022; Kumar et al., 2021; Ormazabal et al., 2018; Rizos et al., 2016). Due to the expensive nature of constructing CE infrastructure and researching CE technology innovations, government funding is essential to widespread CE adoption (Bilal et al., 2020; Van

Bueren et al., 2019). The respondents of this study found the level of government support and funding for CE initiatives to be insufficient, as reflected by the mean score of 3.98 (*Table 11*), which is the highest mean score recorded of all measured factors. This finding corroborates the statement made by Tahulela and Ballard (2019), who stated that the South African government is unable to support businesses with the financial costs associated with making the transition to the CE, thus placing a financial burden on individual businesses.

5.3 MULTIPLE SYSTEM LEVELS OF THE CIRCULAR ECONOMY

The CE comprises three levels of influence, namely the micro, meso and macro levels (Kirchherr et al., 2018). The micro-system refers to factors that are internal to the business and which the business has control over (Malik et al., 2022). Of the factors measured in the present study, the factors listed below in *Table 14* are micro-system factors.

Table 14: Micro-System factors

Code	Description	Mean	Factor State
SF2	Knowledge of circular economy business operations within South African SMEs	3,89	Barrier
SF4	Support for circular economy adoption among the top management of SA SMEs	3,42	Moderate Barrier

As indicated by *Table 14*, the most significant micro-system level barrier to CE implementation among South African SMEs is a lack of knowledge of CE business operations. While the lack of knowledge does present a challenge to overcome, acquiring knowledge through the employment or consultation of qualified and experienced personnel is a feasible solution (Hart et al., 2019). In terms of top management support, Kirchherr et al. (2018) explain that business leaders are much more likely to embrace a CE transition if a strong business case is presented. This sentiment is echoed by Tahulela and Ballard (2019), who explain South African SMEs do not derive financial or regulatory value from transitioning to the CE. Once business owners can derive meaningful benefits from CE adoption, their levels of support will likely increase.

Table 15: Meso-system factors

Code	Description	Mean	Factor State
EF4	Impact of CE business models on operating expenses	3,77	Barrier
EF1	CE business infrastructure establishment cost	3,35	Slight Barrier
SF3	Availability of reclaimed materials for circular economy manufacturing	3,35	Slight Barrier
SF1	Client demand for circular economy-compliant products or services	3,16	Slight Barrier
EF2	Cost of performing CE activities (R-framework)	3,13	Slight Barrier
EF3	Price difference between reclaimed materials and virgin materials	2,58	Moderate Enabler

Table 15 above represents all measured factors which fall within the intra-business environment, which refers to the dynamics of business-to-business relationships and the characteristics of the

region in which the business operates (Kirchherr et al., 2018). The most prominent barrier within the meso-system level is the negative impact of CE business models on the operating expenses of South African SMEs, resulting in a decrease in profitability. As previously stated by Sohal et al. (2022), SMEs are often faced with cash liquidity and capital management problems, and many SMEs are simply trying to survive. For widespread adoption of the CE to be feasible, business models must be developed that do not harm the long-term financial security of South African SMEs (Tahulela & Ballard, 2019). The only factor regarded as an enabler of the CE adoption for South African SMEs is found in the meso-system, the respondents of the present study found that the price of reclaimed materials is sufficiently lower than that of virgin materials, thus making the factor a moderate enabler (*Table 15*).

Table 16: Macro-system factors

Code	Description	Mean	Factor State
GF3	Government support and funding for the development of CE infrastructure	3,98	Barrier
GF1	Regulatory incentives provided to SMEs for adopting CE practices	3,94	Barrier
GF2	Comprehensiveness of environmental laws to promote CE adoption	3,55	Moderate Barrier

The measured factors of the present study, which fall within the macro-system level, are listed in *Table 16* above. The macro-system level is comprised of factors that fall within the sphere of national and global level decision-making and are completely outside of the business's sphere of influence (Kirchherr et al., 2018). The most significant barrier within the macro-system level is government support and funding for developing CE infrastructure (*Table 16*). A lack of government support and funding is a widely cited barrier to CE (Kharola et al., 2022; Kumar et al., 2021; Ormazabal et al., 2018; Rizos et al., 2016). As previously stated, government support and funding play a crucial role in the widespread adoption of the CE, given the high costs associated with building CE infrastructure and researching technological innovations in this field (Bilal et al., 2020; Van Bueren et al., 2019).

