

# The investigation of South African MSMEs through the lens of a Circular Economy

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## DECLARATION

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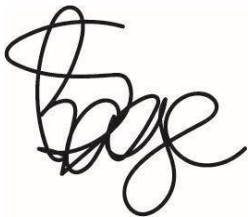
The investigation of South African MSMEs through the lens of a Circular Economy

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## **SUMMARY**

The current economic model is wasteful, linear and unsustainable and there has been a much called for transition to a sustainable development model to guide South Africa's economic development. To guide the transition, there is growing support and buy in for a circular model that enables the circulation resources and eliminates waste. A circular model, called Circular Economy, is a sustainable development concept that addresses issues of waste. This study investigated South African Micro Small and Medium Enterprises with the use of a Circular Economy framework. The said businesses were investigated to determine what environmentally sustainable practices were occurring within the businesses and the motivation for incorporating the practices. Moreover, projections for more future clothing and textile businesses were explored and a framework for business model types was developed. The framework serves as a guideline for business models that centre on better circularity of resources, a fundamental aspect of a circular model for South Africa. Most of the MSME's were found to be practicing strategies that extend the lifespan of products and their parts (Reuse, Repair, Refurbish, Remanufacture and Repurpose) with two MSME's having circularity of resources with their product chains.

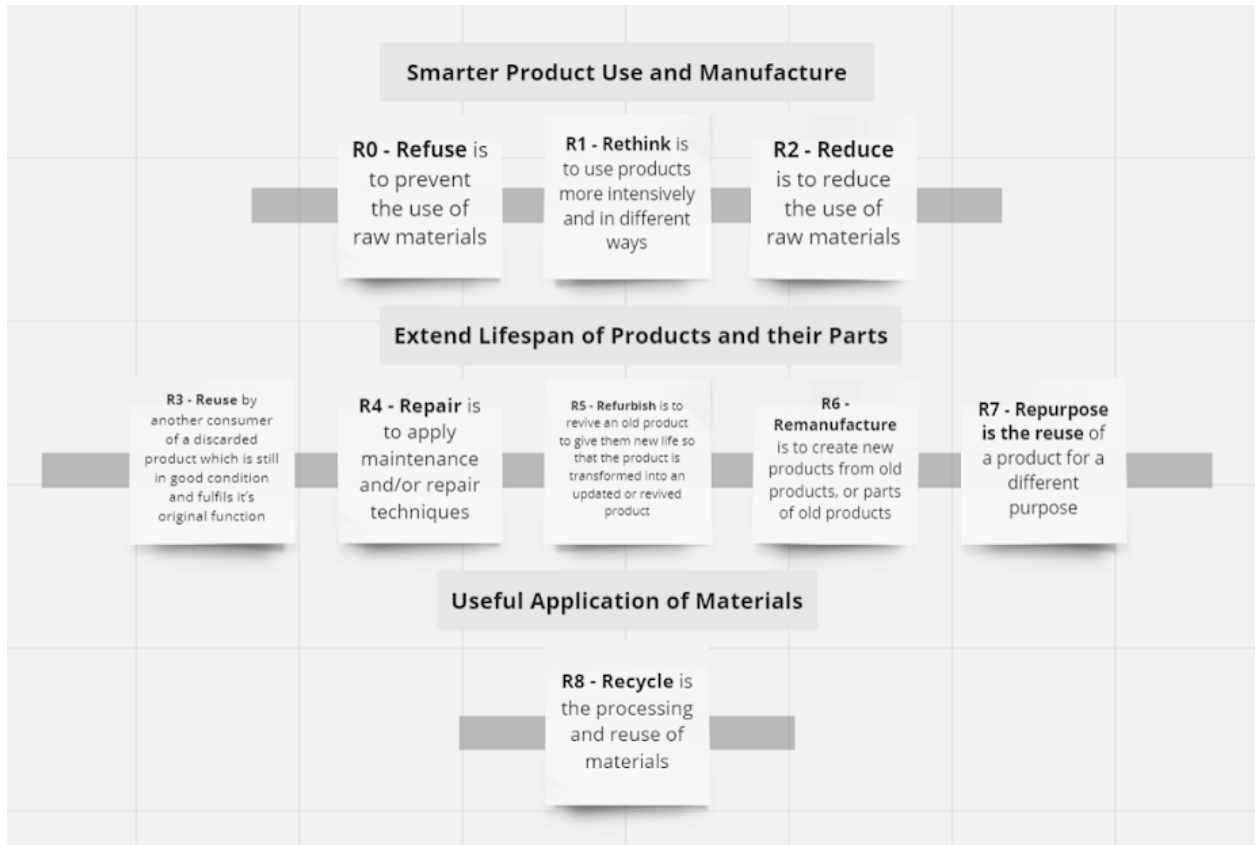
## **KEYWORDS**

Circular economy; South Africa; business model; clothing and textile; environmentally sustainable; 9R Framework; clothing and textile industry; fashion industry; sustainable fashion; sustainable business model; sustainable transition.

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# Chapter 1 Introduction

## 1.1 Introduction

South Africa has a linear, resourced-based economy, sharing an identical model to that of the global economy. The linear South African economy has challenges of being a developing economy with high levels of unemployment, poverty, and inequality (Godfrey 2021). These challenges require the decoupling of economic growth from environmental degradation and carbon-intensive energy consumption (National Development Plan (NDP) 2012). In support of this objective, the South African government recognises the opportunity of a circular economic model for the country, which can also play a leading role in promoting a green economy on the African continent (Potgieter et al. 2020). The said challenges facing South Africa have intensified because of the COVID-19 pandemic, which positions the Circular Economy (CE) as a new developmental model to drive economic recovery (Nahman et al. 2021). A transition to a CE presents South Africa with opportunities for low-carbon, sustainable, and resilient economic growth to address the said challenges of unemployment, inequality, and poverty. The South African government further recognises that a greener, more sustainable economy has potential for job creation (United Nations Environmental Programme (UNEP) 2013). A sustainable economic model for South Africa is considered an approach to achieving sustainable development that advocates for meeting the needs of the present population without compromising those of generations to come. A sustainable economic model, as in the case of a CE, aims to create more with the same input quantities through more efficient production systems, resulting in reduced waste generation and pollution (Melamu 2020). The South African clothing and textile industry mirrors the bigger economic model and has the same inherent challenges of resource use, and wastage accumulation. CE business models (BM) can enable reuse and extend the life of clothing and textile products through efforts of reuse, repairing, remanufacturing, refurbishing, and recycling (Marques et al. 2020).

The issue of the current unsustainable economic system has become the focal point of scientists, environmentalists, and global policy makers (Geissdoerfer et al. 2018), who have highlighted its relevance in terms of research initiatives. In support, there have been calls for a transition to a more sustainable economy in response to increasing concerns about resource over-consumption, environmental degradation, and social inequality (Adams et al. 2016). This study will explore

environmentally sustainable practices, through the 9R Framework, within the South African clothing and textile industry.

## 1.2 Literature Review

### 1.2.1 The Current Economic Model

The current economic model is fraught with resource-depleting systems that generate high emissions and waste, resulting in a negative impact on ecosystems and natural capital. Current patterns of linear economic activity are dependent on a permanent output of materials that are extracted, processed, and disposed of as waste (European Union (EU) 2020). This presents an issue for the current economy that calls for a more sustainable economic model to better preserve the earth's resources, and to mediate wastage generation. The global transition to a CE means moving towards less wasteful systems with efficient resource use, while providing work opportunities and better quality of life for a country's citizens. The said gains of a CE are recognised as a significant contribution to the 2030 Sustainable Development Goals (EU 2020; Jacometti 2019). In addition, the CE is an opportunity to reframe economic development while unlocking new and social-economic development opportunities. The transition to a CE requires a systems change with collaboration and cooperation (Jacometti 2019).

### 1.2.2 Current Clothing and Textile Industry

As the linear economic model is criticised for its increasingly negative impact, the clothing and textile industry is also criticised for its unsustainable use of land, water, raw materials, and energy. This is in addition to harmful manufacturing processes with associated toxic chemical use, waste, pollution, and social injustice (Ellen McArthur Foundation (EMF) 2017b; Wrap n.d.). The textile industry, which forms part of the clothing and textile sector, is viewed as a significant contributor to the global economy, generating jobs worldwide. However, textile production and consumption continue to increase within the existing linear model, causing significant negative environmental and social impact (Waste and Resources Action Plan (Wrap n.d.). The main issues around natural fibre production are the consumption of energy, water and soil, and the use of biocides for natural materials. Meanwhile, issues such as the use of non-renewable resources, emissions and water pollution are inherent to the production of synthetic materials. There are also significant negative impacts in the production and transportation phases of clothing and textile production (Jacometti 2019). While clothing and textile value chains contribute to the global economy, a large part of production has shifted to emerging and

developing economies in search of cheap labour and areas with raw material supply. However, this has exacerbated the negative environmental and social impacts of the industry (Jacometti 2019). A sustainable clothing and textile system should add value to society through the creation of inclusive jobs with fair wages and working conditions, while minimising the said negative environmental and social impacts (European Topic Centre on Waste Materials in a Green Economy (ETC/WMGE) 2019).

### 1.2.3 Opportunities for the South African Economy Within a Circular Economy

Due to the expanse of the global clothing and textile industry, the goals of a CE are unlikely to be achieved without ensuring that suppliers in developing economies adopt business practices in line with the BMs of a CE. This requires making an effective link to the Micro, Small and Medium Enterprises (MSMEs) that form part of the global value and supply chains. However, this is a challenge for multinational companies and smaller businesses alike (EU 2020). Challenges include ensuring that economic growth and development are coupled with job protection, reduction of environmental impacts, and efficient use of resources with sustainable production and consumption models (Jacometti 2019). CE in Africa is recognised as a way to assist in the reduction of natural resource dependence and pollution while contributing to economic growth and job creation (EU 2020). Dalberg et al. (2021) have highlighted opportunities for the African clothing and textile industry that include reuse, recycling and other value-adding opportunities for clothing. In addition, the authors state that there are job opportunities, especially for women. To reduce the negative environmental impact of clothing and textile products, BMs should shift to circular businesses that save on raw materials, water, and waste (ETC/WMGE, 2019). While there is a nascent adoption of CE globally, CE provides a reliable framework towards improving BMs that are preventative of the said issues (Ghisellini et al. 2016).

### 1.2.4 9R Framework

The 9R Framework, developed by Potting et al. (2017), provides the structure and investigatory approach for environmentally sustainable practices in MSMEs' product chains. Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose and Recycle are the 9 Rs of the framework. While the said framework provides the structure for environmentally sustainable practices, it is generic and can be applied to different product and service chains, including those within the clothing and textile industry.

### 1.3 Problem Statement

The growing economy has caused significant damage to our planet and there have been severe environmental and social consequences to our pursuit of economic prosperity (ETC/WMGE 2019). Nations have also suffered from the consequences of a polluted environment, with contaminated air, water and soil causing death or long-lasting compromised health (EMF 2017). This positions a new, sustainable development model as a requirement for a more sustainable future.

The fashion and textiles industry is a major contributor to the decline of our natural world, from both a social and environmental standpoint (EMF 2017b). With unethical labour practices caused by an unregulated international industry, the people involved in the production and manufacture of clothing and textiles bear the brunt of unsafe working conditions, child and slave labour, abuse, and unfair wages (EMF 2017a). The fashion industry's linear model is the root cause of the industry's contribution to environmental degradation through excessive wastefulness of landfilled textile products and pollution caused by burning, among other issues. Environmental concerns are not exclusive to the manufacture and disposal of clothing and textile waste, as there are also polluting concerns while apparel is in use by the consumer (EMF 2017b). CE could contribute towards transitioning the clothing and textile industry to one which aids in the realisation of strategic sustainable development (Olayemi 2022).

South Africa is one of the world's most energy and carbon-intensive economies with a high reliance on natural, limited resources (Organisation for Economic Co-operation and Development (OECD) 2013). As a developing country, South Africa is experiencing high levels of unemployment, poverty, and inequality, while also mirroring the global economy. South Africa's economic model is linear with high throughputs of resources (Godfrey 2021). The New Growth Plan, developed by the South African government, considers the green economy as a job driver with employment potential for low-skilled workers (OECD 2013). This includes employment potential for the low-skilled workers who are typically employed by the clothing and textile industry, positioning the green economy as a solution to several poverty-related issues (OECD 2013). There have been many calls for research into the implementation of or transition to CE (Govindan & Hasanagic 2018). Ghisellini et al. (2016) assert that monitoring existing endeavours is fundamental to advancing CE. Hugo et al. (2021) motivate that studies on sustainable fashion in developing countries like South Africa would help to understand the barriers and initiatives occurring in the industry. This study will explore current environmentally sustainable practices of clothing and textile BMs within the South African industry to determine the progress of transition, and to respond to the said call for clarification of barriers and initiatives.



## 1.4 Aims and Objectives

The aim of this project was to investigate the environmentally sustainable practices occurring within clothing and textile MSMEs within the South African context in terms of the 9R Framework.

- Objective 1: To investigate the environmentally sustainable strategies of clothing and textile business models and product chains
- Objective 2: To explore the reasons why circular strategies feature in clothing and textile MSMEs
- Objective 3: To explore the challenges of current clothing and textile business models, circular strategies for future clothing and textile business models, and frame BM opportunities

The objectives are to be investigated in order to propose a CE BM that addresses the 9R Framework for improved production and consumption in the clothing and textile industry in South Africa.

## 1.5 Research Methodology

### 1.5.1 Research Paradigm

An interpretivist paradigm was employed to investigate the environmental sustainability practices of the said South African clothing and textile MSMEs. The goal of this study is to generate an in-depth understanding of the circular practices occurring within South African clothing and textile MSME BMs by exploring the sustainable practices, through implementation of the 9R Framework, within the product chains, and the motivation for actioning these practices (Cropley 2021; Guest et al. 2013; Saunders et al, 2009). The researcher's own interpretation of the data guided and influenced the generated understanding of the data and resulting findings (Snape & Spencer 2003). By employing an interpretivist philosophy, the researcher's investigation was guided by the research objectives (Leitch et al. 2010), and the participants' understanding of the concepts were used to generate the findings (Braun & Clarke 2006; Ritchie 2003).

### 1.5.2 Research Design

This study used a qualitative research design with an inductive approach, which can be an effective method for investigation where there is a knowledge gap (Saunders et al. 2009), as in the case of CE research for the South African clothing and textile industry. An inductive approach draws upon systematic meaning making procedures, where the analysis is guided by research objectives (Guest et al. 2013; Thomas 2003). This study followed a qualitative inductive research approach that was conducive

to achieving exploratory outcomes (Guest et al. 2013), whereby the research findings were identified by the researcher from significant themes found in the raw data (Thomas 2003). The population sample was investigated using a semi-structured form of inquiry (Saunders et al., 2009) to generate detailed and valid data of the circular strategies occurring in the BMs, while exploring the features that contribute to the occurring circular practices (Cropley 2021). Data collection was a single episode of fieldwork (Legard et al. 2003) to investigate the current setting of MSME practices, as proposed in the 9R Framework by Potting et al. (2017).

### 1.5.3 Sampling

Non-probability sampling was employed for selecting the research population of clothing and textile MSMEs based on the occurrence of sustainability practices in their product chains (Crossley & Rautenbach 2021; Ritchie et al. 2003). A diverse sample selection provided data of different clothing and/or textile products/services. Variations of similar product and service propositions were included in the research sample to explore how different businesses are practising sustainability within the South African context. To create the research sample, South African clothing and textile MSMEs were researched using an online search engine to generate a list of possible businesses that incorporate one or more of the selection criteria (sustainable practices of the 9R Framework). Potential participants were researched using a search engine, shortlisted, and curated to produce a sample consisting of a variety of product and/or service offerings and BMs, after which the participants were contacted for enquiry of participation.

### 1.5.4 Data Collection

Interviews provided a detailed understanding of the practices, processes, and opinions of participants (Legard et al. 2003). Qualitative questioning allowed for flexible inquiry with specific focus on the participant to generate an understanding of the circular practices (Guest et al. 2013; Ritchie et al. 2003). The interview method combined structure and flexibility, allowing data to be generated through the interaction between the researcher and participants (Legard et al. 2003). Interviews were conducted face to face through physical and digital means. An interview topic guide directed the discussion of the interview and detailed the objectives, questions, probes, and specific subjects intended to be discussed during the interview (Legard et al. 2003). However, the participants were allowed to explore and elaborate on issues that they deemed important, as these might not have come up as direct questions.

The interviews were, therefore, conducted through semi-structured interview guides, with the option of elaboration from participants on issues they deemed important.

#### 1.5.5 Data Analysis

An inductive approach guided the analysis of complex data that was guided by the said research objectives (Guest et al. 2013). The inductive analysis involved the development of categories into a framework that condensed the raw data into key themes (Braun & Clarke 2006; Thomas 2003). During the analysis process, multiple meanings were considered along with key themes and processes (Braun & Clarke 2006). Coding methods of descriptive, process, simultaneous, in vivo and pattern coding were appropriate for this study (Saldana 2016). The coded data was explored on a virtual canvas to generate connections. Data analysis concluded with the interpretation of the themes to state various relationships of network, relationships, similarities, and sequences (Braun & Clarke 2006; Cropley 2021; Thomas 2003).

#### 1.6 Ethical Considerations

The University of South Africa, College of Agriculture and Environmental Sciences' ethics committee approved this study (2022/CAES\_HREC/151). Participants who were deemed suitable were contacted by the researcher and provided with an outline of the study, the expectations, and benefits of the study, after which they were asked to participate. Only after participants confirmed their interest were they sent an information document outlining particulars of the study with a consent form. This document explained the estimated time and effort involved, the kind of data to be collected, that participation was voluntary and anonymous, how data would be recorded, and confidentiality of the information (Miles et al. 2014). Participants were assured of the confidentiality of the data, along with their personal information, resulting in anonymity. Participants were also informed that they could withdraw from the study at any given point in time, should they wish, without reason and/or penalty. In addition, it was reiterated that the data will be used for academic purposes only.

#### 1.7 Limitations

A limitation of this study is that the data could be anticipated due to the way that the sample was selected. The sampling method intentionally collected a group of participant BMs that had a variety of sustainability practices occurring already, rather than selecting a sample group that could have provided

a limited understanding of only some of the R-Practices. This has implications for potential bias due to the sampling techniques used. As the study is qualitative in nature, the results are not generalisable to the population of similar BMs. However, the study was able to provide insight into the environmentally sustainable practices of South African clothing and textile MSMEs along with motivational factors and future projections for the industry. It was not intended to have the information generalisable, but rather concepts of trustworthiness and credibility were followed to position the study in relation to other projects of a similar nature. It is recommended that future studies follow a quantitative and/or mixed-method approach to investigate the 9R Framework related to MSMEs in the clothing and textile markets that employ CE, so that generalisations to the larger BMs can indeed be made.

## 1.8 Contributions

While there is a growing body of CE research into the global clothing and textile industry, there is very limited knowledge on CE for South Africa and Africa, and even less that investigates the clothing and textile industry. This study contributes to the understanding of implementation of CE practices within the South African clothing and textile industry and by proposing a framework for BMs to function within a circular model. This is particularly important due to the vast amounts of clothing and textiles that get dumped in developing economies by developed nations. The framework addresses clothing and textile BMs but does also speak to other product-focused industries and businesses. The findings of this study also contribute to understanding the adoption of CE practices for the clothing and textile sector, contributing to the limited knowledge of clothing and textile businesses in Africa. This final said contribution is of particular importance as there are likely different approaches to environmental sustainability for developing economies, compared to more established countries of the global north.

## 1.9 Chapter Outline

This study is organised to the following structure:

- Chapter 1: Introduction to the Research
- Chapter 2: Literature Review
- Chapter 3: Research Methodology
- Chapter 4: Findings Part 1
- Chapter 5: Findings Part 2
- Chapter 6: Conclusion

Chapter 1 provides the background and validation for this study. This chapter briefly outlines the issues related to the current economy and how CE could be a solution as a sustainable development model. The research aims and objects are stated, followed by an overview of the research methodology and design, ethical considerations, and limitations of the study.

Chapter 2 unpacks the significant issues of the current economic model, a brief history of the economy, and the connections and partnerships relative to developing economies and the clothing and textile sector. The chapter follows with a discussion on the CE and positions the CE as a solution for the stated issues of the current linear economic model. The South African clothing and textile sector is discussed, while also addressing the pertinent issues facing the country. Circular BMs are explored, along with an in-depth discussion of the 9R Framework and how the framework is practised within the clothing and textile sector.

Chapter 3 describes and justifies the research design and methodology employed in the study. This is in addition to a discussion of the data gathering and analysis methods, and concludes with discussion of trustworthiness and ethical considerations.

Chapter 4 discusses the findings derived from the data and refers to the framework from the literature review that guided the investigation. This chapter is organised according to the research objectives and organises data according to prominent themes found from the data.

Chapter 5 unpacks the framework of BMs that could function within a CE. The discussion focuses on clothing and textile BMs but relates to partnering industries and other product-centric businesses within the South African clothing and textile industry, as well as other manufacturing contexts. The discussion is substantiated with similar or relative practices within similar contexts or developing economies. The chapter concludes with a framework of CE BMs that operate within a closed-loop cycle.

Chapter 6 presents the conclusions directed by the found constructs of the study. The conclusions are structured according to the research objectives, to address the specific objectives. The chapter concludes with limitations of the study, contributions, and potential avenues of future research.

## 1.10 Conclusion

Chapter 1 presented an overview of the study with a discussion on some of the significant issues occurring within the greater economic model, and issues that South Africa is facing in particular. As

stated, there is limited knowledge of the progression of CE for South Africa, so there is need for more research of current practices. The literature review that follows will provide an in-depth discussion of the pertinent topics for consideration for this study. The chapter will provide the framework for guiding the investigation of the said research objectives.

# Chapter 2 Literature Review

## 2.1 The Economy: An Overview

The global economy can be defined as the summations of activities that occur within a country and between different countries (Statista 2022). The goal of the economy is economic stability, high employment, and financial growth as a result of production, distribution, and consumption of goods and services (Nieman et al. 2003: 3; Sariatli 2017; Smith 1776: 117). Economic activities are the production of goods and services, and relate to the purchasing and consumption of these goods and services (Kenton 2022; Szmigiera 2022). Within the global economy, each country functions as a singular unit, with its own industrial processes, labour market, resources, and environment. However, globalisation has enabled and strengthened the progression of international trade and collaboration to find solutions to common problems. Such interdependence can also cause drastic changes in one country's economy to affect other countries' economies (Statista 2022). This is evident with many of the global events that have occurred in recent years, like Russia's war on Ukraine resulting in a shortage of energy and commodities and the resulting increase of prices for the dependant countries' populace. Similarly, disruptions were experienced from Brexit's impact on the European Union (OECD 2022; Statista 2022). The South African economy is modelled to achieve similar ideals as the global economic model and is connected to the global economy through import and export activities.

Natural resources underpin our economies as they provide vital materials for day-to-day life and are required for almost every sector of the global economy. The current economic model is based on economic growth and is 'linear', as it is dependent on a continuous output of finite resources that are extracted, processed, and disposed of in a 'take-make-waste' model (EU 2020; Godfrey 2021, Morganti & Morganti 2021). Within this model, resource use is not designed to fully exploit the value of the said resources, and profit is determined by the difference between the product or service price and the production cost (Piu & Rossetti 2021; van Buren et al. 2016). To maximise profit, high sales volumes are prioritised in order to reduce the productive and supply chain costs (Morganti & Morganti 2021). Similarly, South Africa is characterised as having a linear economy, but is a developing country that exports resources to benefit developed nations with little returns to benefit the local economy (Godfrey

2021; Nahman et al. 2021). While global GDP (Gross Domestic Product) has doubled since 1970 (International Resources Panel (IRP) 2019), recent global economic activity has stagnated, causing the highest inflation seen in several decades. This has resulted in a grim global economic outlook, compounded by Russia's war on Ukraine and the lingering COVID-19 pandemic (International Monetary Fund (IMF) 2022). The South African economy is the second largest economy in Africa and represents 15% of the continent's GDP (Potgieter et al. 2020). However, the South African economy is plagued by stagnant GDP growth, unemployment, persistent poverty, and social and income inequality (Nahman et al. 2021). The issue of unemployment is shared with other Sub-Saharan African countries with 80% of countries with the highest unemployment rate globally being in Sub-Saharan Africa (Statista 2022). In 2022, the size of the South African economy was at pre-pandemic levels, but the problematic labour market with closely related decade-high poverty levels, and a 13-year high inflation rate, has resulted in a negative economic outlook (The World Bank (WB) 2022).

## 2.2 The Linear Economy

*"While the linear economy has been highly successful in generating material wealth in the industrial nations up to the 20th century, it has demonstrated weaknesses in the new millennium and the ultimate breakdown in the near future is forecast."* Sariatli (2017)

In the last five decades, the world has been transformed by the expansion of global trade, consumption, and economic growth (World Wide Fund for Nature (WWF) 2020) supported by demand for goods and services, which has increased the demand and consumption of resources and raw materials (Morganti & Morganti 2021). Within this pursuit of economic growth, we have negated stewardship of the environment and created an economic system that is unsustainable for the environment and society (WWF 2020). Economic growth caused by the current economic model has caused significant damage to the environment and the human population (WWF 2021). This is because the current linear economic model is fuelled by a relentless demand for natural resources, which are extracted, traded, and processed into goods, and then merely disposed of as waste or emissions (IRP 2019). The increasing demand for limited resources, some of which are becoming scarce already, confront societies with the threats of dependency, shortage, and increased costs (Van Buren et al. 2016). The issue of waste caused by extraction, production, and consumption is a major global environmental and public health challenge, and this is also prevalent in developing countries such as South Africa (Fazluddin et al. 2021). South Africa is characterised as being an extractive-based economy due to its economic model mirroring that



of its international counterparts, with over-exploitation and depletion of resources due to high throughputs of resources, which end up as waste. However, this reliance on resources puts future development prospects at risk as the current economic model is too dependent on finite resources (Nahman et al. 2021; OECD 2018a). In support, the United Nations (UN) (2021) cautions that the rise of the middle class in developing countries is expected to have a significant impact on the environment and competition for certain raw materials. Developing economies like South Africa face the same need as countries of the developed world, whereby environmental and social sustainability must be improved to alleviate the economic and social costs of further environmental degradation, which could lock them further into poverty (EU, 2020). Von Blottnitz et al. (2021) report that waste flows in South Africa are relatively high. This waste is, in part, due to large volumes of extractive waste associated with exports that remain in South Africa, but is also caused by high consumer consumption rates, encouraged to support the current economic model, and poor mechanisms for material cycling (Christie et al. 2016; UN 2022; Von Blottnitz et al. 2021). Therefore, it is evident that a rethink of industrial systems and change of behaviour is required for a new economic model that would enable a more sustainable future for South Africa and global economies (Sariatli 2017; World Economic Forum (WEF) and Wageningen University & Research 2022). This would not only offer continuous growth for the nation's GDP, but also address the overconsumption of finite resources, as well as the waste management system.

### 2.2.1 Economic Partnerships

The current interconnected and dependent economic model has enabled partnerships between developed countries and developing countries with the promise of economic growth, by way of sustained income and economic development for developing countries who participate in international trade (Appelbaum 2015; WB, 2018). This also includes the textiles and clothing sector (Overseas Development Institute (ODI), 2008). While these partnerships, enabled by this economic system, have lifted billions of people out of poverty (IRP 2019; Sariatli 2017), delivering goods and services has centred around relentless extraction and use of essential resources (IRP2019), which brings the sustainability of the partnerships established within the current economic model into question. Furthermore, developing countries, like South Africa, that engage in partnerships with developed economies bear the environmental, social, and economic burden of providing resources to the global market (Nahman et al. 2021). Despite the perceived benefits of these partnerships, the result for the participating developing nations has been an increase in unethical labour and unsafe working conditions, for example the incident at the Rana Plaza in 2013 (Peters et al. 2021). In addition to this,

these trade agreements have not always delivered on the promise of alleviating poverty (National Geographic Society 2019; Rahim et al. 2014). Where trade agreements have led to economic growth, the gains in prosperity have not always been distributed equally among the benefiting population, further entrenching social inequity (Nahman et al. 2021). Moreover, societies of the developing world have experienced negative health consequences caused by environmental pollution because of the economic activities required from these partnerships (World Health Organisation (WHO) 2018). Therefore, it is vital that a sustainable economic model be established that actually delivers on promises that make international trade agreements attractive to developing nations, towards economic prosperity without environmental and social harm.

### 2.2.2 Resource Use

Between 1970 and 2017, the annual global extraction rate of resources and raw materials more than tripled, increasing from 27 billion tonnes in 1970 to 92 billion tonnes in 2017, and is set to increase with continued population growth and economic development (IRP 2019; OECD 2018a; UN 2022). Furthermore, OECD (2018a) projects that global primary resource use will increase to 167 gigatonnes in 2060, almost double the resource use of 89 billion tonnes in 2017. In 2017, Wijkman et al. stated that global resource use for a single year required 1.5 years to regenerate, meaning 50% more of the earth's resources were used than it could regenerate that year. In more recent years, this number has increased with Morganti and Morganti (2021) stating that 1.75 earths were needed to meet the demand for resource exploitation in 2019, while the WWF (2020) and the WEF (2021) have claimed that the regenerative capacity of 1.6 earths are required to provide the natural resources and ecological services that are currently used. Moreover, it has been forecast that by 2050, with the increased global population and the closely linked rise in consumption, this could increase to three to four earths (WEF 2021). These frightening statistics support the need for a more sustainable economic model that is not primarily reliant on finite, non-renewable environmental resources (Von Blottnitz et al. 2021), i.e., a linear economy.

While global resources are under pressure, the South African economic sectors and value chains are experiencing the same rapid diminishing of resources (Godfrey 2021). South Africa is implicated as a developing nation engaging in international trade due to the export of non-renewable resources that are unsustainably extracted and used in the current linear global economy (Von Blottnitz et al. 2021). A study of material flows conducted by Von Blottnitz et al. (2021) revealed that South Africa's extraction of all food, feed, materials, metal ores, and coal amounted to 875 million tonnes in 2017. South Africa's

populace generates 122 million tonnes of waste every year with about 90% of the waste landfilled (Stubbs 2021). As the ever-expanding economy has been to the detriment of the environment (McDonough & Braungart 2002: 91), it has also contributed to the growing issue of climate change because of greenhouse gas emissions.

### 2.2.3 Emissions from Economic Activity

Circle Economy (2022) estimates that 70% of all global greenhouse gas emissions are attributed to material handling and use because of production. Therefore, it is important to consider the resulting greenhouse gases from production that forms part of economic activities towards economic growth. The global economy emitted 59.1 billion tonnes of greenhouse gases in 2019 (Circle Economy 2022) and South Africa is not exempt from such overconsumption as in 2020, South Africa's CO<sub>2</sub> emissions were the 12<sup>th</sup> highest in the world, contributing 1.3% of total global emissions (Godfrey 2021). As in the case with resource use, developed countries are outsourcing the production of carbon-intensive products to outside and developing countries, shifting the emissions while still contributing to greenhouse gas emissions through import demand (OECD 2022). This practice is known as carbon colonialism (Parsons 2021). The high resource consumption and resulting greenhouse gas emissions caused by economic activities make the case for a shift in the way resources are extracted and processed. In support, The IMF (2022) advises that the global economy must emit 25% less greenhouse gases than emitted in 2022, towards meeting the goals set in Paris in 2015 and to avoid climate disruptions, highlighting the pressing issue of unsustainable resource consumption.

### 2.2.4 Resource Flows

Circle Economy (2022) quantified that in 2021, over 90% of all production materials extracted through global economic activities were used and wasted, with only 8.6 % of the remaining value of material goods being recaptured and used when disposing of the products (WEF 2022), meaning a significant loss of valuable resources. In South Africa, Nahman et al. (2021) reports that the socio-economic cycling rate, which relates to the recycling and reuse of materials within the local economy, is only 2%. This socio-economic cycling rate is supported by Von Blottnitz et al. (2021) who, in addition, report the ecological cycling rate of bio-nutrients to be slightly higher, at 5%. This means that the total material cycling rate is estimated to be only 7%, meaning an almost identical figure to the global loss of valuable resources (Von Blottnitz et al. 2021). Furthermore, Linda Godfrey, principal scientist at the Council for Scientific and Industrial Research, stated that at least 17 billion South African Rands (South Africa's financial currency)

worth of valuable secondary resources like polymer, fibre, metal, glass, and organics are lost to the South African economy as they are disposed of in landfills (as cited by Greve 2017), instead of being reintroduced into the economy. Stubbs (2021) estimates a higher loss of R25.2 billion to the South African economy due to unsustainable waste material processing. While there are pockets of high circularity within the domestic economy and informal activity around cascade use, reuse and recycling, recycling activities are not the most efficient and valuable contribution to resource preservation in South Africa (Von Blottnitz et al. 2021). Therefore, the high material cycling deficit caused by wasteful economic practices emphasises that a radical paradigm shift is needed to establish more sustainable end-of-use processing of production materials that recapture the value to fully utilise resources.

It is becoming increasingly evident that the current economic model is unsustainable and poses significant risk to South Africa's future growth (Nahman et al. 2021). Due to the unsustainable economic model, South Africa is one of the most carbon-intensive energy sectors globally and faces economic and environmental challenges while operating within the current linear economic model (Adler 2016). It is, therefore, vital that a solution be found that reduces the pressure on the resource base of our economy (OECD 2018b). Moreover, material use related to economic activities of material extraction, processing, and waste is coupled with negative environmental consequences (OECD 2018a). Therefore, it is critical that more sustainable methods of extracting and processing materials and the resulting waste are found. Furthermore, it is paramount that material use is decoupled from the environmental degradation currently occurring with these processes to preserve our natural environment and stock of non-renewable resources. Godfrey (2021) proposes a possible solution whereby a more circular economy would enable increasing sustainable resource use. However, Von Blottnitz et al. (2021) state that the South African economy, in its current form, is far from circular, meaning significant changes are required to establish a more sustainable economic model to support South Africa's growth. It is, therefore, critical to South Africa's future development that a more sustainable model be established (Godfrey 2021). One particular area of concern is that of the clothing and textile industry (Hu et al. 2014).

*"South Africa faces urgent developmental challenges in terms of poverty, unemployment, and inequality, and will need to find ways to 'decouple' the economy from the environment, to break the links between economic activity, environmental degradation and carbon-intensive energy consumption."* National Development Plan (2012)

## 2.3 The Clothing and Textile Sector

### 2.3.1 An Overview

For centuries, clothing and textiles have been a fundamental part of daily life and society by providing clothing and products. These clothes and products have been part of the global economic model, whereby they were made by millions of people and created immense economic value (Platform for Accelerating Circular Economy (PACE) n.d.). Textiles have been used to create a wide variety of fashion and apparel items with uses that expand beyond the clothing and textile sector (PACE n.d.). EMF (2017b) estimates that over 97% of material inputs for the clothing industry are virgin materials, comprising of 63% plastic, 26% cotton and 11% for other fibres, with only 2% being recycled materials from other industries, and less than 1% from closed-loop recycling from the textile industry.

Prior to South Africa's first democratic elections in 1994, the local clothing industry was an economically strong and profitable industry, sustaining 250 000 jobs in the early 1990s. This was enabled by a lack of international competition, due to the global lockdown that provided protection for local businesses, which were supported by very high tariffs that kept foreign goods from flooding the market (Berman-Jacob 2020; Patel 2016). At the time, businesses in this sector were sustained by offering very low employee wages that kept production costs down and substantial financial subsidies to support businesses, but these features were not sustainable (Patel 2016). During the late 1990s, the industry began shedding tens of thousands of jobs, followed by the sector suffering large setbacks at the beginning of the millennium due to strong competition from foreign markets (Cape Clothing and Textile Cluster (CCTC) 2022; Patel 2016). A total of 100 000 jobs were lost between 2002 and 2013 with 20 000 jobs lost during 2003 which, according to the Department of Trade and Industry, was due to increased trade with China that had undercut the local market (CCTC 2022; Nip 2004). This meant that an influx of Chinese imports priced lower than comparative goods could be produced and sold for locally, in combination with a sharp decline in unemployment and a strengthening Rand (South Africa's financial currency), resulted in a decline in exports. The South African Clothing and Textile Workers Union (SACTWU) blamed the job losses on the government's rush to relax market trade restrictions by cutting import tariffs in the mid to late 1990s (Nip 2004).

### 2.3.2 Industry Size

The global clothing and textile industry represents a USD 2.4 billion global industry, making it a significant contributor to the global economy, and employing 75 million people (WB 2019). The South African clothing and textile industry forms part of the South African Clothing, Textile, Footwear and Leather (CTFL) sector and accounts for about 2.5% of South Africa's manufacturing output (Department of Trade and Industry (DTI) 2020). Furthermore, this sector accounts for around 14% of manufacturing employment, sustaining an estimated 60 000 to 80 000 jobs, contributing around 8% to South Africa's GDP (CCTC 2022). Nip (2004) and Dladla (2016) state a higher employment number of 230 000, which includes the textile manufacturing aspect of the industry. Therefore, this industry plays an important role in local employment and is considered a highly diverse and mature industry (CCTC 2022; Fibre processing & Manufacturing, Sector Education and Training Authority (FP&M, SETA) 2014). The South African clothing and textile sector consists, in part, of niche designers that create limited runs, clothing manufacturers, and textile manufacturers with variations within each one of these generalities (Corrigall 2022; FP&M, SETA 2014). In recent years, the industry has stabilised, supported by government sponsored programmes with moderately positive growth forecasts (CCTC 2022). In addition, the Department of Trade and Industry states that the stabilisation of the industry is due to improved monitoring of imports to ensure customs compliance, import tariff compliance, and the reduction of illegal imports (Business in South Africa 2023).

### 2.3.3 Overview of the South African Industry

The South African CTFL industry is mostly concentrated in the Western Cape and KwaZulu-Natal regions with some activity taking place in Gauteng province (Business in South Africa 2023; CCTC 2022). The part of the sector in KwaZulu-Natal offers capacity and capability in fabric production and finishing, and focuses on producing mass market goods. Technological advancements have enabled local textile production to evolve into a capital-intensive industry that primarily produces synthetic fibres (CCTC 2022). South Africa's textile manufacturing capacity includes natural and synthetic fibre production, spinning, weaving, knitting, dyeing, and finishing (Business in South Africa 2023). These locally-produced textiles are sold to international markets and are South Africa's eleventh largest manufactured goods export (SME South Africa 2022). Many of South Africa's major retailers are located in the Western Cape which allows the CTFL industry within this region to offer a comparative advantage in terms of speed and flexibility to these retailers. These advantages are deemed vital in the context of the global clothing

and textiles industries trend of the 'Quick Response' supply chain model to support the growing demand to keep up with the latest trends and keep to short lead times (CCTC 2022). Coupled with the short lead times from design to delivery, the manufacturing hub of Cape Town is known for a high fashion orientation and has contributed favourably to the 25% to 30% of locally sold goods that are manufactured domestically (Business in South Africa 2023; Mail & Guardian 2014; Nip 2004). CCTC (2022) reports that the next steps for the CTFL industry are *"the deepening of lean production practices in order to maximise efficiency, and a move towards the Quick Response supply chain model in order to create a competitive advantage over foreign competition around flexibility and speed-to-market"*. These objectives are perceived to result in a boost for the competitiveness of South African products and to enable significant and sustainable growth for this sector (CCTC 2022).

#### 2.3.4 Environmental Degradation

The clothing and textile industry is criticised for its unsustainable water use, land use, and requirement of non-renewable energy coupled with manufacturing processes that are linked with toxic chemicals, waste, pollution, and social injustice (Wrap n.d.). In support, Morganti and Morganti (2021) state that the clothing and textile industry is one of the highest consuming industries of raw materials and chemical products, and is one of the main producers of waste. As such, the textile industry uses 215 trillion litres of water annually with an estimated 2700 litres of water required to produce a cotton T-shirt (UNEP 2019; World Wildlife Magazine 2014). Moreover, the United Nations reports that producing a pair of jeans requires around 7500 litres of water, which is the equivalent to drinking water for a single person for seven years (UN 2019). Business Insider (2023) asserts that 1 million pairs of jeans are created each year, meaning significant water use for this product alone. Remy et al. (2016) state that the average number of garments purchased for an individual consumer each year increased by 60%, and the increased volume of clothing is only kept for around half as long as it was 15 years ago, contributing to the wide-spread issue of textile waste (McFall-Johnsen 2020; Šajin 2022). Similarly, Souchet (2019) reports that the industry has doubled production since 2005, but clothing use has fallen by 40%. It is estimated that usable clothing to the value of USD 460 billion is discarded each year, and when these items are discarded, 73% will be buried or landfilled, with only 12% collected for recycling by way of being shredded, and made into insulation or cleaning cloths, while less than 1% will be used to create new clothing (PACE n.d.). At 20%, Koszewska (2018) states a higher percentage of clothing waste that is collected for reuse and recycling globally. Šajin (2022) indicates a lower figure of 60% that is landfilled, while McFall-Johnsen (2020) suggests an increase in this number, stating that 85% of textiles are

landfilled each year. Regardless of the lack of consensus on the matter, the fact remains that the exorbitant production rates compared with the recycling and reuse rates highlight the excessive deficit of valuable resources being wasted. Moreover, so little of what is produced annually becomes clothing again or is reused, so the deficit of clothing that is buried or landfilled poses hazards to the natural environment by way of pollution. This is evident with the pollution of micro-fibres in the ocean resulting from textile waste (Kazancoglu et al. 2020). In addition, the raw materials and chemicals used to sustain the sheer volume of production would result in high usage of these resources that are not fully utilised if the majority are discarded because of the high landfill statistics. For example, the vast amounts of second hand/discarded clothing being shipped to Ghana (Business Insider 2022). In South Africa, things are no different as the local clothing and textile industry is a sizable contributor to the issue of waste, and the country has significant waste management challenges to compound this issue (Jenkin & Hattingh 2022). Fazluddin et al. (2021) state that the clothing and textiles sector requires significant circular interventions to mitigate the industry's resource demand and waste. From this statement, the conclusion can be drawn that the issues of high resource use and significant waste are issues that plague the local clothing and textile industry, much like the greater global sector within which the local industry operates. As stated previously, the South African clothing industry is said to be moving towards adopting a Quick Response supply chain model that would create a competitive advantage of flexibility and speed-to-market over foreign competition (CCTC 2022). This model has been adopted in the international clothing and textile industry and has enabled the 'fast fashion' model that is frequently criticised as being a main contributing factor to unsustainability within the fashion industry (Business in South Africa 2023; PACE n.d.). While the aforementioned advantages of speed-to-market and flexibility could benefit the South African clothing and textile industry, there should be a focus on using sustainably manufactured materials, ethical manufacturing, producing quality clothing, and paying fair wages. In short, the industry should adopt a circular model and take advantage of its benefits, without inheriting the negative impacts that would further jeopardise South Africa's economic growth, environment and well-being associated with a linear cycle.