CHAPTER SIX: RESEARCH CONCLUSION

6.1 SUMMARY OF FINDINGS

The present study aimed to determine the barriers and enablers of South African SMEs entering and successfully operating within the CE situated in the South African context. To accomplish this research objective, the study investigated the economic, societal, and governmental factors which affect SMEs abilities to enter the CE and how important these factors are in influencing CE adoption decisions among South African SMEs.

This study drew inspiration from recent studies which investigated the barriers and enablers to CE adoption for Spanish (Ormazabal et al., 2018) and Italian (Mura et al., 2020) SMEs. Through the employment of the survey method, this study used a Likert-scale questionnaire to quantitatively evaluate the perceptions of leaders from South African SMEs. The present study collected 62 responses. These responses were analysed through descriptive statistics, followed by inferential statistics.

Of the 11 factor states measured in this study, the respondents perceived 4 of the 11 factors to be “*barriers*”, 2 of the factors were considered “*moderate barriers*”, 4 of the factors were considered “*slight barriers*”, and 1 of the factors was considered a “*moderate enabler*” (Table 11). The summary of the findings is presented below.

Governmental factors are the cluster of factors that presented the most significant barriers to South African SMEs adopting the CE. Governmental factors refer to any factor related to government policy or legislature (Sohal et al., 2022). The respondents of the present study perceived the South African government's level of support and funding for developing a CE infrastructure to be inadequate for South African SMEs to transition to the CE. In the same essence, the respondents perceived the incentives offered by the South African government for CE adoption as weak and insufficient. These two factors represent the two most significant barriers to CE adoption among South African SMEs (Table 11).

Societal factors, encompassing factors related to society's attitudes, perceptions and knowledge of the CE (Sohal et al., 2022), were perceived as moderate barriers to South African SME adoption. Notably, respondents perceived a lack of knowledge of CE business operations within South African SMEs as the most significant societal barrier and the third overall highest barrier to

CE adoption among South African SMEs (*Table 11*). Interestingly, the respondents found the level of client demand for CE-compliant products or services to be only a slight barrier to CE adoption.

Economic factors refer to factors that have a direct or immediate impact on the profitability or expense of an organisation (Sohal et al., 2022). The respondents collectively perceived the economic factors measured during the present study to be a slight barrier to CE adoption. However, respondents did perceive the financial impact of CE business models to be negative, resulting in the financial impact of CE business models being perceived as the fourth most significant barrier to CE adoption, of the 11 factors measured, for South African SMEs (*Table 11*). Importantly, among the economic factors was this study's only enabler to CE adoption, namely the favourable price difference between reclaimed materials and virgin materials. The respondents perceived the cost of reclaimed materials to be sufficiently less than the price for virgin materials, resulting in this factor being regarded as a moderate enabler of CE adoption (*Table 11*).

6.2 IMPLICATIONS

The present study argues that the most significant barriers to CE adoption among South African SMEs are outside of the SMEs' control. Government support and funding and regulatory incentives are the two most prominent factors hindering the adoption of CE practices among South African SMEs.

Regarding government support and funding, it has been widely argued that due to the expensive nature of establishing the infrastructure required to conduct CE business operations, government support is essential to widespread CE adoption (Bilal et al., 2020; Van Bueren et al., 2019). Both the scholarly literature and the findings of this study point to the fact that many SMEs will not be able to successfully navigate the transition from the LE to the CE without the support of a third party, such as the government, to assist in the development of the infrastructure which is required to operate CE-compliant businesses. The respondents perceive all other factors related to CE transitioning or adoption as less of a barrier to CE adoption.