Textile production is a key component of clothing production, which forms part of the clothing and textile industry and should be addressed alone. It is a sizable industry that sustains supply chains, many parts of which deserve criticism. Much like the clothing industry within which it operates, the textile sector is a significant user of toxic chemicals with high resource consumption, water and energy use, and water and air pollution. There are also issues of unfair and unethical labour practices with labour rights violations and unsafe working conditions, and vast amounts of waste creation (PACE and Accenture



2021; UNEP 2020). By way of pollution, the chemicals used pollute the water system, along with detergents and micro-fibres during both the production and user phases (PACE & Accenture 2021). Heida (2014) reports that China and other Asian nations release trillions of litres of chemically damaged water that pollutes the environment. Water is used throughout textile production, for dyeing, washing, mercerizing, printing, and bleaching processes (Heida 2014). Mecurus (2023) states that yarn dyeing uses approximately 60 litres of water to dye a kilogram of yarn, while dyeing 1 kilogram of cotton requires over 100 litres. There is also the issue of decomposition of landfilled textiles. Natural fibres can take years to decompose and may release CO<sub>2</sub> gas into the atmosphere while synthetic textiles could pollute groundwater and surrounding soil through leakage of toxic substances (LeBlanc 2020).

Jenkin and Hattingh (2022) state that *some* local (South African) manufacturers have begun to prioritise transitioning to switching to organic materials, increasing the recycled content of materials, and adopting measures to reduce hazardous chemicals within textile production. Moreover, they go on to state that there have been some improvements toward reducing the environmental impact of manufacturing through efforts to reduce harmful chemicals in dye houses, and to optimise water and energy use (Jenkin & Hattingh 2022). It is important to note that South Africa is a water-scarce country, with cities such as Cape Town and Gqeberha already having faced the possibility of Day 0 associated with dried-up dams (Baker 2018). While the aforementioned does indicate the South African textile industry is making gains towards increasing sustainability, these gains are minor in the face of the major issue that is the global clothing and textile industry. South African textile production primarily focuses on producing synthetic fibres, which raises the issue of microfibre pollution during production (Business in South Africa 2023). The issue of waste closely links both sides of the clothing and textile industry with textiles generating waste materials throughout the entire production process, and waste also being generated during the production and use of clothing (Karaosman et al. 2016). To illustrate this, PACE and Accenture (n.d.) state that billions of clothing products are becoming waste due to being unsold in warehouses or stores, left unused in wardrobes, and discarded while still in a usable condition. Therefore, the way in which textiles are created and processed throughout the entire life cycle of clothing affects its impact on the environment and society (Fletcher 2014:140), meaning that its pre-consumer and post-consumer impact must be considered in the implementation of a more sustainable model.

Like many of the other sectors functioning within the current global economic model, the textile segment of the clothing and textile industry has contributed to the increase of greenhouse gas

emissions (PACE & Accenture 2021). UNEP (2020) estimated that the global apparel and footwear industry accounted for 8% of the world's greenhouse gas emissions in 2016. A contributing factor is that an estimated 23 kilogrammes of greenhouse gases are released into the environment for every 1 kilogramme of cotton produced (Remy et al. 2016). However, PACE (n.d.) advises that if garment use is doubled, a 44% reduction of greenhouse gas emissions could be achieved, positioning more sustainable consumption as a way to lessen the environmental impact.

### 2.3.5 Trade Agreements and Partnerships

As previously mentioned, the current economic model has enabled international trade agreements and partnerships to benefit nations of developing countries within the clothing and textile sector. Trade agreements within this model were made attractive with promises of prosperity for the nations included in the long-spanning supply chains (Appelbaum 2005; Keane & te Velde 2008). These agreements have been enabled by trade liberalisation and enduring cost pressures (Pucker 2022) and have resulted in the competitive advantage of the fashion industry to move to developing countries, a pattern of creating strategic manufacturing regions also seen within the bigger global economic model (Karaosman et al. 2016). Conversely, these activities have had environmental and negative societal impacts with inequalities and problems related to impoverishment in many regions of the world (Peters et al. 2021). The sporadic and expansive nature of the clothing and textile industry has meant that the industry's boundaries are spread globally with multi-layered supply chains that are complex and opaque (Pucker 2022). Over the past 30 years, the least advanced industrial nations of the world have become manufacturing production centres based on industrial models that take advantage of lower labour costs, greater availability of lower skilled labour, and less bargaining power (Piu & Rossetti 2021). As a result, very few brands own the assets of their upstream factories and most outsource their final production (Pucker 2022). As a consequence of the far-reaching clothing and textiles industry, significant environmental and social degradation occurs at various stages of global operations (Karaosman et al. 2016). South Africa is considered a developing country and these trends have contributed to challenges of sustainable economic growth as the focus is on eradication of poverty and an increase in the country's GDP.

As previously stated, South Africa has experienced an influx of cheap clothing and textile imports from other parts of the world, making it difficult for local manufacturers to compete (Berman-Jacob 2020). This should be considered in the context that South Africa's clothing and textile manufacturing industry has focused on remaining cost competitive (Jenkin & Hattingh 2022). In 2014, the CCTC blamed, in part,

the substantial textiles and wearing apparel import basket for causing employment levels to suffer in the South African clothing and textile sector (FP&M SETA 2014). This was an issue because the clothing and textile sector is an intensive employer of low-skilled labour, often in impoverished communities where there are few other employment opportunities. Not only was the reduction of employment an issue, but the scaling down of production detracted from economic growth for the country (FP&M SETA 2014; Volk 2006). In recent years, local (South African) governing bodies have been working towards establishing fair pay structures for people working in the textile and clothing industry, which has meant an increase of costs for affected businesses (Volk 2006). This has resulted in further job losses as clothing companies have moved most of their operations outside of South Africa to keep costs low, a trend seen within the greater economic model (Berman-Jacob 2020).

### 2.3.6 Conclusion

The clothing and textile industry is a significant contributor to the global economy, but as global apparel production and consumption continue to increase within the current linear economic model, terrible environmental and social impacts continue to rise (UNEP 2020; Wrap n.d.), much like the resulting impact of the bigger global economic model that this sector forms part of. Due to this industry's significant environmental impact, and health and social risks caused by activities aimed at economic growth, there is an urgent need for transformation (Jacometti 2019; PACE & Accenture 2021). Like the global textile sector, it is recommended that the South African textile and clothing industry focus on implementing sustainable interventions like increased local production to generate employment (Jenkin & Hattingh 2022). Furthermore, the linear model of take-use-dispose should be replaced by a circular economy.

## 2.4 Circular Economy

*"In the face of the global climate emergency and local economic crises, a transition to a green economy has the potential to drive sustainable economic growth in South Africa. The green economy is considered an approach to achieving sustainable development that advocates for meeting present global population needs without compromising those of future generations. It is characterised by an economy that is low carbon, resource efficient and socially equitable, and at its core aims to improve human wellbeing while drastically reducing environmental risks and ecological scarcities."* Melamu (2020)

A Circular Economy is generally related to sustainable production (Shivarov 2020), with diverse theoretical backgrounds of ecological economics, environmental economics and/or industrial ecology (Ghisellini et al. 2016) contributing. The concept of CE has a foundation that relates to the circular flow of materials through an economy and considers the economic conditions to enable the circular flow of such resources (Ekins et al. 2019). Within this realm, CE originally appeared in material flows and industrial ecology literature during the 1970s, but the field has evolved in recent years with the inclusion of inputs, concepts, and tools from other disciplines like cradle-to-cradle design, biomimicry, and economic systems for sustainable development and growth (Ekins et al. 2019; GRID-Arendal 2021). In 1982, Walter R. Stahel developed his idea of prolonging the 'use-life' of goods as a starting point towards establishing a more sustainable society that better considers the world's finite resource base (as cited by Ekins et al. 2019). As described, the concept of CE began with an initial focus on material flows to address the use of natural resources in a more efficient and sustainable manner, but has expanded to have an economic and social agenda (PACE & Accenture 2021). This change is also evident through the evolution of CE definitions, which initially addressed environmental sustainability, to become more inclusive of economic growth with societal benefits (van Buren et al. 2016). The more recent definitions of CE are discussed in the paragraphs that follow. These definitions speak of reframing economic growth objectives to promote society-wide benefits that are in harmony with the environment by decoupling economic activities from the consumption of finite resources (GRID-Arendal 2021).

#### 2.4.1 Defining Circular Economy

The concept of and literature about CE is still in its infancy, however, the outcome of an analysis of an extensive quantity of CE definitions conducted by Kirchherr et al. (2017) was that CE can be defined as *"an economic system that replaces the 'end-of-life' concept with reducing, alternatively reusing, recycling, and recovering materials in production/distribution and consumption processes"*. Geissdoerfer et al. (2018) offer a similar but more encompassing definition by stating that CE is a regenerative system in which resource input and waste, emissions, and energy leakage are minimised through the practices of slowing, closing, and narrowing material resource loops. Slowing loops is achieved through the design of long-life goods and product-life extension where the utilisation period of products is extended, closing resource cycles uses recycling methods to close the loop between post-use and production, resulting in a circular flow of resources and, narrowing loops is aimed at utilising fewer resources per product (Bocken et al. 2016; Lacy et al. 2014; McDonough & Braungart 2002; Preston et al. 2018). The

Kirchherr et al. (2017) definition includes reference to an economic system clearly stating its relevance within the economic context. Moreover, they suggest that the economic model would replace the traditional linear model by resorting to a variety of practices to extract and recover value during production, distribution, and consumption processes. Geissdoerfer et al. (2018) refer to a regenerative system that is more expansive in its application and note that production inputs and outputs are minimised through strategies to extend the life of goods, use fewer resources, and, like Kirchherr et al. (2017), apply practices to keep resource value circulating within a system. Another important factor is that the definitions are relevant to environmental sustainability. The African Circular Economy Network (ACEN) defines CE as *“an alternative model that will allow African cities to pursue their development agenda along a pathway that ensures economic growth is decoupled from use of finite materials, enabling green growth and industrialization by closing the loop of resources and by developing regenerative and circular systems”* (Local Governments for Sustainability Africa and ACEN as cited by GRID-Arendal 2021). While this definition does refer to a circular flow of resources, a common element found in the previous definitions, it is in the context of industrial development, whereby the closed flow of resources will enable industrial development. Referencing industrialisation considers Africa’s unique developmental challenges and referring to economic growth without increasing the use of limited resources refers to sustainable growth. Like the previous definitions, a regenerative and circular systemic approach is used to describe CE as a model that keeps resources circulating through renewal, regrowth, or restoration. The ACEN definition aligns with the South African government’s buy-in of a circular module for South Africa’s pathway to a more sustainable economic model, as referred to in the National Development Plan (2012).

EMF (n.d.) states that a CE is based on three principals which are to *“eliminate waste and pollution; circular products and materials at their highest value and to regenerate nature”*. Moreover, the definition of CE by EMF (n.d.) poses that CE is a systems solution framework to address global challenges like waste. Due to the challenges of environmental pollution, social harm and degradation caused by the current economic model, most definitions and descriptions reference the potential gains for pollution and regeneration of earth's natural resources. The EMF principals have similarities to the afore discussed definitions on the aspects of reducing and eliminating waste, the circulation of materials while maintaining resources at their highest value possible, and the goal of regeneration. Moreover, like the first and second definition, the EMA definition refers to a CE as a system to provide solutions to challenge global issues. To encompass the overlapping features found in the definitions it can be stated that the definitions advocate reframing economic growth objectives to rather promote an economic

model that would benefit society without harming the planet's natural systems by decoupling economic activities from the consumption of limited resources (GRID-Arendal 2021).

McDonough and Braungart (2002) propose that CE is an ideology that is intended to replace industries' current linear practice with an end-of-life concept of restoration that eliminates the use of toxic chemicals and aims for the elimination of waste through the innovative design of materials, products, and systems. In support of CE, Meyer (2011) argues that a more sustainable economic model would dissociate resource use from economic growth to minimise the environmental impact caused by economic activities (van Buren et al. 2016). This ideal is also supported by Stahel (2019:1), who states that *"the objective of the circular economy is to maintain the values, and manage stocks, of assets, from natural, cultural, human, manufactured to financial stocks. [Circular Economy] is the most sustainable post-industrial economy business model available"*. Potting et al. (2017) caution that although the ideal situation of CE is ultimate circularity, whereby a product chain is closed (i.e. a closed loop system) as the materials continuously flow into each other, that this will not be feasible in practice. However, the WEF (2022) estimates a USD 4.5 trillion global economic benefit through CE activities by 2030, motivating the economic benefit of such a circular system.

#### 2.4.2 Circular Resource Flows

Within a CE model, resources are viewed as either technical nutrients (resources), which are based on metals and non-metals, or biological nutrients, which are material resources extracted from the earth's natural ecosystem (Lemille 2021). For a CE model to optimise resource use, tight product circles are prominent for the flow of resources within a circular model. This is to circumvent the loss of embedded energy, resources, and labour (Fazluddin et al. 2021). A tight resource circle means prioritising a practice to maintain the highest possible resource value within every part of a resource cycle (Potting et al. 2017). For the circulation of resources to occur within a circular model, the practice of industrial symbiosis can be adopted whereby surplus resources generated through one industrial process are captured and redirected for use as an input for another process (Williams et al. 2018). For example, within a material flow cycle in the context of CE, materials from a discarded product should ideally maintain their original quality and be used again, resulting in no new natural resources being needed to produce new materials. Simultaneously, the discarded products would not be considered waste as they are now rather a resource within another material cycle (Potting et al. 2017). This means that surplus resources and waste output from a cycle would either be regenerated for new production/consumption

or recycled, becoming part of a new flow of resources and resulting in a save of energy and materials, as no new resources are extracted (Lin 2020). This new flow of resources is seamlessly connected to production processes in a new circular flow (Lin 2020). Therefore, the cyclic nature of circular flows within a CE prevents the value of resources from exiting the economy, resulting in less energy and resource consumption (Accenture 2020; van Buren et al. 2016). These constructs are illustrated in the diagram that follows (EMF 2019).

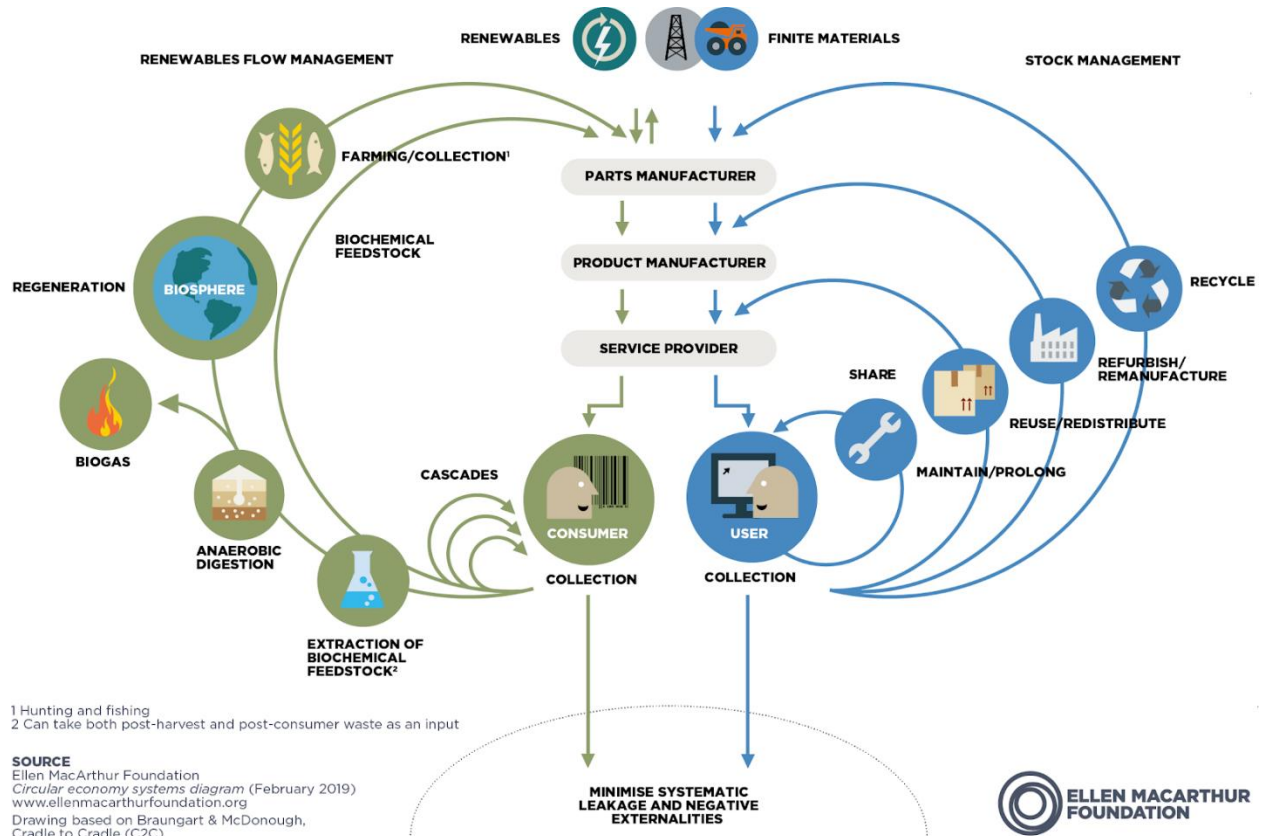


Figure 21 Circular Economy System Diagram (EMF 2019, developed from Braungart & McDonough Cradle to Cradle)

In practice, industrial symbiosis connects business within industries and across different industries that share common resources. Industrial symbiosis is prioritised by South Africa's National Waste Management Strategy as a key component to strategically managing waste streams and to reducing the pressure on landfills (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020a). Therefore, the gains of a circular model extend beyond reducing material extraction, as within a circular model all unnecessary waste materials are removed, and the consumption of energy and raw materials is reduced, with all energy and resources used for production fed back into a cycle (Stubbs 2021). Industrial symbiosis, within a CE, has the intention for industries to increase production output

with the same input, enabled by more efficient production systems, and resulting in reduced waste generation and pollution (Melamu 2020). However, there are limitations to the nature of industrial symbiosis that consider the additional energy required to enable the action of industrial symbiosis.

To address the circular flow of resources within a CE, it is important to consider the circular flow of resources within the context of a product's life cycle. Andrews (2015) proposes that a typical product's life cycle comprises of four key stages: raw material extraction, processing, manufacture, and use with end of life. A circular flow of resources reduces the supply of virgin resources as materials are kept circulating and this will eliminate the initial life cycle stage of raw material extraction. However, energy and resources would still be required for recycling or reuse (Andrews 2015). This requirement of additional energy and resources for the recovery of recycling of materials is discussed by Shivarov (2020) who states that due to increasing entropy, recycling and recovery of materials require an increase of the use of energy and resources within a circular model. This poses a limitation to recycling and recovery (Shivarov 2020). In support, Lemille (2021) states that the CE aims for a circular model that is not solely reliant on recycling and aims to limit recycling as much as possible because the sustainable mechanism of recycling does not consider reuse of the raw materials. Moreover, Lemille (2021) argues that recycling is designed to recover waste, rather than prioritise exploiting the highest possible resource value. Therefore, it can be deduced that recycling should not be prioritised as a circular solution of possible practices within a CE, as the additional energy and resources required to enable industrial symbiosis means that further resources are required with a loss of resource value.

#### 2.4.3 Circular Economy as a Sustainable Development Model

The section that follows will consider CE as an answer to sustainable development that considers social, environmental, and economic sustainability. It has been widely proposed that the CE could be a solution to a more regenerative and sustainable economic model that would aid in fully realising opportunities for environmental and economic prosperity to benefit society (EMF 2015; International Institute for Sustainable Development 2020; Sariatli 2017; McDonough and Braungart, 2002:91; Wijkman et al. 2017; WHO 2018). More specifically, van Buren et al. (2016) state that CE has great potential to create new employment opportunities to benefit societies and environmental resilience for better stewardship of the environment (Geissdoerfer et al. 2018). Wright et al. (2019) motivate that CE has the potential to be a path for sustainable development for low to middle income countries, such as South Africa. The South African government has highlighted a green recovery plan with the priorities of sustainability, resilience,



and inclusion as the framework for rebuilding and growing the economy (GRID-Arendal 2021; Richards 2020; UNEP 2013). This framework is aligned with the National Development Plan 2030, the National Waste Management Strategy, and the Low-Emission Development Strategy (GRID-Arendal 2021). Therefore, it is important to consider the potential benefits of CE within the context of sustainable development for South Africa. The CE in South Africa is poised to provide opportunities for low-carbon, sustainable and resilient economic growth with a future-proof economic system to address South Africa's three prominent challenges of social and economic inequality, poverty, and unemployment (Nahman et al. 2021). Like the anticipated impact for the global economic model, a CE for South Africa would aid in job creation and lead to greener and cleaner industries (Potgieter et al. 2020). Moreover, a circular model could be a pathway to social, economic, and health co-benefits (Wright et al. 2019). Richards (2020) outlines key gains which could be made through reducing South Africa's over-reliance on virgin input material that entail new industry markets and skills development opportunities. The South African government has recognised the opportunity that a CE for South Africa is inclusive of economically marginalised segments of the population (Potgieter et al. 2020). In the bigger picture, the CE provides the means to meet international climate commitments and to achieve the Sustainable Development Goals (SDGs) that are recognised by the South African government as guidelines for interventions for these challenges (The Department of Science and Innovation (DSI) n.d.; Statistics South Africa 2019). Wright et al. (2019) motivate that CE strategies could provide the means for South Africa to leapfrog to a more sustainable development economic model, which would mean achieving the gains of a more sustainable model without the negative impacts associated with economic growth from the linear economy.

#### 2.4.4 Conclusion

CE is a collaborative economic model that seeks to adapt to social, economic, and environmental constraints (Lemille 2021). CE is understood as an economic model that produces neither waste nor pollution enabled by the circulation of materials at their highest quality with minimal energy input (Potgieter et al. 2020). A CE model challenges our perceptions of abundance and requires the circular flow of materials within the biosphere to restore natural capital at the end of life (Lemille 2021; Potgieter et al. 2020). The CE is inclusive of both the economic aspects of value addition, job creation and GDP growth, as well as environmental benefits of material and resource preservation, but requires that economic growth be decoupled from environmental degradation and resource use (Melamu 2020;

Potgieter et al. 2020). The section that follows will address and explore practices that would enable a circular economic model.

## 2.5 Circular Economy in Practice

This section will address practical ways and methods to enable a circulation of resources inherent to a CE model. During the design phase of a product, all possible negative unsustainable outcomes which affect future stages of the product can be prevented through strategic design decisions to enable sustainability (Kazancoglu et al. 2020). To enable this, Lemille (2021) advises that during an object's design phase, the object should be considered and thought of as a service provided to meet demand, a function that is shared and continuously evolving with potential to be added to in subsequent versions. While it is recognised that product transformation is a critical aspect for consideration towards and within a more circular model, the greater supply chain within which the product occurs must be transformed in a holistic manner (Kazancoglu et al. 2020). Moreover, Kazancoglu et al. (2020) recognise that a supply chain within a circular model is complex, dynamic, and large-scale, and consists of different elements, which should all be considered for transformation. Strategies related to resource efficiency within a circular model are discussed below. The discussion briefly touches on strategies that are explored for a general understanding. These strategies introduce practices that will focus on clothing and textiles and be explored within this context.

Many of the found practical strategies to practise within a CE centre on resource efficiency to maximise high resource use. Meyer (2011) proposes that CE can be achieved using resource efficiency strategies like the reduction of the consumption of raw materials by designing products that would enable easy reuse, prolong a product's lifespan through maintenance and repair efforts, use recyclables in products and recover raw materials from waste flows (Geissdoerfer et al. 2018; van Buren et al. 2016). Many of these initiatives are supported by GRID-Arendal (2021) with the addition of remanufacturing of used goods to achieve resource efficiency. Lemille (2021) states a practical method of making new objects from non-virgin materials that have already been extracted as raw materials to assist in resource efficiency. Remanufacturing, which aids resource efficiency, has advantages of reducing large volumes of durable materials, which in turn lessens the creation of waste and pollution.

For the local approach, the Department of Environment, Forestry and Fisheries, Republic of South Africa (2020a) states that non-biodegradable, technical materials, including plastics, metals, and industrial waste-streams, can be diverted from landfills through resource-prolonging strategies to extend the life

of these technical materials through maintaining functionality, repair, reuse, refurbishing, and recycling. Another emerging theme is strategies related to waste processing. These strategies can be considered as part of resource efficiency strategies as they deal with prolonging the use of materials, but also reframe the concept of waste as these practices enable waste materials to be used again. Lemille (2021) proposes that the life cycle of an object should be considered for longevity, together with holistic strategies that promote the durability of objects. The Department of Environment, Forestry and Fisheries, Republic of South Africa (2020a) asserts that there should be a separation of material flows at the source of the raw material, and states that this would enable maintaining the highest possible resource value and maximise beneficiation potential. Moreover, the department motivates that there are many opportunities to increase recycling within the South African economy, which seems to be moving towards more localised, decentralised beneficiation operations.

*"It is anticipated that in the future, the 'waste' sector will ultimately be referred to as the 'materials' sector as products and services are increasingly designed to keep materials within the biological and technical cycles, thus designing waste out of the system."* Department of Environment, Forestry and Fisheries, Republic of South Africa (2020b).

Accenture (2020) recognises that a single industry cannot achieve circularity alone but that it will be a collaborative effort between different value chains. In Support, Hassim (2021) motivates that collaboration across supply chains with partners from various industries presents the best opportunity to support the CE in South Africa. In support of the required supply chain transformation, the Department of Environment, Forestry and Fisheries, Republic of South Africa (2020a) states that transitioning to a CE should also improve opportunities for reuse, re-distribution, refurbishment, and repair of materials. GRID-Arendal (2021) advocates for innovative ownership/user models that enable the reuse of resources. Similarly, Williams et al. (2018) propose a sharing economy as a strategy that would enable businesses to share tangible assets among multiple users. However, an environment and infrastructure to enable sharing within an economy are required for this strategy to maximise its potential, necessitating the said supply chain transformation and general industry buy-in (Williams et al., 2018). Therefore, practising a CE in South Africa means a fundamental change of economic model, which would be achieved through resource efficiency strategies and by BMs that are based on collaboration, resource sharing, products as services, and prioritising access over ownership (Nahman et al. 2021). As can be seen from the preceding literature, there are definite benefits and opportunities associated with the implementation of a CE. These will be discussed in the next section.

## 2.6 Circular Economy: Benefits and Opportunities

*“The worldwide transformation to a circular economy entails moving from linear, highly resource depleting systems with high emissions, waste generation, and high impacts on ecosystems and natural capital, towards circular, less wasteful systems that use resources more efficiently and sustainably, while providing work opportunities and a high quality of life. This is a key contribution to the 2030 Agenda for Sustainable Development and its Sustainable Development Goals.”* European Union (2020).

The benefits of a circular model are far reaching. It has been widely agreed that a CE would answer to biodiversity loss, decreasing carbon emissions, pollution, efficient resource use, job creation, and be an all-round economic model for a sustainable future (Van Buren et al. 2016; EMF 2021b; McDonough and Braungart 2002; Meyer 2011; Williams et al. 2018). Williams et al. (2018) second job creation as a benefiting factor, while Potgieter et al. (2020) state potential benefits of a 0.8% increase in GDP with an increase of 226 000 jobs for South Africans. In a country that is rife with unemployment, officially indicated as 31%, while unofficially regarded as much higher (Statistics South African 2023), with a youth unemployment rate of 60%, such job creation opportunities are paramount. In addition, there are environmental gains to be had for South Africa by adapting to a circular model by way of a waste-free environment (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020b; GRID-Arendal 2021; Lin 2020). This is because a CE model enables the amount of pollution to be reduced as the value of circular output increases, enabling environmental protection and creating economic gains (Lin 2020). Therefore, there are environmental gains to be had for South Africa by adapting to a circular model by way of a reduction of pollution (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020b; GRID-Arendal 2021; Lin 2020). For example, the now formalised rubbish pickers that collect South Africa’s plastic waste, also known as urban waste miners, are a key part of recycling plastics and cans, and because of such practices, they get monetary compensation (South African Waste Pickers Association 2023). They are, therefore, responsible for a reduction in waste that goes to landfills, as well as a testament to an economic livelihood gained from circular actions. A circular model would also benefit a reduction in greenhouse gas emissions by increasing material flow efficiency and utilising the value of materials and products for as long as possible (GRID-Arendal 2021). Lower greenhouse gas emissions for South Africa would mean environmental gains enabled by the prioritisation of a waste-free environment (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020b; GRID-Arendal 2021; Lin 2020). A Circular Economy model is critical to reducing natural resource dependence

for the African continent and this could produce environmental gains for South Africa, as adapting to a circular model would mean conservation of finite resources (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020b; GRID-Arendal 2021; Lin 2020).

*"There is growing interest in the circular economy as a strategy for helping to achieve the Sustainable Development Goals. In low- and middle-income countries, initial case studies have shown that circular approaches hold great potential for increasing incomes, creating jobs, reducing the mortality and morbidity caused by pollution, and protecting ecosystems."* Williams et al. (2018).

Nahman et al. (2021) stress the urgency for a new development model for South Africa to initiate economic recovery, and also recognise that a CE could be a key driver of post-pandemic economic recuperation toward sustainable and resilient economic growth. Moreover, CE in South Africa has the potential to be implemented in a way that empowers poor and marginalised communities and seems to be a practical way to redesign and regenerate resource systems, contributing to advancing towards the SDGs and post-pandemic recovery (GRID-Arendal 2021; Williams et al. 2018). Wright et al. (2019) state that lower-income countries, as predominantly occurring in Africa, are in many ways already 'circular' due to the low-income setting and resulting lower levels of consumption, and lesser availability of material goods. They go on to say that these circular efforts in Africa have been informal efforts that are driven primarily by poverty and unemployment. Circular efforts occurring include activities around recycling, repair, and reuse, meaning there are opportunities for cleaner production, remanufacturing, product sharing, and the use of renewable materials for increased circularity (Wright et al. 2019). It is, however, important to note that African countries, and other developing countries, are starting to reject the waste generated by developed countries that are shipped to such countries. Many people are taking a stand and state, for example, that Africa should not be considered a dumping ground for the rich, as an influx of second-hand waste is not wanted (Louw 2022).

The green economy has received much support from government departments and is a key aspect of the National Development Plan and Waste Management Strategy (National Development Plan 2012; GRID-Arendal 2021). As discussed, CE is a way to achieve a green economy through sustainable consumption and production. However, resource flows within the South African economy would need to be reconfigured to increase the circularity within the economic model (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020a; Von Blottnitz et al. 2021). The significant quantities of waste generated within South Africa offer opportunities for waste beneficiation as part of a circular model that could contribute to the GDP if the materials currently lost to landfills can be

recovered and beneficiated (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020b). South Africa generates 122 million tonnes of waste per annum with an estimated value of R25.2 billion (Stubbs 2021). Such quantities require appropriate management to prevent a negative impact on the economy, but such quantities also have the potential to benefit the economy (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020b). Only 10% of the 122 million tonnes of waste is repurposed or recycled, with the remaining 90% landfilled, meaning a significant loss of potential resources at an alarming rate (Stubbs 2021, Peterson 2021). Of the 90% currently being sent to landfills, a significant portion is made from recyclable content, which presents job opportunities for collection and processing of materials along the value chain (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020a; Peterson 2021). While recycling does seem a viable opportunity, Lemille (2021) asserts that a circular model aims to go beyond recycling towards a model that seeks to limit it as much as possible. This finding is in line with recycling being low on the list of options to maintain the highest resource value possible, and a need to keep to tight resource loops within a circular model (GRID-Arendal 2021, Potting et al. 2017).

South Africa has a goal to achieve zero waste to landfill by 2030 and this would require a significant shift of current practice and the adoption of new processes to address recycling, reuse, and recovery (Stubbs 2021). Von Blottnitz et al. (2021) conducted a study into resource flows within South Africa and found that the current South African economy heavily relies on fossil fuels and is focused on export-oriented activities with little circularity. Therefore, the current state of the South African economy compared with the waste management goals show a significant gap, but also the potential for the repositioning of waste to become a vital resource within a circular model for South Africa. However, business models in Africa that focus on recycling face a variety of challenges relative to technological factors and limited knowledge (PACE & Accenture 2021).

To conclude, it can be asserted that a CE in the South African context can be viewed as a new source of sustainable growth that could bolster the resilience of the economy through environmental and economic contribution (DSI n.d.), and could better the lives of the citizens in general. However, for CE to be economically, environmentally, and socially successful in Africa, models should keep to the fundamental ideals of CE and focus on inclusive and society wide benefits, avoid the current linear industrial practice, and decouple non-resource extraction from economic activities (GRID-Arendal 2021). The CE can also particularly be applied to the clothing and textile industry, as this is one area of great waste generation with limited job opportunities as currently presented in its linear form.

## 2.7 Circular Economy: Benefits and Opportunities for the Clothing and Textile Sector

*“The shortage of resources such as water and energy cannot meet the growing demand for fashion apparel produced in the current linear system. Moving from linear to circular fashion may bring major benefits to the fashion industry in terms of water and energy saving, reducing emissions and resources requirements. Such a transition would drive new business models, employment opportunities and a sustainable consumer segment.”* Dissanayake and Weerasinghe (2022).

Much like the ideals of the CE model previously discussed, a CE within the clothing and textile industry is described as an industrial system with the ideals of no waste or pollution. CE for this industry focuses on the many stages of the textile process to reduce waste and environmental impacts, and includes recovery processes that contribute to the sustainability of clothing supply chains (EMF 2017b). More specifically, CE for the clothing and textile industry could mean a reduction in chemical use, dependence on finite resources, and pollution. Therefore, this model could also bring about gains for society and biodiversity (PACE & Accenture, 2021; PACE, n.d.). The transformation of the clothing and textile industry to a more circular model is both an urgent necessity and an opportunity for Africa’s pathway to circularity (PACE n.d.; WEF et al. 2021).

### 2.7.1 Benefits for the South African clothing and textile industry

To guide the transformation of the clothing and textile industry, EMF (2017b) proposes goals towards realising a circular textile and clothing system within a CE. These goals include phasing out microfibres and substances of concern; transforming the way clothing is designed and sold with the goal of moving away from the current disposable nature; improving recycling by transforming the way clothing is designed, collected, and processed at the end of use; the effective use of resources; and a move to renewable inputs. PACE & Accenture (2021) outline similar objectives for a circular textile industry whereby inputs for textile manufacturing are safe, recycled, or renewable; textiles are used for longer; and textiles are recyclable and recycled at the end of their use. Jenkin and Hattingh (2022) propose interventions for a more sustainable South African textile industry with the goal to set the value chain on a climate-compatible and sustainable path that could achieve the goals and objectives proposed by the EMF, as well as PACE & Accenture (2021). The section that follows details how the said objectives could be achieved with the proposed interventions by Jenkin and Hattingh (2022).

PACE & Accenture's (2021) first objective of making sure that *"inputs for textile manufacturing are safe"* could be achieved through the reduction and use of hazardous chemicals, and efficient water management (Jenkin and Hattingh 2022). The second objective of increasing the use of textiles could be achieved by adopting clothing and leasing models, increasing the second-hand clothing market, and by optimising manufacturing and consumer use (Jenkin and Hattingh 2022; PACE & Accenture 2021). The final objective, as proposed by PACE & Accenture (2021), of recyclable and recycled textiles could be achieved through interventions of fibre-to-fibre recycling within the South African textile industry (Jenkin and Hattingh 2022). While these objectives and strategies address some of the industry's overarching challenges to overcome, understanding how the individual parts of the industry could become more circular is key. Jenkin and Hattingh (2022) state themes for the mitigation and adaptation of the South African textiles sector's manufacturing industry for a more sustainable industry. These themes are to reduce the impact caused through processing and manufacturing of textiles and to adopt a zero waste to landfill initiative. The authors go on to outline scalable interventions to achieve a more sustainable manufacturing sector of the textile industry, which closely match the interventions that could answer to PACE & Accenture's (2021) objectives, with the addition of local sourcing of resources. It can, therefore, be said that the interventions would assist in transitioning South Africa's textile manufacturing sector to that of one that would occur in a clothing and textile sector of a CE.

The South African textile industry is recognised as a major contributor to environmental degradation, due to resource depletion, pollution, and hazardous chemical use (Jenkin and Hattingh 2022). Like the global clothing and textile industry, it is recommended that the South African textile and clothing industry focus on implementing sustainable interventions like reducing pollution, as well as reducing chemical, energy, and water use (Jenkin and Hattingh 2022). CE could answer to the necessary changes needed for a safer clothing and textile industry, as within a CE, material inputs used to make textiles do not cause harm to the environment, workers, or consumers' health during the production and use phase (PACE n.d.). This is achieved, in part, through fibre resource inputs that are renewable and safe through the reduction of chemical use and fossil fuels, resulting in less associated emissions and pollution. Moreover, textile fibres would be of a high quality and designed to last as long as possible, enabling the fibres to be redesigned into a secondary resource at the end of life, or be regenerated into another resource. Alternatively, the fibres could be returned to the biosphere or technosphere (EMF 2017b). These sustainable strategies would reduce the quantities of textiles created and the impacts caused through the current model. Therefore, shifting to safer textile inputs would protect workers' and consumers' health, and help to preserve biodiversity (PACE & Accenture 2021).



EMF (2021c) reports that BMs that incorporate circular practices in the global fashion industry have shown significant growth since 2019, and that this global market currently represents a USD 73 billion market, emphasising this growing sector of the fashion industry. This budding sector of the fashion industry has the potential to benefit the South African clothing and textile sector through economic growth, as it holds the potential for significant job creation (Bizvibe 2018). The South African government has prioritised increasing employment within the clothing and textile industry by way of a new Textile, Footwear and Clothing Master Plan for the sector, which intends to increase employment through manufacturing more locally produced goods for the South African market (Berman-Jacob 2020). Berman-Jacob (2020) states that the plan could create 120 000 extra jobs, but that this opportunity hinges on a different approach. Economic opportunities for the South African clothing and textile industry lie both in local and international trade. This is affirmed by Naumann (2001), who investigated the South African Textile Industry, and states that developing countries hold much of the world's textile manufacturing capacity, and that economic activities relative to the textile industry are key for global employment opportunities, as the global textile market is a crucial market for many upstream industries. Moreover, WEF et al. (n.d.) state an immediate opportunity for CE in Africa, whereby clothing and textile waste are converted into garments for commercial export. Therefore, within a sustainable economic model, the clothing and textile industry presents opportunities for employment and economic prosperity that would help realise the goals of the South African Master Plan.

PACE & Accenture (2021) state that the transition to a CE for the clothing and textile industry is expected to shift employment from upstream to mid and downstream, and due to the labour-intensive nature of the clothing and textile manufacturing sector, this is supportive of the notion of increased job creation as part of economic transformation brought about through the CE opportunity (Koszewska 2018; Williams et al. 2018). EMF (2017a) proposes that these opportunities lie in collecting, sorting, and improving the value of the resources used in the clothing and textile industry. In addition, research undertaken in 2021 for the African Circular Economy Alliance (ACEC) by Dalberg et al. identified that activities related to recycled garments present immediate opportunities for job creation in Africa (GRID-Arendal 2021). Within the category of recycled garments is the opportunity to repair and extend the lives of products and their components (Lemille 2021). Any strategy for maintenance, repair, reconditioning, or remanufacturing will be essential to creating employment. Lemille (2021) motivates that the African textile and clothing industry should focus on repairing as an opportunity for job creation. This is supported by Dalberg et al. (2021), who state that increased market access for recycled clothing and textiles can create thousands of jobs, particularly for women. Moreover, Walter R. Stahel

motivates that those activities related to remanufacturing of clothing use fewer resources and create a higher need for labour in comparison to manufacturing the 'virgin' equivalent (Lemille 2021).