The study's findings suggest that South Africa lacks worthwhile regulatory incentives that encourage adopting CE business practices. The scholarly literature suggests that the presence of regulatory incentives such as tax benefits, loans, or subsidies is a strong aid in encouraging CE adoption (Bilal et al., 2020; Mura et al., 2020). The importance of regulatory incentives is

emphasised by the fact that CE business models aren't yet fully self-sustaining, resulting in businesses which transition from the LE to the CE, often reducing their levels of profitability (Mhatre et al., 2023; Mura et al., 2020; Osei-Tutu et al., 2023; Rizos et al., 2016). Reducing profitability to transition to a CE business model isn't a feasible course of action for many SMEs, as many SMEs must protect their profitability to keep their businesses open (Sohal et al., 2022). Therefore, until CE business models are comprehensive enough to allow SMEs to transition from the linear economy to the CE without decreasing their profitability levels, the South African government will need to provide South African SMEs with sufficient regulatory incentives to make their transition financially viable.

6.3 RESEARCH LIMITATIONS AND FUTURE RESEARCH DIRECTIONS

The present study had Three limitations. The first limitation was time-related; the researcher had four months to collect data, which resulted in the sample of the present study being smaller than had been initially planned. The second limitation is related to the use of convenience sampling. The present study made use of non-probability sampling instead of probability sampling. The key limitation of this decision is that no statistical inferences can be made about the target population from the sample used during this study. The third limitation is related to the use of descriptive statistics as the method of data analysis. The use of descriptive statistics as apposed to a composite factor analysis could have resulted in an oversimplification of the findings, which could have potentially led to important nuances in the data being due to descriptive statistics being a relatively simplistic method of data analysis.

It is suggested that future research investigating the barriers and enablers to South African SMEs entering the CE be done on a prolonged timeline to ensure that a sufficiently large sample can be collected. Additionally, it is recommended that probability sampling be used as the sampling method to allow the researcher to make statistical inferences about the target population. The present study evaluated the perceptions of South African SME leaders from across South Africa. It is recommended that future research focus on one geographic area of South Africa to gain a clearer picture of the barriers and enablers of CE adoption in the different regions of South Africa.

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APPENDIX

APPENDIX I. RESEARCH INSTRUMENT



The Barriers and Enablers to South African SMEs operating in the Circular Economy

Background and purpose of the research - The global population is projected to reach nine billion by 2050, significantly increasing the strain on natural resources and exacerbating environmental degradation under the current linear economy (LE) model. The LE, characterised by a take-make-use-dispose framework, has driven economic growth but at the cost of unsustainable resource consumption and waste generation. Transitioning to a circular economy (CE) is a potential solution, as it aims to decouple economic activity from natural resource use and waste production through the principles of reducing, repairing, reusing, recovering, remanufacturing, and recycling. South African SMEs, representing over 98% of businesses and contributing 40% to GDP, play a critical role in this transition.

Despite substantial research on the CE barriers and enablers in developed economies, there is a distinct lack of studies focused on the global south, particularly South Africa, as the world's 14th largest emitter of greenhouse gases.

This study aims to fill this research gap by conducting a quantitative survey to identify the barriers and enablers to South African SMEs operating in the circular economy. The findings will provide stakeholders with crucial data to facilitate a more seamless transition for South African SMEs from a linear economy to a circular economy, contributing to economic sustainability and environmental preservation.

General Consent Form

I volunteer to participate in a research project conducted by Stefan van der Poel as partial fulfilment of the requirements for the Master of Management (International Management) Degree at the Graduate School of Business. I understand that the research is designed to gather information about The Barriers and Enablers to South African SMEs Entering the Circular Economy and that I will be one of approximately 100 of people being surveyed for this research.

Ethics approval - Ethical consent for the study has been approved by the UCT Commerce Faculty Ethics in Research Committee.