Continuing with the discussion of job creation, Fazluddin et al. (2021) suggest the practical solution of a pre-worn clothing market that would harness underutilised clothing and would be a feasible opportunity for South Africa. However, South Africa should take caution with a pre-worn clothing model due to the crisis seen in Ghana, which has received an influx of Western cast-offs, which are sold as second-hand goods. The situation in Ghana is that approximately 40% of what is received from international countries is unsuitable for resale and is landfilled, burnt, and pollutes the environment (Business Insider 2022). There is also criticism that these second-hand imports have impacted the local textile market due to the lesser cost of the imports, which have undercut the market as textile manufacturers cannot produce to match the price of the imported clothing (Dissanayake & Weerasinghe 2022). An identical issue has occurred in the South African industry and has required significant government intervention to firstly stabilise the local market, and then grow employment and production capacity (Business in South Africa 2023). Should this facet of the industry be fostered locally, South Africa would need to establish boundaries and measures to protect the local clothing and textile industry due to the high volumes of clothing already purchased within the local economy. Moreover, it may be less invasive to keep only clothing originally purchased locally circulating within a reuse model, but this could hinder scaling these types of BMs and lead to a variety of challenges in procuring quality goods due to knowledge and infrastructure limitations. As motivation for potential consumer buy-in to support a pre-worn clothing market in South Africa, Linda Godfrey states that there is a greater acceptance and practice of reusing clothing in developing countries (cited by May 2019), but the pre-worn clothing needs to be of a good enough quality to warrant reuse, i.e. not fast fashion.

*"The practical and economic viability of textile and clothing recycling depends on many factors, including the availability of appropriate infrastructure, the type of textile product and its physical condition, the degree of wear, fibre composition, finish, garment construction...[and] how the garment has been disposed of."* Durham et al. (2015).

Ütebay et al. (2020) motivate that textile recycling is an important aspect for consideration of CE within the context of production and consumption processes. PACE & Accenture's (2021) prioritise textile recycling as a sustainable benefit for clothing and textiles that can no longer be reused, but go on to stress that upcycling should be prioritised over downcycling. Downcycling lessens the quality of the raw material fibres and, as a result, is not favoured in a circular model due to the loss of quality inherent in

this circular mechanism. Mechanical recycling makes up the current industry practice and involves the deconstruction of fabrics to produce fibres that could then be used to make new yarn, which is then used in fabric production, or appropriated for other uses (PACE & Accenture 2021). Within the South African clothing and textile industry, most fibre-to-fibre recycling is downcycled into other products, negating maintaining the highest possible value of the fibre resources and meaning a loss of resource value (Jenkin & Hattingh 2022). Jenkin and Hattingh (2022) propose encouraging reuse and increased textile recycling while using recycled fibre content within textiles. This strategy considers the approach whereby the maximum value of resources is prioritised. Moreover, the authors propose actions to achieve these interventions, whereby the clothing and textile sector should improve product durability and reparability, adopt clothing leasing models, increase the pre-worn clothing market, and promote fibre-to-fibre recycling.

Jenkin and Hattingh's (2022) interventions answer to the goals proposed by EMF for a more circular clothing and textile industry within CE (EMF 2017b). Therefore, the interventions can be considered appropriate measures towards establishing a sustainable clothing and textile industry within the South African context. Moreover, the authors go on to state that such interventions would also lower greenhouse gas emissions and in support of this, Ütebay et al. (2020) make the argument that utilising recycled fibres within production lessens pesticide and water use, and prevents pollution caused through production processes. The transition to a CE is expected to deliver social and environmental benefits for the clothing and textile industry through the reduction of chemical use, industry dependence on non-renewable resources, and pollution, as well as providing benefits to climate change, human health, and biodiversity (PACE & Accenture 2021). Unfortunately, as with any other sector, some barriers do exist to converting and promoting a CE within the clothing and textile sector. This will be discussed in the following section.

## 2.8 Circular Economy: Barriers Impeding the Clothing and Textile Sector

Hugo et al. (2021) observe that while there has been an increase in sustainable initiatives, a CE for the clothing and textile industry requires many interventions that are still far off from being implemented. There are a breadth of barriers affecting businesses operating within and wanting to transition to a CE. Some of the barriers are more generic and would affect most businesses in this context, but some are specific to clothing and textile-related entities. Supply chains within the clothing and textile industry are complicated as they involve numerous stakeholders with various interconnected processes. This

interconnected and fragmented nature has been enabled by globalisation (Hugo et al. 2021). Kazancoglu et al. (2020) describe a circular supply chain as being a large-scale system that is complex, open, and dynamic that consists of different elements and stakeholders. Therefore, there are many aspects to consider regarding the barriers that clothing and textile businesses will need to overcome to be more circular. Kazancoglu et al. (2020) further propose a framework to structure barriers to circular supply chains that will be used to organise the obstacles faced by businesses within the current clothing and textile sector. Moreover Kazancoglu et al. (2020) position the use of the framework in emerging economies, like South Africa, due to the similarity of issues existing in the textile industry of these countries.

### 2.8.1 Management and Decision

*Management and decision* is the first barrier proposed by Kazancoglu et al. (2020). A generalist view can be adopted that acknowledges that habitual behaviour by leaders within an organisation can impede the transition to a more circular model. More specifically, institutional conditions regarding material management regulations could enable or inhibit the environmentally sustainable actions of remanufacturing or recycling within organisations of clothing and textile-related entities (Ekins et al. 2020). Dan and Østergaard (2021) cite barriers for a designer within an organisation to overcome in the transition to a CE, within an organisational setting. These barriers include obstacles within the organisation that can be unique to the business entity and industry specific; structural barriers relative to missing transparency and obscure responsibility; operational barriers causing hindrances in infrastructure and supply chain; attitudinal barriers regarding the designer and organisation's perception of sustainability; and limited understanding of CE, with the latter also recognised by Majumdar and Sinha (2018). Dissanayake and Weerasinghe (2022) state that a lack of appropriate company policy hinders an organisation's transition to a function within a CE. Todeschini et al. (2017) assert that incumbent businesses are known for resource rigidity with a strong legacy of the fast fashion, high speed-to-market model.

### 2.8.2 Labour

Kazancoglu et al. (2020) state a second theme to organise the barriers that address *labour* within a circular supply chain. Dissanayake and Weerasinghe (2022) cite lack of awareness and education within the workforce as a barrier to implementing a circular supply chain, which is also recognised by Majumdar and Sinha (2018). This negatively impacts achieving sustainability as the environmental

impact of decisions is not fully considered. The barrier of labour can be considered to address current industry practice of textile sorting, which is done manually and is reliant on worker knowledge and experience (PACE & Accenture 2021).

### 2.8.3 Design Challenges

The third barrier from the proposed conceptual framework of Kazancoglu et al. (2020) addresses barriers relative to *design challenges*. Govindan and Hasanagic (2018) found that organisations experience problems in solving technological issues because products are not designed using environmentally friendly technology, resulting in limitations in environmental gains. In addition, the clothing and textile sector faces challenges of how to extend product durability and increase service intensity (Koszewska 2018). There is also the matter of poor-quality goods that are not designed for reuse (Geyer et al. 2007). It has also been found that design for disassembly is a limitation. Design for disassembly enables garments to be easily deconstructed so that the components that make up the garment can be reused, recycled, or remanufactured. In order to disassemble a garment more easily, there should be fewer seams, which offer gains in disassemble time, and bigger fabric pieces that offer gains for redesign or remanufacture into new garments or garment components while minimising waste (Dissanayake & Weerasinghe 2022). Designing out waste from the production cycle is a design challenge in and of itself (Colucci & Vecchi 2020).

### 2.8.4 Materials

*Materials* are proposed by Kazancoglu et al. (2020) as the fourth barrier. Koszewska (2018) states that textile (materials) waste has two main sources, namely pre-consumer waste that is generated during manufacturing, and post-consumer waste that is generated by consumers from worn, damaged or unwanted clothing. Regarding pre-consumer waste, the author describes issues of water and chemical consumption of textile manufacturing where fibre growth, wet pre-treatment, dyeing, and finishing are described as barriers. In addition to this, barriers occur when pre-consumer waste is generated during manufacturing as textile products and clothing that do not meet the specified standard are considered 'waste'. In terms of post-consumer textile waste, a barrier for clothing and textile businesses within a CE model are the plethora of low-quality garments with poor durability that are unsuitable for reuse and recycling, meaning that there needs to be appropriate material selection to allow for easier recovery of resources (Dissanayake & Weerasinghe 2022; PACE & Accenture 2021). The issue is that fibre blends are not easily recyclable due to the required separation that is technically challenging, costly and energy

intensive to achieve, with the contribution factor that textiles made from unseparated fibre blends yield low-quality products (Dissanayake & Weerasinghe 2022; PACE & Accenture 2021). The African clothing industry has experienced an influx of low-quality material imports that are sold within a reuse model (Business Insider 2022). The low-quality materials impact the reuse and circularity potential as this is dependent on the quality of the raw material (PACE & Accenture 2021). Koszewska (2018) cites that effective waste management is required to overcome this barrier, and that this is dependent on decisions made during the product design and development phase, meaning that decisions should be made to enable and favour the recyclability of textile waste. To conclude, the author motivates that material intensity, dispersion of toxic substances, enhancement of the ability to recycle, and maximisation of renewable resources are challenges for the clothing and textile industry that are relative to materials. In response to the barriers, Jenkin suggests that recyclability and longevity guidelines be adopted for South Africa, as has been practised with international counterparts (cited by Parker 2022).

#### 2.8.5 Rules and Regulations

The fifth barrier proposed by Kazancoglu et al. (2020) addresses challenges related to *rules and regulations*. This barrier can be interpreted as meaning the requirement of supportive policies and regulations that support a transition to a circular economy. Producer Extended Responsibility is a scheme that involves holding producers in the manufacturing of raw materials or products accountable for the waste and processing of materials (OECD n.d.). Policies to address Producer Extended Responsibility would regulate how producers dispose of waste, but would also specify processes for waste collection and sorting (Koszewska 2018). In South Africa, much of the proposed gains within this strategy deal with the general waste sector, which does not include clothing and textile by-products and waste, despite the call by Jenkin for schemes of this nature to be addressed regarding trade and industrial policies for South Africa (cited by Parker 2022). The lack of attention to address this issue in this sector is a limitation in and of itself. Producer Extended Responsibility is gaining popularity globally and is regarded to play a significant role within CE, as it is considered a strategy towards achieving a circular economic model (Crocker 2018; Dan & Østergaard 2021; Lin 2020). Producer Extended Responsibility would necessitate supportive infrastructure (Koszewska 2018). Ekins et al. (2020) motivate that inconsistent policies and messages contribute to the challenge of how to transition to a circular model. Meanwhile, Majumdar and Sinha (2018) assert that complex government regulations contribute to this barrier. In response, Govindan and Hasanagic (2018) state that the government has a

key role regarding how CE is implemented in supply chains and should, therefore, make laws and policies to regulate organisations.

#### 2.8.6 Knowledge and Awareness

*Knowledge and awareness* is the sixth barrier (Kazancoglu et al. 2020). SWITCH Africa Green and UNEP (2020) refer to gaps in technical skills that enable CE capacity and skills development, while also acknowledging a general lack of public awareness and understanding of CE, which is supported by u Plessis (2022). The lack of awareness is seconded by Koszewska (2018) and Kirchherr et al. (2017) as 'behaviour and education' is cited as a barrier in closing the loop within the clothing and textile industry. Therefore, the unknowing consumer is implicated in overconsumption, and the resulting waste (Colucci & Vecchi 2020). Freudenreich and Schaltegger (2020) discuss that even if the consumer can be swayed to more sustainable consumption behaviour by sustainability-related information, this is likely to be insufficient for most consumers. The Department of Environment, Forestry and Fisheries, Republic of South Africa (2020b) highlights that education and skills are critical for the adoption of CE with upskilling requirements for traditional jobs, along with reskilling to prepare for the different circular economic system of CE. Another contributing factor that Kirchherr et al. (2017) found is that discussions related to CE are most often restricted to environmental departments of companies, with many of the more prominent divisions of an organisation having little interest in the topic, resulting in CE still being primarily a niche discussion within companies. Govindan and Hasanagic (2018) state the barrier of reverse logistics as a challenge that requires knowledgeable managers and decision makers to establish supply chains that are equipped to return goods to their producers. Ekins et al. (2020) state that *"knowledge and organisational practices have significant impacts on the ability of organisations and individuals to undertake CE measures, and the existence of pre-existing relationships with other actors, for example to facilitate industrial symbiotic relationships, can be significant drivers, with the absence of such relationships correspondingly having the potential to create barriers"*. Recycling is a strategy to keep resources circulating within a circular system, but PACE & Accenture (2021) have found that there is an inadequate knowledge base for textile sorting, which is the first stage of textile recycling. Textile sorting is a key stage within the recycling process to achieve high-quality recycling output. The textile sorting phase's importance is elevated in the cases of post-consumer textiles, which are a significant contributor to textile waste. Inaccurate labelling contributes to this barrier as fibres cannot be easily identified. These challenges further incur challenges in scaling textile sorting. There are also issues around quality assurance and human error with the current practice of manual sorting because of a lack

of knowledge within the labour force (PACE & Accenture 2021). To conclude, Koszewska (2018) states that the speed and scale of the transition to a CE model is contingent on knowledge and awareness.

### 2.8.7 Integration and Collaboration

A common barrier identified from the literature is the requirement of *integration and collaboration* (Accenture 2020; Hassim 2021; Nahman et al. 2021; Shivarov 2020). Accenture (2020), Shivarov (2020) and Kirchherr and Piscicelli (2019) collectively agree that circular BMs will not be successful in individual industries and thus, require collaboration with the greater economic model. Furthermore, they state that collaboration is needed from a variety of stakeholder groups, as well as between value-chain segments. Shivarov (2020) supports this notion by raising the issue that new circular BMs within the same industry will not be able to absorb material flows from previous technological and business products and services that have become obsolete, necessitating collaborating industries. The barrier of collaboration is supported by Kazancoglu (2020), who states that integration and collaboration are barriers for circular supply chains within the clothing and textile industry. For collaboration to take effect, a rethink of industrial systems and governance is required (WEF and Wageningen University & Research 2022). There is also the consideration of the consumer markets' willingness to engage with the CE (Kirchherr et al. 2017; Koszewska 2018). Therefore, this requires unprecedented collaboration among manufacturers, retailers, users, and governments to establish a value chain of clothing and textiles that is aligned around a shared vision (WEF and Wageningen University & Research 2022). Considering collaboration for global supply chains, or *supply cycles* within the context of CE, the EU (2020) states that suppliers in developing countries would also need to adopt circular business practices to create effective links between MSMEs, who participate at the latter stages of global value and supply chains.

### 2.8.8 Cost

The seventh barrier of *cost* addresses costs related to business models, materials, production, and consumers. Business models with circular supply chains veer from the conventional counterpart, so they don't have a proven track record (Ekins et al. 2020). This means that there is increased difficulty in procuring financing, making the perceived financial risk of the business model higher (Ekins et al. 2020; Kazancoglu et al. 2020). A further inhibiting factor is the likely resulting high upfront investment (Ekins et al. 2020; Kirchherr et al. 2017; PACE & Accenture 2021). Ekins et al. (2020) make the case that sometimes CE initiatives are simply not cost effective due to the costs of materials, labour, and insufficiently high rates of return on investment. The matter of financial capacity and lack of economic



benefit is also motivated by Majumdar and Sinha (2018). Another factor deals with businesses not having a strategy for reducing their production while continuing to profit financially (Govindan & Hasanagic 2018). Challenges faced by sustainable clothing and textile business models are higher costs for new business ventures with additional capabilities of customer service, accounting, and legal departments. In this vein, business models that focus on renting or reuse may have higher costs for additional transport, cleaning, and distribution compared with the conventional retail equivalents (Kazancoglu et al. 2020; PACE & Accenture 2021). Jia et al. (2020) found that SMEs in the clothing and textile industry in particular faced financial constraints.

To remedy the barriers associated with cost, there have been calls for private sector investment along with innovative types of business models (PACE & Accenture 2021). Moreover, incentivising the CE is recommended with policy tools to encourage access to financing (SWITCH Africa Green and UNEP, 2020). Kirchherr et al. (2017) support that government intervention should address these barriers. The Department of Environment, Forestry and Fisheries, Republic of South Africa (2020b) agrees that circular BM needs assistance in the transition to circularity by way of business support schemes to promote access to capital, profitability, and markets. Jia et al. (2020) motivate that significant financial support is needed for new infrastructure implementation and staff training. Kirchherr et al. (2017) found that low virgin material prices, in comparison to the higher priced recycled counterpart, is a barrier faced by sustainable business models. This price deficit is supported by the claim that materials with recycled components still represent a niche market (Dissanayake & Weerasinghe 2022). Hugo et al. (2021) state that there are more barriers that keep consumers from adopting sustainable fashion than factors that bring them closer to sustainable consumption habits. This is, in part, caused by sustainable goods being of a higher price and not commonly bought by a price sensitive consumer.

#### 2.8.9 Technical Infrastructure

*Technical infrastructure* is the final barrier cited by Kazancoglu (2020). Ekins et al. (2020) state that supply chain constraints exist for circular BMs. These constraints consist of the lack of proven technologies (Majumdar and Sinha 2018) to implement CE, along with infrastructure capacity of location and space (Ekins et al. 2020; Kirchherr et al. 2017). Within the greater clothing and textile supply chain, there are barriers to effectively collect and sort textile and clothing. Textile sorting is an aspect of the industry that is labour and skill intensive and does not have sophisticated sorting technological infrastructure to enable accurate and speedy sorting. The barrier of textile sorting impacts how much textile waste is recycled as sorting is the initial step in the process of recycling (Dissanayake &

Weerasinghe 2022). In support, Koszewska (2018) reports that only between 15% and 20% of textile waste is recycled, while the remainder is landfilled or incinerated. This statistic could be influenced, in part, by the lack of adequate textile sorting infrastructure. Mechanical recycling of cotton is the current dominant form of textile recycling locally, and a limiting factor is that the process shortens the length of the fibre, resulting in a lower quality, referred to as downcycling (Hawley 2006). South Africa faces challenges of costly machine upgrades and the purchasing of new technology to make textile recycling gains for the local industry. In addition, accessing more environmentally-conscious feedstock for recycling comes at a high cost due to the associated logistical network required (Jenkin cited by Parker 2022). An overarching challenge impacting the barriers of collection, sorting, and recycling is that there is little infrastructure in place to support these processes (PACE & Accenture 2021). Furthermore, establishing these processes is, therefore, dependent on a common vision between manufacturers, retailers, and governments, and contingent on collaboration and establishing a value cycle rather than a value chain.

#### 2.8.10 Calls to Action

To address these barriers, Dissanayake and Weerasinghe (2022) state that the textile and clothing supply chain requires a redesign to make it more circular and to participate in the circular flows inherent to a circular model. This sub-section will conclude with assigning calls to action proposed by PACE & Accenture (2021) to overcome each of the barriers and optimise the impact of the transition to CE for the textile and clothing industry.

The call to action of incentivising and supporting design for longevity and recyclability could address the barriers of materials; rules and regulations; design challenges; integration and collaboration; and technical infrastructure. The call to action to produce virgin natural fibres sustainably could answer to the barriers discussed regarding materials, and rules and regulations. Encouraging the market to increase its use of existing clothing owned by the user could also speak to the barriers discussed regarding materials, and knowledge and awareness as stated by PACE & Accenture (2021). Lastly, PACE & Accenture (2021) propose a call to action to guide and support new business models for environmental, financial, and social sustainability that could address the barriers discussed regarding rules and regulations, knowledge and awareness, and costs. PACE & Accenture (2021) go on to state that strategic planning of collection, sorting and recycling operations could speak to the barriers associated with management and decision, integration and collaboration, rules and regulations, labour, materials, knowledge and awareness, and technical infrastructure. Increased efficiency and quality in

textile sorting is a call to action that could address the barriers associated with labour; materials; knowledge and awareness; integration and collaboration; and technical infrastructure. PACE & Accenture (2021) propose that recycled fibres should be made market competitive, which could speak to the barriers aligned with cost; design challenges; materials; integration and collaboration; and technical infrastructure. A final call to action proposed is to integrate and advance decent work in the transition for CE of textiles. This call to action could address the barriers of labour, rules and regulations, and knowledge and awareness.

## 2.9 Circular Design

*"Circularity gives us the tools to transform our linear economy into one where waste and pollution are eliminated, products and materials are reused and nature is regenerated. If we integrate circular strategies into our economies based on...flows, we will ultimately require fewer materials and emissions to live."* Circle Economy (2022)

Circular Design (CD) is a design philosophy that is a sustainable design approach whereby the minimisation of raw material use is prioritised by keeping materials circulating in closed loops (IDEO and, EMF 2022). As with CE, CD aims to slow, close, and narrow resource cycles (Twyg 2019). Therefore, business entities that participate in a CE employ CD practices. Between 80% and 90% of the environmental and economic costs of a product is determined through decisions made during the design phase of a product's production (Andrews 2015; Vecchi 2020). As products within a CE should, ideally, travel through multiple resource loops, designing for circularity from the product's inception can minimise the cost of the production resources and energy required (WEF 2022). CD techniques can aid in making clothing more durable and easier to repair, upcycle, remanufacture, and disassemble to recover valuable materials and components, as is key to a CE (Niinimäki 2018). Moreover, extending the useful life of clothing and textiles would enable efficient resource flows that would lead to more sustainable resource use, and a reduction of waste flows along the value chain (Dissanayake & Weerasinghe 2022). Therefore, CD encompasses practices that would keep materials circulating in closed loops within a CE model. Keeping materials circulating in closed loops can be achieved through design practices that include reuse, repair, remanufacture, refurbishment, or recycling, all with the goal to extend the product's life cycle (Medkova & Fifield 2016). Slowing the way resources are processed within a CE can be achieved through the design of long-life goods and product life extension, where the utilisation period of products is extended. Closing resource cycles can be realised by using closed loop

recycling methods between post-use and production, resulting in a circular flow of resources, and narrowing resource loops aimed at utilising fewer resources per product (Bocken et al. 2016; Lacy et al. 2014; McDonough & Braungart 2002; Preston et al. 2018). This then brings the discussion of the CE to the 9R Framework, which will be used as the framework proposed for the current study.

## 2.10 9R Framework

### 2.10.1 R Framework Evolution

The 9R Framework, which will be used as the framework for the current study, has its origin as the 3R Framework. The 3R Framework encompasses circular ideals around Reduce, Reuse, and Recycle (Östlund et al. 2020; Stahel 2019; Su et al. 2013). What began as the 3R Framework progressed to include more circular strategies and became the 6R Framework consisting of Reuse, Recycle, Refuse, Repair, Rethink, Recover, with the addition of the Rethink strategy to establish the 7R Framework (Kirchherr & Piscicelli 2019; Östlund et al. 2020; van Buren et al. 2016). The 7R Framework then evolved to become the 9R Framework with additional circular strategies that could be collectively applied as *“a generic model based on maximising the utilisation of the resource and product, in order to achieve a more sustainable production capacity”* (van Buren et al. 2016). From this statement, it is evident that the strategies have a product-centric focus towards achieving sustainability of production through more efficient resource use. The 9R Framework includes circular strategies of Recycle, Reduce, Refurbish, Refuse, Remanufacture, Repair, Repurpose, Rethink, and Reuse (Kirchherr & Piscicelli 2019; Östlund et al. 2020; van Buren et al. 2016).

It can be stated with a simplistic view that a CE model is shaped by the three Rs of Reduce, Reuse, and Recycle (Koszewska 2018). Situated at the core of the ideals proposed through CE is the 3R strategy of Reduction of resources, Reuse, and Recycling (Ceschin & Gaziulusoy 2016; Stahel 2019; EMF 2017b). The 3R Framework addresses actions that are applied throughout the whole value cycle of production, consumption, and return of resources (Koszewska 2018). It can, therefore, be said that the 3R Framework focuses on environmental aspects of sustainability, due to resources being central to its underpinnings, and negating social and economic considerations (Ceschin & Gaziulusoy 2016). In addition, this approach only considers the product life cycle, and not flows of energy within a product's life cycle. Interventions to achieve environmental sustainability using the 3R Framework occur at product level, where solutions are developed and implemented by an individual actor. These interventions focus on environmental sustainability problems in isolation (Adams et al. 2016; Ceschin &

Gaziulusoy 2016). A large system-level change has led to a new understanding of sustainability as a social-technical challenge (Adams et al. 2016; Ceschin & Gaziulusoy 2016). A socio-technical challenge appreciates complex systems where 'people-centred' aspects of sustainability are at the fore. This has meant that within a socio-technical system, sustainable strategies consider the role of users, communities, and various actors (Adams et al. 2016; Ceschin & Gaziulusoy 2016). Moreover, issues of labour conditions, poverty alleviation, social cohesion, and general quality of life are also considered within the socio-technical system. However, these considerations are not the focus of this study's investigation. It is recognised that the socio-technical system is complex and potentially requires a stakeholder value chain that consists of a variety of linked socio-economic actors like users, policymakers, NGOs, and consumer groups that are linked through an interwoven set of innovations (Ceschin & Gaziulusoy 2016). Shivarov (2020) motivates that the existing CE literature sidelines social and cultural dimensions of CE, and this is supported by the small percentage of CE research that originates from social and humanities backgrounds. Lastly, Shivarov (2020) states that researchers and advocates of CE are taking a technological path to achieve sustainability. From these criticisms it can be deduced that technological considerations are still prioritised, even though constructs of sustainability have expanded to be inclusive of social considerations. This is supported by the initial said definitions of CE that speak mostly to environmental sustainability with later definitions speaking to social needs, along with an overarching umbrella solution for a sustainable development model, as discussed in the definition of CE.

There are contributing factors to the evolution of constructs around sustainability and the different versions of R Frameworks. Constructs around sustainability and the said R Frameworks have evolved to better meet the needs of nations and countries that have applied them as guidelines for sustainability gains (Guy & Kibert 1998). These guidelines are in place to address new recommendations for improvement based on practical applications, and to improve directives and policies (Guy & Kibert 1998; United Nations Department Of Economic And Social Affairs 2007). The evolution of sustainability and the R Frameworks has responded to the growing dimensions of sustainability, and the complex interactions within sustainability strategies themselves (Guy & Kibert 1998). This development enabled the prediction of requirements of sustainability and led to the lessening of sustainability challenges within design for system innovations and transitions (Ceschin & Gaziulusoy 2016).

### 2.10.2 9R Framework

Within the 9R strategy framework, each strategy has its own characteristics, but some strategies can be grouped as they exhibit common attributes. Refuse, Rethink, and Reduce allude to smarter product use and manufacture; while Reuse, Repair, Remanufacture and Repurpose aims to extend the lifespan of a product and its parts; and lastly, Recycle and Recover refer to useful application of repurposing materials (Kazancoglu et al. 2020; Kirchherr & Piscicelli 2019; Potting et al. 2017). These strategies consider the product chain of the product or service within the businesses.

These R strategies are ordered and prioritised from high circularity (high sustainability) to low circularity (low sustainability). Higher circularity means materials remain in use for longer periods and could potentially be applied again after the product is discarded, preferably maintaining the original quality (Potting et al. 2017). Another way to consider a high circulation rate is to consider that more secondary materials are substituted for primary raw materials (Shivarov 2020). This means that, in principle, fewer natural resources are required to create new materials used for manufacturing products and their subsequent use. As a guideline, more circularity equals less resource extraction and production of materials (Potting et al. 2017). The 9R Framework strategies by Potting et al. (2017) are ordered, grouped, and described accordingly.

### 2.10.3 R-Strategies for Smarter Product Use and Manufacture

Geissdoerfer et al. (2018) assert that strategies, or practices, of smarter product use and manufacture take place when a product or service is conceived, designed, and developed. This group of strategies enable other strategies that make up the R Framework. As the strategies of Refuse, Rethink, and Reduce inform design decisions prior to production taking place, the design decisions enhance the reuse or disassembly of a product (Geissdoerfer et al. 2018).

**Refuse** is to “*prevent the use of raw materials*” (van Buren et al. 2016) whereby the use of a certain product, or the product itself, is made redundant. To achieve this, the function of the product is abandoned, or the same function should be offered by using another product (Kirchherr & Piscicelli 2019; Potting et al. 2017). Due to the extensive use of water in textile dyeing, waterless (or almost waterless) dyeing technologies have been developed that significantly limit the requirement of water, a key resource in textile dyeing, in textile production (Heida 2014). These advanced dyeing techniques make use of air dyeing and supercritical fluid dyeing, which are waterless dyeing technologies (Mecurus 2023). In these cases of textile dyeing, the quantities of water are reduced due to the advent of the said

technologies. Colucci and Vecchi (2020) assert that Smart-Indigo dyeing processes prevent traditional water consumption inherent to traditional denim textile dyeing. A strategy to limit or refuse additional materials is to design in a mono material, whereby only a singular fibre is used to produce the garment, requiring closures and garment details to be replaced by an identical fibre, refusing the use of common trim applications (Norris 2019). A practice of refusing raw materials is to reuse an existing component of clothing through manufacturing (Atasu et al. 2008). WRÅD, the company that produced the Graphi-Tee, reused industrial graphite to dye their product, refusing traditional dye resources (Colucci & Vecchi 2020).

**Rethink** is to use products more intensively and in different ways, such as product sharing (Kirchherr & Piscicelli 2019; Potting et al. 2017). As found in the clothing and textile industry, a rental service by the name of Dress You Can allows consumers to rent items while also providing monetising opportunities to their clients for their unused clothing items (Dress You Can as cited by Colucci & Vecchi 2020). South African businesses Style Rotate and Noa Rental offer a similar rental service where clothing is rented for a period, enabling an increased and shared product use (Noa Rental 2022; Style Rotate 2023).

**Reduce** is to reduce the use of raw materials by prolonging the lifespan of products (van Buren et al. 2016), resulting in a decreased need for products and the dependent production resources. This strategy allows for the optimisation of resources and energy (Kirchherr & Piscicelli 2019; Potting et al. 2017). In addition, reduction techniques imply that fewer natural resources are required, reducing resource input and waste output. Candiani Denim is an Italian denim wear brand that separates waste generated through production, meaning that the waste is not sent to landfill and is repurposed, resulting in a reduction of the raw materials required to produce the denim fabric that is then used (Candiani Denim as cited by Colucci & Vecchi 2020). Zero Waste Daniel uses textile waste to construct and add decorative details to the clothing produced by the brand, reducing the required resources for production (Zero Waste Daniel 2023). Heida (2014) discusses new waterless dyeing technologies, whereby water use in textile dyeing is almost zero, meaning a reduction in chemical use for this process. In addition, there is also the added benefit of this process requiring less energy. Therefore, recycled fibre enables the reduction of virgin raw materials as less virgin fibre is needed.

#### 2.10.4 R-Strategies to Extend Lifespan of Products and their Parts

The strategies of Reuse, Repair, Refurbish, Remanufacture, and Repurpose are strategies to retain finished goods and their parts while maintaining or improving their value. These strategies are

contingent on market receptivity, well-functioning reverse logistics, and profitability for all collaborating users involved. Repair, Refurbish, Remanufacture, and Repurpose all aim at reversing or postponing obsolescence. A product can be remanufactured, refurbished, or repaired, but cannot be subject to these treatments simultaneously (Geissdoerfer et al. 2018).

**Reuse** is the reuse of a product that is still in good condition and fulfils its original function by another consumer (van Buren et al. 2016; Potting et al. 2017). Van Buren et al. (2016) describe product reuse as being second-hand or as a shared product, which is supported by Potting et. al. (2017), who state that product sharing extends the lifetime of products through sharing the use of the product. Reuse can also be achieved by using a discarded product which is still in a good condition and fulfils its original function again. This strategy allows for the minimisation of resource, energy, and labour consumption (Kirchherr & Piscicelli 2019; Potting et al. 2017). As applied in the clothing industry, businesses that resell goods and clothing rentals are considered practices of Reuse (Hugo et al. 2021). In the clothing industry, the company ThreadUp is a retail brand for second-hand garments (Segran 2023). Business Models that resell extend the life span of clothing as these items have increased usage (Hugo et al. 2021). In South Africa, Vintage Love, Vintage and the City, and Vintage Lover resell second hand clothing items (Vintage Love n.d.; Vintage Lover n.d.; Vintage and the City 2023). Stahel (2010) asserts that reuse requires quality checks to eliminate defective goods from returning to use. In line with this, Vintage and the City (2023) refers to quality standards in its product offering.

**Repair** is to apply maintenance and/or repair techniques to deficient or damaged products and their components to achieve increased longevity (Kirchherr & Piscicelli 2019; Potting et al. 2017; van Buren et al. 2016). Stahel (2010) includes that repairs are to correct minor defects and wear and tear, so these interventions are not significant. As applied to clothing, repairing or mending clothes is a way to extend the lifespan of clothing (Hugo et al. 2021). Durrani (2018) investigated mending workshops in New Zealand that facilitated teaching repairing techniques to attending consumers. Locally, the denim wear brand Levi's offers repair services at select stores (Levi's, 2019). Repair methods fix worn, damaged or not-for-purpose (size, fit, style) clothing, whereby items are returned to a usable or presentable condition. McQueen et al (2023) assert three broad types of Repair categories. The first being self-repair for repairs carried out by the owner of the clothing item; the second type is a paid repair service from a professional tailor or mender; and the final is a repair that is carried out without payment.

**Refurbish** is to revive an old product to give it new life so that the product is transformed into an updated or revived product (Kirchherr & Piscicelli 2019; Potting et al. 2017; van Buren et al. 2016).



Refurbishing is equivalent to reconditioning, which means that an old product is restored. This strategy addresses modernising or upgrading the product's function (Geissdoerfer et al. 2018). Levi's offers customers the opportunity to customise and personalise their purchased denim wear, producing an upgraded product (Levi's 2019).

**Remanufacture** is to create new products from old products, or parts of old products (van Buren et al., 2016). This can be achieved through using second-hand or discarded products with their former attributes (Kirchherr & Piscicelli 2019; Potting et al. 2017). Atasu et al. (2008) describe remanufacturing processes where components of used products are replaced to bring the product to a like-new condition, recovering value from the used products. Moreover, the authors assert that this improved product usually has the same functionality as a new product. Geyer et al. (2007) describe Remanufacture as a strategy to recover value from end-of-use products where their durable components are utilised for the remanufacturing of a product with the same functionality, as stated by authors Kirchherr and Piscicelli (2019) and Potting et al. (2017). Geissdoerfer et al. (2018) also support this understanding and refer to Remanufacture as second-life production. In terms of textiles and clothing, fibres and materials can be remanufactured as materials or clothing (Lappi 2021). Sinha et al. (2016) define remanufactured fashion as *“the process of remaking used clothes into new clothing that is at least equal to if not better than the original manufacture specifications from the consumer's perspective”*. The authors go on to state that the remanufactured garment should carry labelling to state the intervention carried out, which could hold relevance to the consumer or hinder remanufactured clothes' adoption. However, in contrast to Atasu et al. (2008), Sinha et al. (2016) assert that the remanufactured product could differ in its original identity, design, and function from the original product. Dissanayake and Sinha (2015) expand upon Sinha et al.'s (2016) definition, stating that remanufactured garments or products use post-consumer and post-industrial textile waste. The latter consists of waste material resulting from the textile or garment manufacturing process. Both groups of authors agree on the quality of the remanufactured output being equal, or of a better quality.

Dissanayake and Sinha (2015) describe a detailed process and reverse supply chain for remanufactured clothes that is gleaned from an investigation of case studies of businesses that practised remanufacturing of clothing. The remanufacturing process begins with discarded garments being sourced from the consumer. The consumer in this case initiates the reverse flow. The consumer could return the product during or at the end of its perceived life cycle. Designers or the remanufacturers assess each garment or textile component for quality and usability. During this stage, these designers

are constricted by the availability of fabrics; the quality of the fabrics; the design elements of print, colour and, texture; and the quantity of fabrics to work with. Here, the outcome of the remanufactured product is dependent on the designers' ability to work within the limitation and create a quality outcome. Designers who lack skills and experience could be a constraint in the material application process. Design ideas are generated through experimenting with various possible shapes and colour combinations that could be produced from the available textile on hand. To plan and use the textile components or parts of garments, garments are disassembled by cutting or unpicking seams in the most strategic way to gain the most use from the garment. Disassembly is a time-consuming process that can only be done by a person, enabled with cutting equipment varying in sophistication and efficiency. This phase of planning the design outcome requires that the used garments are either partially or fully disassembled to produce a flat, workable fabric to rework. Designers work directly with the second-hand clothing pieces to explore potential combinations and design ideas. A draping technique is employed to combine different fabrics to create shapes. This manufacturing method is time intensive and can produce a singular or multiple designs of the same style. Dissanayake and Sinha (2015) suggest a network for remanufacturing garments, which, as a high-level process, consists of textile recycling firms that collect textile waste; pattern cutting actors; craft entrepreneurs; and markets or retail spaces for second-hand clothing. Zero Waste Daniel is an American fashion brand that uses fabric scraps and off-cuts to produce new clothing using patchwork, appliqué, and embellishment techniques of which the outcome echoes a remanufacturing process described in this section (Zero Waste Daniel 2023).

Onur (2020) describes how upcycling involves working with discarded fabrics for redesigning old garments, which lends itself to remanufacturing. Upcycling is a term commonly found within the literature as part of clothing modification. As upcycling does not feature as one of the Rs from the 9R Framework but shares similarities and commonalities to the said practices, it is positioned in between Remanufacture and Repurpose for this study. Adıgüzel and Donato (2021) position upcycling as a process that maintains the quality of the material while extending the use of the material. The authors also state the requirement of creativity and originality to upcycle a product into something of use. Similarly, Muthu (2016) positions upcycling as a process to create a new item, of better quality to the used item, which requires innovation to produce a hand-made product. Therefore, upcycling has similar attributes to Remanufacture. Muthu (2016) goes on to differentiate downcycling as a process that reduces the quality of the product, like a T-shirt that produces cleaning rags, as in the context of Remanufacture.

**Repurpose** is the reuse of a product for a different purpose or parts of a product for a different function (Geissdoerfer et al. 2018; van Buren et al. 2016). Therefore, within this strategy original products or parts acquire different identities and functions (Geissdoerfer et al. 2018). This can be achieved by developing a new product from a discarded product by re-establishing its functions or use of purpose (Kirchherr & Piscicelli 2019; Potting et al. 2017). Geissdoerfer et al. (2018) describe Repurpose as recontextualising. Onur (2020) discusses textile crafts that involve the reuse of wasted material, whereby old knitwear is unravelled and knitted to create rugs and sweaters, and dresses are cut into strips in preparation to be crocheted into tablecloths. In South Africa, a business called Wastecrete has partnered with a local national retailer of clothing and apparel to utilise fabric waste in the production of concrete construction blocks. The company uses fabric strips, off-cuts, zips, buttons, and other trims produced by the retailer in an innovative production process to create fire-retardant and water-resistant bricks (Ackermans 2022). As found in the global apparel industry, Adidas has developed a shoe that is comprised of 95% recycled fishing nets that were recovered from the Maldives (Mohabuth 2017).

#### 2.10.5 R-Strategies for Useful Application of Materials

These strategies entail the recycling of materials through recovery (Potting et al. 2017). Incineration, from which energy is recovered, has the lowest priority in a circular economy because it means the materials are no longer available to be applied in other products (Potting et al. 2017) and is, therefore, removed from the circular loop. Stated otherwise, materials that could have been seen as an input for a different product are removed from the production cycle in its entirety.

**Recycle** is the processing and reuse of materials. Recycling is based on converting materials from existing products to create a new raw material, or a different product (Todeschini et al. 2017). Ideally, recycling should take place when product reuse is not possible, and the only alternative is to recover material value. The ideal for recycling is to harness used/wasted materials or resources for reuse in production while maintaining the highest possible value (Kirchherr & Piscicelli 2019; Potting et al. 2017). However, there is often a loss of value, meaning that the recycled parts are used in applications with lower specifications (Geyer et al. 2007). This is asserted by van Buren et al. (2016), who state that the recycling process can degrade the quality of the materials as the current *“applied recycling system is not able to create high quality secondary resources out of all waste streams”*.

Textile recycling involves value recovery of clothing and other textiles, and these raw materials are the basis for the textile recycling industry. Muthu (2016) describes two primary stages for recycling, which

are collection and reprocessing. In a high-level process, textile recycling involves collecting textiles, sorting and processing, and then the recycling process. Textiles used for recycling are generated through pre and post-consumer sources (LeBlanc 2020). Pre-consumer includes all waste generated prior to the product's use by the consumer and can be from scraps as a by-product from yarn and fabric manufacture, scraps from textile and other industries, and from clothing production (LeBlanc 2020; Muthu 2016). Muthu (2016) describes post-industrial waste generated during manufacturing of upstream industries, which include virgin fibre as part of textile waste sources. Post-consumer textile waste can be from garments no longer needed for use, household items, and other sources where the consumer no longer has use for the product (LeBlanc 2020). This source of waste is recovered from the consumer supply chain of which collection can take place at a variety of points within the said supply chain (Muthu 2016).