Participation and confidentiality - I understand that my participation in this research is voluntary, that I will not be compensated and that I may withdraw at any time. The survey will take approximately 10 minutes. I understand that I will not be identified by name in any reports using information obtained from this interview and that my confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions. Should you have any questions or concerns, please contact me (VPLSTE003@myuct.ac.za) or my supervisor (camille.meyer@uct.ac.za).

- I consent to participate in this research survey, based on the terms outlined above.

Demographic Information

Thank you for participating in our research. In this section, we will request some demographic information. Please be assured that all responses will be treated with strict confidentiality and will solely be used to compare and contrast- answers from respondents of diverse backgrounds to identify trends in our research. Your privacy is our top priority, and your data will be managed with the utmost care and security.

1) Which of these titles most accurately describes your position?

- General Manager
- Managing Director
- Chief Officer Position
- Owner
- Other

2) In what Province is your business based?

- Eastern Cape
- Free State
- Gauteng
- KwaZulu-Natal
- Limpopo
- Mpumalanga
- Northern Cape
- North-West
- Western Cape

3) How many employees does your business have?

- Fewer than 10
- Between 10 and 29
- Between 30 and 49
- Between 50 and 99
- More than 100

4) In what sector does your business operate?

- Accommodation and Food Services
- Administrative and Support Services
- Agriculture, Forestry, and Fishing
- Arts, Entertainment, and Recreation
- Construction
- Education
- Electricity, Gas, and Water Supply
- Financial and Insurance Activities
- Human Health and Social Work Activities
- Information and Communication
- Manufacturing
- Mining and Quarrying
- Real Estate Activities
- Transport and Storage
- Wholesale and Retail Trade
- Repair of Motor Vehicles and Motorcycles

- Other
- 5) What is the annual revenue of your business?**

- Less than R5 million
- Between R5 million and R20 million
- Between R20 million and R35 million
- Between R35 million and R50 million
- Between R50 million and R65 million
- Between R65 million and R80 million
- Between R80 million and R95 million
- More than R95 million

Economic Factors

This section investigates the financial costs associated with operating within a circular economy model and performing circular economy initiatives such as:

- **Reduce** - Lowering the usage of natural resources as a production input.
- **Repair** - Restoring damaged or decayed products to a usable condition.
- **Reuse** - Products must be designed to be reusable across several usage cycles.
- **Recover** - Collecting end-of-life products, disassembling them, and reusing the components.
- **Remanufacture** - Restoring already used products to their original state or creating new products.
- **Recycle** - Returning natural resources back into the economy after their life cycle is complete.

6) How would you rate the upfront cost of establishing the business infrastructure for circular economy initiatives, such as reduce, repair, reuse, recover, remanufacture, and recycle, for South African SMEs?

- Very Low-Cost
- Low Cost
- Moderate Cost
- High Cost
- Very High-Cost

7) To what extent do you consider the upfront cost of establishing business infrastructure for circular economy initiatives, such as reduce, repair, reuse, recover, remanufacture, and recycle, to influence SMEs' adoption of these practices?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

8) How would you rate the cost of performing initiatives such as repairing, reusing, recovering, remanufacturing, and recycling in comparison to the cost of disposing of materials for South African SMEs?

- Much Lower Cost for the circular economy Initiatives
- Lower Cost for the circular economy Initiatives
- About the Same Cost
- Higher Cost for the circular economy Initiatives
- Much Higher Cost for the circular economy Initiatives

9) To what extent do you consider the cost of performing circular economy initiatives such as repairing, reusing, recovering, remanufacturing, and recycling in comparison to the cost of disposing of materials to influence SMEs' adoption of circular economy initiatives?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

10) How would you rate the cost of buying reclaimed materials relative to virgin materials for South African SMEs?