Recycling often involves high-energy processes (Todeschini et al. 2017) and can be differentiated between primary and secondary recycling (Muthu 2016). In the context of synthetic fibre recycling, primary recycling involves recycling a product back to its original form, while secondary recycling involves mechanical (melt) processing of post-consumer plastic product into a lessened quality of physical, mechanical and/or chemical properties (Hawley 2006; Muthu 2016). Mechanical recycling can produce fabric, yarn, or fibres that are used in new products. In textile recycling of post-consumer waste, apparel is disassembled, and fabrics are processed into smaller pieces (Business Insider 2023). These pieces pass through a rotating drum to break down the smaller pieces until fibre is produced, a process referred to as garneting (Muthu 2016). The resulting fibre is assessed for characteristics of length, strength, fineness, colour, and polymer towards considering the most appropriate new end-product application. Usually, textile waste collected from manufacturing supply chains will produce higher-quality fibres than those sourced from post-consumer sources. This pre-consumer and post-industrial waste can be respun into yarns for knitting or weaving to produce fabric that is used for apparel, soft furnishing, and upholstery applications (Freudenreich & Schaltegger 2020). However, these produced yarns require the addition of virgin fibre to strengthen the final yarn (Hawley 2006). Medium-grade fibres are used to produce fabrics intended for wipes and fillings, while low-quality fibres are used for reinforcement (concrete), non-woven fabrics, carpet underlays, shoe inlays, automotive sound and thermal insulation, home insulation, stuffing for soft toys, and other end products (Muthu 2016).

There are differences between the textile recycling processes of synthetic fabrics and natural fabrics (LeBlanc 2020). For natural fabrics, textiles received for processing are sorted by type of material and

colour. One of the advantages of colour sorting is that there is not the requirement of dyeing of the textile that will be produced, meaning a reduction of energy and pollutants. These textiles are then shredded into fibres and could have the addition of more or different types of fibres. These fibres are then processed into yarn, which is respun, and then woven or knitted into fabric. Natural textile recycling can also produce textile filling used in mattresses. (LeBlanc 2020). In cases of synthetic textiles like poly-based materials, the textile and garments are shredded and then processed into polyester chips. In a high-level process, these chips are then melted and processed to create fibres, which are spun and then woven or knitted to create material (LeBlanc 2020). Chemical recycling is a common method used to process waste collected in the textile industry. Using a chemical recycling method, synthetic fibres like polyesters and polyamides can be recycled. Synthetic recycling of plastic, plastic bottles, and thermoplastic fibres commonly uses mechanical methods. This process is similar to the recycling processes of poly-based materials, whereby the plastic waste is chopped into smaller flakes that are melted and extruded into filaments, yarns, or another product that can be used in a new end product (Muthu 2016). Muthu (2016) asserts that there is a difference between virgin polyester and recycled polyester fibres as not all recycled thermoplastic fibres have similar properties to virgin fibres.

Muthu (2016) discusses that textiles made from blended fibres are challenging to recycle due to the differing physical and chemical properties of the blended fibres. Cotton and polyester blended textiles are among the most commonly used blends for apparel. Chemical recycling has successfully recycled these types of blended fabrics due to a selective degradation method used in the recycling process. This means that blended cotton and polyester fibres are chemically separated and then reformed into new fibres for further processing (Muthu 2016).

Clothing brands Nike and Patagonia engage with textile recycling via recycling partners. The recycling processes used by these brands depend on the fibre composition and the recycling processes for different fibre types (Nike 2023; Patagonia 2023). The fashion brand Stella McCartney uses recycled polyester fabric made from recycled water bottles (Adigüzel & Donato 2021). In South Africa, Connacher is a textile recycler of a wide variety of textiles to create reusable fibre for different applications (Connacher 2019). Advancements in textile recycling mean that a closed-loop system of fibre-to-fibre recycling is possible for cotton recycling. The solvent used within the process can be recovered and reused. In addition, this technology also has the potential to maintain the colour (Ma et al. 2019). However, recyclable fibres are needed to create a closed-loop textile recycling system (Muthu 2016), which is currently an issue impacting the adoption and implementation of textile recycling.

These three categories of R-Strategies can be seen in Figure 2.1 below.

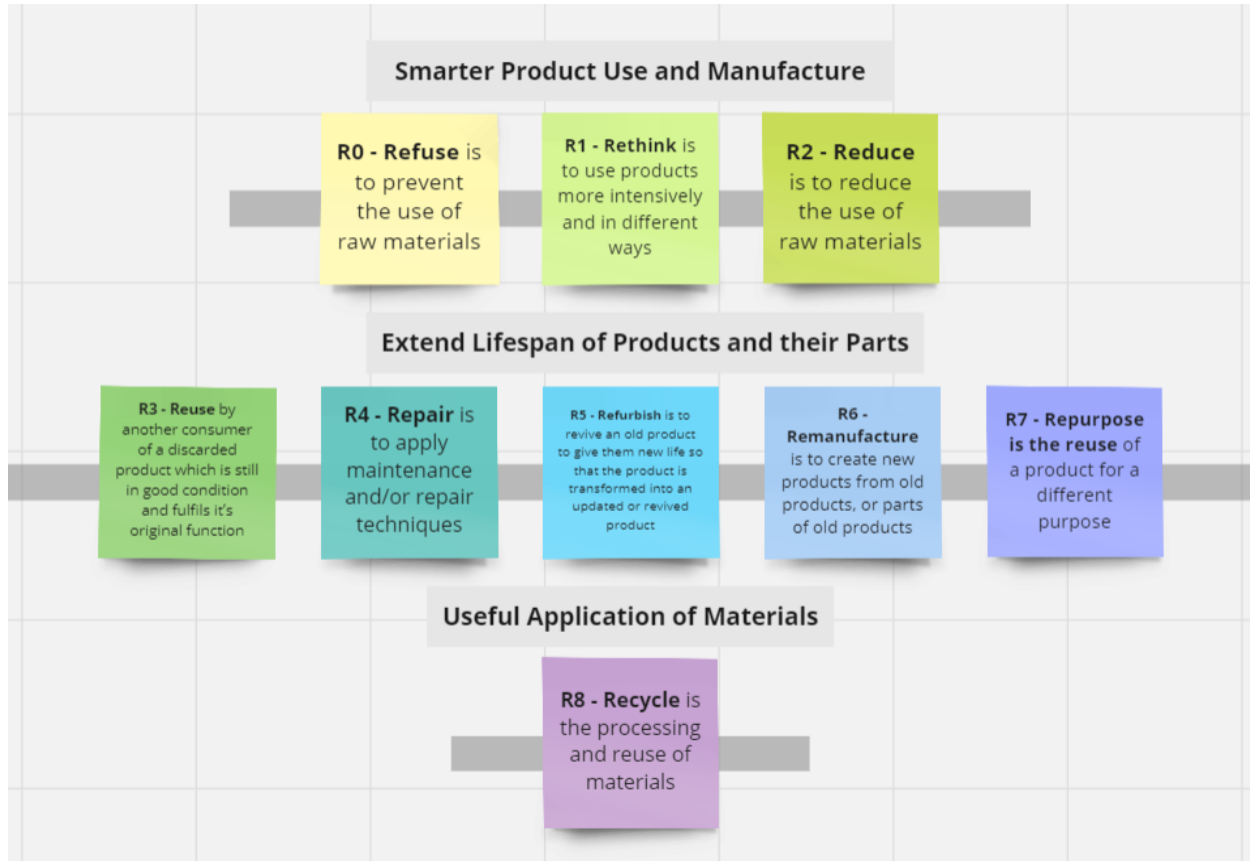


Figure 1 9R Framework (Potting et. al 2017)

In a study that employed the R Framework, Morsetto (2020) found that circular initiatives or priorities can address one or more of the R strategies. Moreover, the author states that targets can lead to trade-offs or strategies within the framework that complement each other, like in the case of Recycle, which can be minimised by the Reuse, Repair, Refurbish, Remanufacture, Refuse, and Reduce strategies. Strategies for Reduce, Rethink, and Refuse can facilitate the remaining strategies, and sustainable efforts targeted at design or Rethink can help with the remaining strategies (Morsetto 2020).

#### 2.10.6 Positioning the Framework Within the Context of this Study

The current study will employ the 9R Framework, as proposed by Potting et al. (2017), to investigate the sustainable practices of MSMEs within the South African clothing and textile industry. Potting et al. (2017) developed the framework to investigate innovation in product chains and revenue models, of which both areas are relevant as the research sample investigated in this study practises environmental sustainability and is made up of MSMEs. Product chains in the context of this study, and Potting et al.'s

(2017) framework, address the product development cycle from the extracted raw materials up to how the 'waste' is managed after being discarded by the user. The said framework was applied in the study to identify what CE transitional strategies should be measured as a precursor to measuring the sustainability interventions. Within the R-Strategy framework, each strategy speaks to a circulation of resources with the focus on the product, excluding the social aspect of CE (Geissdoerfer et al. 2018; Potting et al. 2017). A global trend within the movement towards a global circular model is the trend to measure the 'circularity' of a business, or an industry. Applying the said framework in the context of the South African clothing and textile industry aids in determining what practices are occurring, should 'circularity' want to be measured. In addition, the Potting et al. (2017) framework would expand upon current knowledge as it has not been applied within a developing economy within the context that this study will focus on. To aid in the development of CE, a system of indicators has been proposed that consists of metrics to guide and evaluate the soundness of CE development (Fiksel et al. 2012; Labuschagne et al. 2007; Su et al. 2013). A review by Su et al. (2013) found that indicator evaluating systems of metrics and guides are the most widely applied instruments for assessing the progression of CE. This has led to the use of the R-Strategy framework that has been applied to investigate and gauge sustainability efforts (Östlund et al. 2020; Potting et al. 2017; Su et al. 2013). Therefore, the use of the R Framework as CE indicators lends itself to using the R Framework to investigate the sustainability practices of a business or industry.

Stahel (2019) proposes the application of the 6R Framework to adopt for moving towards CE for SMEs. However, the 6R Framework neglects to investigate all the relevant possible strategies for an optimum circular strategy. Therefore, the 9R Framework, which expands upon the 6R Framework, would be suitable in investigating the circular practices of the said framework for the South African clothing and textile industry, due to the similarities of the said frameworks. To bolster the relevance of investigating CE initiatives within the South African clothing and textile industry, Hugo et al. (2021) found that CE initiatives occurring in the fashion industry were commonly found in production chain stages or product development, which supports the investigation of product chains within the context of this study. The sustainable practices of Reuse, Recycle, and Reduce feature as part of South Africa's NWMS (New Waste Management Strategy) to transform South Africa's waste sector to a circular model. For this reason, it can be motivated that these Rs, which also form part of the 9R Framework, are suitable strategies to employ for investigation in this study due to their relevance to the NWMS. Similarly, the R-Strategies from the 9R Framework are also referred to in the National Development Plan, which outlines a strategic plan of action for sustainable development for South Africa (NDP 2012). Geissdoerfer et al.

(2018) motivate that the latter R Frameworks should be employed for investigating specific industries and products to deepen the understanding of product and industry innovation, as is the case of investigating the environmentally sustainable practices of the South African clothing and textile industry, as this study does.

Geissdoerfer et al. (2018) criticise the ordering of sustainability practices to achieve sustainability as found in the Potting et al. (2017) framework. The said authors are critical of the rule-of-thumb approach to achieving sustainability, as the order is not always consistent for certain products under certain conditions. For example, in the context of recycling, secondary materials could be upcycled to convert them to materials of a higher quality, or these materials can be downcycled. Using the 9R Framework as a guideline, upcycling is preferable, due to the resultant higher-quality output. However, upcycling is not often possible (Geissdoerfer et al. 2017). Whalen and Whalen (2020) argue that Reuse, Repair, Refurbish, Remanufacture, and Repurpose can have imprecise and overlapping meanings, as found with the practices of Rethink and Reuse, which were both found to include product sharing (Kirchherr & Piscicelli 2019; Potting et al. 2017; van Buren et al. 2016). It was found that indeed, there were overlaps of the categorisation of practices of the research sample supporting Whalen and Whalen (2020) argument. Therefore the need to more clarified explanations is recommended for the framework used.

## 2.11 Circular Business Models

Osterwalder and Pigneur (2010) position that a BM is made up of a collection of elements, such as the value proposition (the product/service, customer relationships), activities, resources, partners, distribution channels, cost structure, and revenue model. Like the principles that underpin CE, circular BMs are designed and structured to enable product and material circulation in the economy while maintaining the highest resource value (EMF 2021c). Circular BMs fundamentally seek to reconfigure a company's use of material resources to achieve resource efficiency and environmental gains while financially benefiting the company (Ekins et al. 2020). OECD (2018b) proposes that the transition towards increased resource efficiency can occur at various levels along the product value chain, such as in second-hand goods, end-of-life products, secondary materials or waste, as well as trade in related services. This is affirmed by Ghosh et al. (2017) and Lacy and Rutqvist (2015), who propose that the CE is categorised by five general types of circular BMs, including entities that deal with circular supplies, resource recovery, product as service, product life extension, and sharing. Therefore, circular BMs prioritise sustainability by enabling or facilitating the recycling, repairing, or reusing of raw materials and



products (Peterson 2021). Circular BMs emphasise access over ownership, selling performance and use, as opposed to selling the product itself. It is also proposed that performance and use-based BMs will keep products in use for longer as they are used more frequently (WEF and Wageningen University & Research 2022). Similarly, circular BMs within the clothing and textile industry are structured to increase product and material use that have the potential to increase revenue streams that are not solely dependent on new resource input (EMF 2021a). Therefore, a BM operating within a CE has the impact of waste reduction and circulation of resource inflows in some shape or form.

GRID-Arendal (2021) states that each African nation should create and customise BMs that require less resources and increased production, of which the latter will lead to job creation for the clothing and textile industry due to its labour-intensive nature. Lacy et al. (2014) and Williams et al. (2018) propose specific opportunities around CE BMs for the clothing and textile industry in the developing world. These prospects for value creation overlap with the well-known principles of CE. Specifically, these prospects for value creation deal with the utilisation of resources that are regenerative in nature; designing products for multiple uses; maintaining high resource value when resources are reused and recycled; and creating higher-quality products that are intended to have longer life cycles. In support, Nahman et al. (2021) motivate that South African business entities should shift the way product ownership is perceived and move towards product sharing, renting, repair, refurbishment, upgrading, recycling, and reuse. Bocken et al. (2016) argue that to transition the current linear economy to one that is more circular in nature, the development of BMs and design strategies should be combined to realise suitable strategies, approaches, methods, and tools. A CE in South African, therefore, requires a change in the way product ownership is currently viewed and requires an increase of the said strategies (Nahman et al. 2021).

## 2.12 MSMEs

### 2.12.1 Defining MSMEs

According to the South African Department of Small Business Development (2019), SMEs in South Africa are defined as “...a separate and distinct business entity, together with its branches or subsidiaries, if any, including cooperative enterprises, managed by one owner or more predominantly carried on in any sector or subsector of the economy”. The South African Department of Small Business Development (2019) also uses full-time employment and annual turnover to segment micro, small and medium business enterprises. For the manufacturing sector, which the South African clothing and textile sector

forms part of, micro businesses are defined as having five or fewer employees with a turnover of R200 000, small businesses have 20 to 50 employees with a turnover of not more than R13 million, and medium enterprises have no more than 200 employees and generate no more than R51 million (National Small Business Amendment Act 2003). Moreover, South African SMEs are classified into formal, informal, and survivalist ventures (Mokwana 2021).

#### 2.12.2 MSMEs' Contribution to the Economy

The WEF (2022) estimate that 90% of companies worldwide, of which many could be considered SMEs, are responsible for 70% of worldwide jobs and GDP. Meanwhile, Rees (2019) asserts that SMEs account for about 50% of global GDP, creating 60% to 70% of employment globally. In South Africa, MSME businesses are said to contribute 34% to GDP and employ 50% to 60% of South Africa's labour force across all sectors (Kalidas et al. 2020; The Banking Association of South Africa (BASA), 2021; International Finance Corporation (IFC), 2018). There are a range of estimates that quantify to what degree SMEs make up the formal business landscape in South Africa. BASA (2021) estimates that SMEs make up 91% of formalised businesses, while Kalidas et al. (2020) estimate a higher number at 98%. The Small Business Institute (SBI) (n.d.) states that the formal MSME sector is made up of 250 000 firms in South Africa, which translates to 28% of employment of total formal jobs, or 3 863 104 people employed in this sector. Moreover, 5.1% of this formal employment occurs in micro firms, 11% in small firms, and 12% in medium enterprises (IFC, 2018; SBI, (n.d.). SMEs account for 25% of job growth in the private sector, making them a key contributor to the South African economy (Kalidas et al. 2020).

SMEs within the South African clothing and textile industry form part of multinational value chains, including exporting for the European market (Sedieane 2021). Moreover, MSMEs within this sector consist of enterprises that have 'Business to Business' and 'Business to Consumer' supply chains and consist, in part, of niche designers that create limited runs, clothing manufacturers, textile manufacturers, and textile recyclers (Clothes To Good n.d.; Corrigall 2022; FP&M, SETA2014; Rewoven n.d.; We-Collect Textile Recycling 2022). The South African designer fashion sector, which primarily creates niche limited collections, is estimated to comprise of 641 local designers of which 92% are SMEs (South Africa Cotton Cluster and DTI, 2020). MSMEs are known for their contribution to economic growth and are recognised as productive drivers of inclusive economic growth and development for South Africa (BASA, 2021; IFC, 2018; Mokwana 2021). These benefits positively impact the economy through job creation that impacts the government and South African citizens (Dladla 2016). SME types of BMs tend to use more labour-intensive production processes compared to large enterprises, which is

an important factor towards creation of labour (Ayandibu & Houghton 2017). Moreover, these businesses are often customers to larger companies across supply chains (Kalidas et al. 2020). Building micro, small, and medium enterprises that contribute to the economy and create employment is one of South Africa's biggest development opportunities (IFC 2018).

### 2.12.3 Sustainability and SMEs

Ever increasingly, South African SMEs are prioritising sustainability within their BMs and product/service design in support of South Africa's aim toward a more sustainable economic model (Moorhouse & Moorhouse 2017). These South African SMEs have become pioneers in the local sustainable economy, often providing innovative solutions in response to the challenge of sustainability (Marks & Hidden 2017). Reddy (2022) motivates that SMEs that include sustainability within their business practice have the potential to increase their profit. Meanwhile, Dladla (2016) states that innovation in SMEs is a key challenge in operational performance, but also positions sustainability as crucial to sustaining a competitive advantage. SMEs are quick to respond to economic and industry changes and this agility can be exploited to design and foster new technology and BMs (Barrett 2016; Kalidas et al. 2020). Therefore, SMEs are well positioned to incorporate sustainability and leverage this to appeal to sustainably minded consumers. Schiffbauer et al. (2015) propose that SMEs have high labour absorption as they contribute between 60% and 70% of jobs in most developing countries. With smaller and simpler organisational structures compared to global clothing and textile businesses with continent-spanning supply chains, SMEs are more agile and would be quicker to respond to social, environmental, and economic needs in the transition towards a CE in South Africa (Govuzela & Mafini 2019). In support, Ogujiuba et al. (2021) propose that sustainable entrepreneurship contributes to meeting social and environmental needs in emerging and developing countries, which South Africa is considered as. Williams et al. (2018) recognise that the circular flows inherent to CE would allow firms operating within this model to reduce material and resource input costs and generate revenue from waste, which would foster competitiveness and support job creation. Moreover, businesses with a significant social and environmental agenda have increasing appeal to consumers, who want to create impact through the use of goods and services (Peterson 2021). As found within the general SME sector, Mokwana (2021) motivates that clothing and textile SMEs in South Africa are a significant contributor to the growth and development of the South African economy. The SMEs that form part of the textile sector are part of multinational value chains that export goods for the European market and should be targeted to improve sustainability and innovation (Sedieane 2021).

The South African Government has adopted the National Development Plan, which is intended to support the development of the MSME sector for the creation of employment opportunities for South Africans (Worku 2018). The quote that follows supports this statement with the addition of referring to the transition to a more circular model:

*"Government recognises that, in addition to government-led 'top down' enabling measures, the 'bottom up' buy-in and co-operation of civil society, business and labour are an essential part of implementing a circular approach."* Department of Environment, Forestry and Fisheries, Republic of South Africa (2020b).

Unemployment is a significant issue plaguing the South African economy and as discussed, it is widely recognised that SMEs play a significant role in employment and long-term sustainability (Ayandibu & Houghton 2017; Dladla 2016; IFC 2018; Mokwana 2021; Rees 2019; Worku 2018). Due to the significant contribution to global employment that SMEs provide, it is essential for these businesses to take advantage of the potential opportunities that CE could offer. Worku (2018) states that the National Development Plan, proposed by the South African government, relies on the development of the MSME sector for job creation and to alleviate poverty. However, Peterson (2021) motivates that for these economic gains to be realised, businesses require the right support to succeed.

*"Only about 1% of micro-enterprises in South Africa, starting with one to five employees, will grow to employ more than 10 people. This means most entrepreneurs will face so many barriers they will make little meaningful difference to unemployment in the county."* Peterson (2021).