- Much Lower Cost for Reclaimed Materials
- Lower Cost for Reclaimed Materials
- About the Same Cost
- Higher Cost for Reclaimed Materials
- Much Higher Cost for Reclaimed Materials

11) To what extent do you consider the cost of buying reclaimed materials relative to virgin materials to influence SMEs' adoption of circular economy initiatives?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

12) How would you rate the impact of operating in a circular economy model on South African SMEs' operating expenses?

- No Impact on Expenses
- Low Impact on Expenses
- Moderate Impact on Expenses
- High Impact on Expenses
- Extreme Impact on Expenses

13) To what extent do you consider the operating expenses associated with operating in a circular economy model to influence SMEs' adoption of circular economy initiatives?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

Societal Factors

This section explores the social perception of the circular economy within South African SMEs.

14) How would you rate the level of client demand for circular economy-compliant products or services offered by South African SMEs?

- Very High Demand

- High Demand
- Moderate Demand
- Low Demand
- Very Low Demand

15) To what extent do you consider the level of client demand for circular economy-compliant products or services to influence SMEs' adoption of these practices?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

16) How would you rate the level of knowledge of circular economy business operations within South African SMEs?

- Very High Knowledge
- High Knowledge
- Moderate Knowledge
- Low Knowledge
- Very Low Knowledge

17) To what extent do you consider the level of knowledge and expertise of circular economy business operations within SMEs to influence their adoption of these practices?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

18) How would you rate the availability of reclaimed materials for manufacturing circular economy-compliant products in South Africa?

- Very High Availability
- High Availability
- Moderate Availability
- Low Availability
- Very Low Availability

19) To what extent do you consider the availability of reclaimed materials for manufacturing circular economy-compliant products to influence SMEs' adoption of circular economy practices?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

20) How would you rate the level of support for circular economy adoption among the top management of South African SMEs?

- Very High Support
- High Support
- Moderate Support
- Low Support
- Very Low Support

21) To what extent do you consider the support of top management to influence SMEs' adoption of circular economy practices?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Highly Influential
- Extremely Influential

Governmental Factors

This section explores the governmental factors influencing the circular economy within South African SMEs.

22) How would you rate the level of governmental and regulatory incentives provided to SMEs for adopting circular economy practices?

- Very Strong Incentives
- Strong Incentives
- Moderate Incentives
- Weak Incentives
- Very Weak Incentives

23) To what extent do you consider governmental or regulatory incentives important for SMEs to adopt circular economy practices?

- Not Important at All
- Slightly Important
- Moderately Important
- Very Important
- Extremely Important

24) How would you rate the comprehensiveness of environmental laws and regulations aimed at promoting SMEs' adoption of circular economy practices?

- Very Comprehensive
- Comprehensive
- Moderately Comprehensive
- Not Very Comprehensive
- Not Comprehensive at All

25) To what extent do you consider environmental laws and regulations that promote circular economy business practices to influence SMEs' adoption of these practices?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Very Influential
- Extremely Influential

26) How would you rate the level of government support and funding for the development of circular economy infrastructure?

- Very High Support and Funding
- High Support and Funding
- Moderate Support and Funding
- Low Support and Funding
- Very Low Support and Funding

27) To what extent do you consider government support and funding for circular economy infrastructure to influence SMEs' adoption of circular economy practices?

- Not Influential at All
- Slightly Influential
- Moderately Influential
- Very Influential
- Extremely Influential

APPENDIX II. CORRELATION ANALYSIS

Table 17: Correlation analysis of all measured factors and their corresponding degrees of influence

	EF1	EF1_I	EF2	EF2_I	EF3	EF3_I	EF4	EF4_I	SF1	SF1_I	SF2	SF2_I	SF3	SF3_I	SF4	SF4_I	GF1	GF1_I	GF2	GF2_I	GF3	GF3_I	
EF1																							
EF1_I	0,47																						
EF2	0,45	0,31																					
EF2_I	0,30	0,58	0,32																				
EF3	0,26	-0,01	0,21	0,07																			
EF3_I	0,06	0,39	0,17	0,39	0,23																		
EF4	0,51	0,52	0,38	0,41	0,24	0,37																	
EF4_I	0,16	0,56	0,27	0,59	0,14	0,62	0,45																
SF1	0,06	0,04	0,17	-0,12	0,26	-0,06	0,19	0,18															
SF1_I	0,16	0,31	0,18	0,44	0,06	0,50	0,25	0,56	-0,19														
SF2	0,03	0,20	0,03	0,06	0,11	0,03	0,06	0,08	0,26	-0,28													
SF2_I	0,00	0,35	0,05	0,38	-0,12	0,34	0,10	0,41	-0,15	0,45	-0,16												
SF3	-0,07	0,13	-0,13	0,13	-0,25	-0,04	-0,02	-0,08	0,08	-0,32	0,37	0,00											
SF3_I	0,19	0,43	0,22	0,66	0,09	0,38	0,19	0,49	-0,15	0,46	-0,06	0,57	-0,21										
SF4	0,04	0,08	0,10	0,03	0,07	-0,02	0,12	-0,06	0,32	-0,29	0,56	-0,22	0,29	-0,06									
SF4_I	0,03	0,36	0,21	0,54	0,03	0,30	0,19	0,45	-0,14	0,34	0,00	0,40	-0,12	0,70	-0,03								
GF1	0,16	0,31	0,05	0,00	0,01	-0,20	0,11	0,03	0,14	-0,17	0,33	-0,07	0,32	-0,03	0,24	-0,07							
GF1_I	0,06	0,38	0,11	0,31	-0,02	0,37	0,07	0,35	-0,27	0,39	0,02	0,52	0,11	0,51	-0,08	0,49	0,04						
GF2	0,11	0,29	0,32	0,09	0,05	0,04	0,39	0,08	0,24	-0,01	0,29	-0,11	0,31	-0,06	0,22	0,03	0,46	0,05					
GF2_I	-0,02	0,29	0,02	0,43	0,10	0,37	0,31	0,36	-0,06	0,38	-0,17	0,37	-0,06	0,49	0,06	0,52	-0,19	0,48	-0,12				
GF3	0,17	0,23	0,15	0,01	0,01	-0,21	0,12	0,02	0,13	-0,19	0,40	-0,17	0,25	0,00	0,34	0,04	0,65	0,09	0,50	-0,12			
GF3_I	0,18	0,49	0,16	0,54	-0,01	0,34	0,32	0,41	0,01	0,45	0,11	0,40	0,01	0,56	0,08	0,53	-0,09	0,56	0,02	0,52	0,09		

Code	Description	Code	Description
EF1	CE business infrastructure establishment cost	EF1_I	Influence of CE business infrastructure establishment costs
EF2	Cost of performing CE activities (R-framework)	EF2_I	Influence of costs associated with performing CE R-framework
EF3	Price difference between reclaimed materials and virgin materials	EF3_I	Influence of price difference between reclaimed and virgin materials
EF4	Impact of CE business models on operating expenses	EF4_I	Influence of CE business models on operating expenses
GF1	Regulatory incentives provided to SMEs for adopting CE practices	GF1_I	Influence of regulatory incentives for SMEs adopting the CE
GF2	Comprehensiveness of environmental laws to promote CE adoption	GF2_I	Influence of comprehensive environmental laws that promote CE adoption
GF3	Government support and funding for the development of CE infrastructure	GF3_I	Influence of government funding for the development of CE infrastructure
SF1	Client demand for circular economy-compliant products or services	SF1_I	Influence of client demand for circular economy-compliant products or services
SF2	Knowledge of circular economy business operations within South African SMEs	SF2_I	Influence of circular economy business operations knowledge within SA SMEs
SF3	Availability of reclaimed materials for circular economy manufacturing	SF3_I	Influence of reclaimed materials availability for circular economy manufacturing
SF4	Support for circular economy adoption among the top management of SA SMEs	SF4_I	Influence of SA SMEs top management support of circular economy adoption