Despite the developmental contribution that SMEs make towards developing the South African economy, there are significant challenges to overcome for these businesses (Ayandibu & Houghton 2017). Challenges experienced by South African SMEs are access to finance, markets, and skills (IFC 2018). Meanwhile, Mokwana (2021) found that cheaper imports, lack of government support, lack of support to produce locally, lack of technical know-how, and access to capital are some of the factors negatively impacting SMEs in the South African textile, clothing and leather goods sector. Mokwana (2021) states general issues of cheaper imports, inadequate government support, and infrastructure as challenges affecting the sustainability of the textile, clothing, and leather goods sector, of which the clothing and textile-related MSMEs form part of in South Africa. In a study of businesses within the clothing and textile industry based in Johannesburg, South Africa, Kunene (2008) found that these SMEs struggle to create long-term sustainable employment. This study focused on businesses that dealt with clothing and it was found that these SMEs were affected by employee age, work experience, and

education. These challenges overlap and are similar and identical in some cases to the discussed challenges that impact the clothing and textile sector. It is, therefore, imperative to investigate the environmentally sustainable practices that are occurring within the product chains of South African clothing and textile MSMEs.

## 2.13 Conclusion

This chapter discussed literature pertinent to the research study, namely, to investigate the environmentally sustainable practices of South African clothing and textile MSMEs. The resulting framework provides literature to guide and support the said investigation of this study. Various relevant aspects have been discussed as a synthesis of global and local considerations. The following chapter will focus on the methodology that this study undertook to investigate the practices of South African clothing and textile BMs.

# Chapter 3 Research Methodology

## 3.1 Introduction

This chapter will explain and justify the research design and methodology employed to attain data required towards fulfilling the research objectives of this study. The aim of this study was to investigate the environmental sustainability practices occurring with South African clothing and textile MSMEs in terms of the 9R Framework. The three research objectives are:

- To investigate the environmentally sustainable strategies of clothing and textile business models and product chains
- To explore the reasons why circular strategies feature in clothing and textile MSMEs
- To explore the challenges of current clothing and textile business models, circular strategies for future clothing and textile business models, and frame BM opportunities

The objectives are to be investigated, in order to propose a CE BM that addresses the 9R Framework for improved production and consumption in the clothing and textile industry in South Africa.

The research design, methodology, data collection, and analysis methods, as well as credibility and trustworthy consideration pertaining to the data will be discussed in this chapter. The section that follows provides an explanation for the research paradigm and research design crafted to address the research objectives of this study.

## 3.2 Research Paradigm and Design

### 3.2.1 Research Paradigm

This study employed an interpretivist paradigm to investigate the environmental sustainability practices of South African clothing and textile MSMEs. Leitch et al. (2010) state that questions regarding entrepreneurial practice that revolve around 'why' and 'how', which relate to the investigation of business practice as this study does, are better suited to interpretivist philosophies. Saunders et al. (2009) motivates that the goal of interpretivist research is to generate new, rich understandings and interpretations of contexts within the social world. As there is little existing research of clothing and

textile business product chains within the context of CE or circularity, generating rich understanding and interpretation is appropriate. In addition, Guest et al. (2013) state that an interpretivist perspective is based on the premise that qualitative research is concerned with revealing multiple realities, which this study will do by interpreting the data. The aim of this study is to generate an in-depth understanding of the circular practices occurring within South African clothing and textile MSME BMs through investigating the circular practices within supply chains and the motivation for doing so (Cropley 2021; Guest et al. 2013; Saunders et al. 2009). Views and understandings of participants will generate a faceted understanding of the research topics pertinent to the objectives, towards creating an in-depth understanding of environmentally sustainable practices, motivational factors, and future considerations.

Ritchie (2003) proposes that researchers practising qualitative research tend to place emphasis on interpretative aspects of knowing the social world and that there is a significance of the investigators' own interpretation of the topic being studied. Therefore, the researcher's own interpretation of the data will guide and influence the generated understanding of the data and resulting findings. Using an interpretivist philosophy, the researcher's investigation will be guided by the research objectives (Leitch et al. 2010), and the participants' understanding of the concepts will be used to generate the findings (Braun & Clarke 2006; Ritchie 2003).

### 3.2.2 Research Design

Cropley (2021) proposes that the aim of all research is to enlarge the knowledge pertaining to the research subject and that through empirical research, knowledge is expanded through observing the world in a systematic manner. This study will follow a qualitative research design using an inductive approach, which can be effective where limited knowledge exists (Saunders et al. 2009), as in the case of this study. The advantages of qualitative research are the flexibility to probe into participant responses as needed to achieve detailed descriptions and explanations of experiences that speak to the research objectives (Guest et al. 2013). Thomas (2003) argues that an inductive approach draws upon systematic meaning making procedures, where the analysis is guided by specific objectives (Guest et al. 2013). This study will employ an inductive approach to systematically analyse empirical evidence guided by the said objectives. Thomas (2003) states reasons for the development of an inductive approach that share a likeness to qualitative analysis. These reasons are to condense data; establish clear links between the summary and objectives; to ensure that the links are defensible and transparent; and that they develop theory about underlying experiences evident in the data. Therefore, a qualitative research design will be

suitable for the inductive approach for this study due to the similarity of the inductive analytical approach and the process of qualitative analysis to meet the said objectives. Moreover, this study will follow a qualitative inductive research approach that is conducive to achieving exploratory outcomes (Guest et al. 2013), whereby research findings will be identified by the researcher from significant themes inherent in the raw data (Thomas 2003) through a process of analysis and reflection on the identified themes (Braun & Clarke 2006; Saunders et al. 2009). Ritchie (2003) states that qualitative research can contribute to the generation of data by exploring the interaction between phenomena in various settings and exploring differences in the contexts in which the phenomena occur. As the said research objectives require an exploratory approach, the population of clothing and textile MSMEs will be investigated using a less structured form of inquiry (Saunders et al. 2009) to generate detailed and valid data of the circular strategies occurring in the BMs, discussing the features that contribute to the occurring circular practices (Cropley 2021), and how the circular practices occur in different BMs (Guest et al. 2013).

The research strategy will involve a single episode of fieldwork (Lewis 2003) to investigate the current setting of MSME practices that are synonymous with CE (Guest et al. 2013) as proposed in the 9 R Framework. The current manifestation of circular practices being studied is deemed to be relatively stable (Lewis 2003) due to the complex and established nature of the existing clothing and textile system within which the MSMEs operate.

Cropley (2021) proposes that the process of generating detailed knowledge using an interpretive paradigm involves investigating and describing phenomena by describing the nature of the phenomena and how they operate, and improving understanding of the phenomena's dynamics by stating how the dynamics relate to each other and how they have developed. Therefore, through the interpretational input of the researcher and participants, this study aims to identify and describe the circular practices occurring; describe the features of the circular practices; how these practices occur in the BMs; explore the development of the circular practices within the BMs and the partnerships required for the circular practices.



## 3.3 Data Collection

### 3.3.1 Unit of Analysis

This study investigated MSMEs operating within the South African clothing and textile industry. These businesses had a product or service that was either clothing or textiles and undertook at least one of the Rs in their BMs. Interviewees were either the owners of the businesses, or held senior positions within the businesses and were in a position to understand the granular details of the product chains.

### 3.3.2 Research Sampling

The qualitative research approach for this study utilised non-probability sampling for selecting the research population, whereby clothing and textile MSMEs were specifically chosen based on the sustainability practices featuring in the product chains of their BMs (Crossley & Rautenbach 2021; Ritchie et al. 2003). This method of criterion-based purposive sampling used the strategies (practices) of the 9R Framework as the selection criteria, whereby each participant included at least one of the practices from the 9R Framework. As characteristics (sustainable practices) are key attributes to the population selection of MSMEs, it allows for a smaller- scale, in-depth study (Ritchie et al. 2003). This 'symbolic representation' sample selection method has two key aims, which are to ensure relation to the context of this study and that there is some diversity within the boundaries of the defined population so that the characteristics (sustainable practices) can be explored (Ritchie et al. 2003). A diverse sample selection of clothing and textile MSMEs provided data for this study, as they had different clothing and/or textile products/services. Only textile-related businesses that included clothing or apparel within their product chains were included, excluding household and industrial textiles. Variations of similar product and service propositions were included in the research sample to provide evidence of how different businesses are practising sustainability when confronted with similar challenges within the South African context. In addition, diversity was achieved by including businesses with different BM structures considering processes and product chains. Businesses had a B2B (business to business) or B2C (business to consumer) orientation. This study collected data until saturation was reached, which was the case after nine (9) participants were interviewed.

To create the research sample, SA clothing and textile MSMEs were researched using an online search engine (Google) to generate a list of possible businesses that incorporate one or more of the selection criteria (sustainable practices of the 9R Framework). To conduct this search, key words were utilised

that describe the type of fashion, clothing, and production processes, paired with location information. Examples included: 'sustainable fashion South Africa', 'sustainable clothing South Africa', 'upcycled fashion South Africa', 'upcycled clothing South Africa', 'textile recycling South Africa', 'sustainable textile', 'textile recycling Cape Town', and 'South African sustainable fashion'. The objective was to shortlist businesses which would enable a research sample consisting of a variety of product and/or service offerings and BMs. Business websites were explored to ascertain on a surface level if the businesses were met the studies sample requirements. Businesses were selected for further investigation based on achieving the best possible variety and ease of contact using the online contact details provided. The selected businesses were contacted with the request that a knowledgeable representative of the business' processes and product/service offerings participate in the research study. Upon receiving approval of participation, the businesses were individually interviewed. Over the data collection period, the participants were gradually collected while continuously being scrutinised for diversity of product/service output and BM, variation of business model types, product diversity and environmentally sustainable practices as part of the businesses product chains. Participants were approached via a telephone call or email to arrange for a suitable meeting for the interview to take place. Data was collected from 2022-2023.

### 3.4 Research Methodology

#### 3.4.1 Research Instrument

Interviewing was suited to this research study as the study required a detailed understanding of the practices, processes, and opinions of participants, which interviewing affords (Legard et al. 2003). Interviewing provided the opportunity for detailed investigation of the MSMEs' personal perspectives to generate an in-depth understanding of the practices occurring within the BMs, motivational factors, and opinions (Guest et al. 2013; Legard et al. 2003). Qualitative questioning allowed for flexible inquiry, whereby the researcher asked the participant questions in various ways to ensure understanding (Guest et al. 2013). In addition, interviewing allowed for an undiluted focus on the participant to generate an understanding of actions, processes, and outcomes of the circular practices (Legard et al. 2003). Therefore, the semi-structured interview method was suitable for this research study due to the complex nature of the circular strategies to be explored, and the in-depth understanding of the circular practices required to answer the said objectives. Flexible questioning, inherent to an interview method, enabled the generation of data that explored the participants' motivations for including the circular

practices within the MSME BMs, as well as opinions about challenges and opportunities surrounding current and potential circular practices for clothing and textile businesses (Legard et al. 2003).

The interview method was iterative in nature and combined structure and flexibility, through which data was generated through the interaction between the researcher and the clothing and textile MSMEs. The interview process was conducted face to face and collaboratively generated new knowledge by exploring avenues of thought regarding sustainability practices that have previously not been explored in the South African context. During the interview, participants answered questions which led the researcher to ask follow-up questions based on the participant's response. Initial participant responses yielded 'surface level' results that required the interviewer to use follow-up questioning and probes to achieve the required in-depth answer in terms of penetration, exploration, and explanation. This approach was employed to obtain a fuller and deeper understanding of the participant's intended meaning (Legard et al. 2003).

An interview topic guide was the mechanism for guiding the discussion of the interview and was a written document that detailed the objectives, carefully worded questions, probes, and specific subjects intended to be discussed during the interview. The interview guide was based on topics and summations and conclusions from the literature review. The interview topic guide included probes to accompany each question, which consisted of more specific questions related to the main question. The probes aimed to create a full 'picture' of the answer provided and encourage the interviewer to add depth to their initial answer. During the interview, definitions of the 9R Framework were discussed, along with the objectives of the study. Ordering the questions focused on easing participants into the interview by asking relatively surface-level, contextual questions about the business' demographics (Legard et al. 2003). These questions addressed the business entity's history, what the product/service offering was, the evolution of the product/service within the business, and whether the business had a B2B or B2C orientation. Questioning followed with which of the 9R Framework sustainable practices were applied in the BMs. In support of this approach, Guest et al. (2013) proposed that the process of scientific inquiry should begin with broader, general questions and then move to more specific and structured questions. Ground mapping questions were initially asked to 'open' a subject, followed by focusing on identifying factors and aspects of the sustainable practices (Legard et al. 2003). This part of the interview consisted of more in-depth questions. This approach was employed to achieve a thorough understanding of the partnerships/collaborative actions and benefits of the sustainable practices (Arthur & Nazroo 2003). Questions followed to investigate the benefit and motivation for the adoption and practising of the

environmentally sustainable practices. After which questions to address barriers and challenges followed. Concluding questions were projection (future) based, encouraging suggestions, advice, or recommendations for MSMEs in similar contexts that incorporate sustainable practices (Arthur & Nazroo 2003).

Suitable venues for interviews were environments that were conducive to concentration where it was private/neutral, quiet, and physically comfortable (Legard et al. 2003), such as an office or residence. The interviews were conducted face to face where possible, but mostly virtually due to limitations of location. The interviews were recorded to ensure an accurate and verbatim record of the interview could be used for transcribing the interview (Legard et al. 2003).

### 3.4.2 Operationalisation

Table 3.1 indicates the operationalisation of the semi-structured interview questions.

*Table 3.1 Operationalisation of semi-structured interview questions*

<b>Section and question</b>	<b>Question</b>	<b>Objective</b>
S1Q1	Demographics analysis	Question intended to discuss the length of business operation, the product/service of the business, the evolution of this product or service, the age of the business and the orientation of the business (B2B/B2C)
S2Q1	Which practices from the 9R Framework feature in the product chains	To identify which practices are occurring, their process within the business, the partners required for the practices, the significance of the practice in relation to the products/services offered by the business, the resources required for the practice
S2Q2	Motivation for the circular practices	Investigating the motivational factors for adopting and practising the environmentally sustainable practices
S2Q3	Perceived benefit of the circular practices	Investigating who and what benefit from the circular practices
S2Q4	The challenges and opportunities of the sustainable practices for the business, and similar businesses	Determining the challenges and opportunities that the businesses have faced in practising the circular practices

S2Q5	The factors that prevent the business from being more sustainable	Determining what obstacles the businesses face in increasing their sustainability
S2Q6	Products and services of future clothing and textile businesses	What environmentally sustainable attributes future clothing and textile businesses should have
S2Q7	Changes for clothing and textile business models to be more competitive	How current businesses can adapt to better their sustainability with changes for gain in competitiveness

### 3.4.3 Data Collection

Participants were approached to participate either with a phone call, or via an email. This initial contact firstly provided an overview of the study and enquired about their potential interest. Participants who expressed their interest were sent (via email) the information document and consent form with proposed meeting times and dates, along with suggestions of virtual platforms to conduct the interview on and an estimated time for the interview. The information document detailed the relevant information pertaining to the study, the interview, and the rights of the participant. The consent letter was signed by the researcher and then by the participant, who gave consent to participate in the interview and to be recorded.

Participants were met either in person, or virtually. In-person interviews were conducted in Pretoria, South Africa, and virtual interviews enabled participants from South Africa’s other major cities to participate. Physical locations were either at the work premises of participants or at a mutual meeting location that was suitable to conduct the interview. A significant proportion of the interviews were conducted virtually, using well-known applications that allowed for video and audio recording. In-person interviews were audio recorded with a mobile phone. The recordings were kept on a personal laptop device, and on a personal online data storage platform.

Upon meeting, virtually or in person, participants were thanked for their time and read the introductory statements to address voluntary participation, confidentially, partial anonymity, and carte blanche to discuss their views. The interview began with demographic and background questions to ease the participant into the interview. This followed with more specific questions. Participants responded in ways that allowed for some of the intended latter questioning to be answered prior to asking, as this afforded a more in-depth questioning based on the information given.

### 3.5 Data Analysis

Epistemological questions with the aim of understanding a phenomenon are suited to research objectives that require an exploration of participant processes, actions, and perceptions, as is the case of this study (Saldana 2016). In this study, an inductive approach guided the analysis of complex data that was guided by the said research objectives (Guest et al. 2013). The inductive analysis involved the development of categories into a framework that condensed the raw data into key themes and processes that were judged to be important by the researcher (Braun & Clarke 2006; Thomas 2003). The process of analysis is outlined and justified in the section that follows.

Data analysis began with the formulation of predetermined provisional codes prior to analysis. These attribute and descriptive codes were based on the anticipated categories gleaned from the literature review, 9R Framework, research objectives, and research questions from the interview guide (Saldana 2016).

The process of inductive analysis began with transcribing each interview verbatim to an electronic document and reading the text to gain a general understanding, during which prominent themes emerged (Braun & Clarke, 2006, Cropley 2021). The interview recordings were transcribed shortly after each interview took place. In addition, each interview was coded (first cycle coding) while data collection took place. This allowed for a general understanding of the collected findings to get a general sense of when data saturation was reached. According to Quantilope (2022), data saturation is the point in a research process where no further data collection will add valuable insights as enough data has been collected to draw the necessary conclusions. Guest et al. (2013) motivate that saturation is a criterion to justify appropriate sample sizes in qualitative inquiry, while Hennink and Kaiser (2022) assert that data saturation can be achieved in a limited quantity of nine (9) interviews. During the reading of the raw textual data, multiple meanings were considered and text segments that contained meaning units were identified along with key themes and processes (Braun & Clarke 2006). These meaning units and key themes and processes were highlighted on each transcript using colour highlighting to identify the coded textual data.

Saladana (2016) states that coding methods of descriptive, process, and pattern coding are most appropriate in cases of epistemological inquiry, as is the case of this study. Attribute codes were assigned to data that was descriptive of participant demographics and basic information, while descriptive coding summarised the assigned data in a word or short phrase (Saldana 2016).

Simultaneous coding was employed where practices and actions spoke to more than a single code, as was found commonly with the codes of the 9R Framework. In vivo coding was applied for data that spoke to participant motivation and beliefs to best capture the meanings. Text assigned with in vivo codes contained verbatim text segments of data to best capture the participant's intended meaning (Saldana 2016). Holistic coding was employed where the overall meaning was captured from sentences and paragraphs that described a process and key activities of the participant product chain. Process coding was also applied to data that described actions as part of a process or flow (Miles et al. 2014).

Codes were noted and detailed in a coding document. A list of the codes was noted in this document with the following features: name of the code, description of the code, links to other codes, and the research objectives within which the code is embedded. Coding the emergent themes required creating summaries of the coded textual data on a virtual canvas to collect and organise the themes identified from the data. These summaries of the text segments that were coded in the interview transcriptions were added to a virtual canvas (Miro: [www.Miro.com](http://www.Miro.com)) that allowed the data to be collected and organised on virtual sticky notes. Each participant business was allocated an exclusive coloured sticky note with all data collected from the participant added to their given colour, which was organised into common themes on a virtual canvas. The virtual canvas collected coded summaries and text segments that were organised within categories of similar meaning, facts, and processes (Braun & Clarke 2006; Thomas 2003).

During the first cycle of coding, additional codes were generated that were identified by common themes found in the data. The additional coded data was collected and arranged according to the given codes on the virtual canvas, accompanied with initial observations and ideas for further analysis. These initial findings were used to draft the first analysis. During the process of creating the first draft, matrices were used to collect and present demographic data and verbatim data to present the benefit of, and motivation for the circular practices (Miles et al. 2014). Networks were used frequently to portray a significant proportion of the data where actions, events, and processes were found in the data. This approach was appropriate as the networks allowed for showing complex interrelationships between variables. The initial analysis revealed patterns in the data, common themes, contrasts, comparisons, and entailed clustering data with commonalities. During this phase of initial analysis, a multiple variable case-ordered network was employed to display similarities within the data between two or more participants. In order to explain the interrelationship of the common practices, a variable-by-variable matrix was applied to collect the practices that were commonly found occurring among the

participants. This allowed for an analysis of each practice as it was applied to the various participants. A casual network for a within-case analysis was used frequently for the processes, events, and actions of the individual participants. Codes that dealt with 'barriers' and 'challenges' were analysed using a conceptually clustered network where themes within these codes brought together data of common concepts and themes. Event listing networks were employed to organise data of events of participants' practices and processes (Miles et al. 2014).

During the first-cycle analysis and initial writing of the findings chapter, inconsistencies emerged that required the data to be checked for accuracy and cohesive understanding of the applied codes. This led to the second cycle of coding that entailed reviewing the codes, creating additional codes, deleting codes that did not speak to the research objectives, refining the meanings of the codes, re-ordering the codes, and reviewing the data assigned to each code. Reviewing the priori codes and codes created through first-cycle analysis meant questioning each code for relevance and removing similar codes from the initial code list (Bazeley 2013). This stage also yielded more observations of emerging patterns. All documents that evidenced the codes and the virtual canvas that displayed the organised data was reviewed and updated. The virtual canvas was also re-organised so that all data and codes were allocated to the said research objectives that were displayed on the canvas. Additional text segments were labelled with the created codes and new codes were created for the new emergent themes (Thomas 2003).

After the second cycle of coding, some inaccuracies and inconsistencies emerged that required reallocation of some data to codes, but these were minor changes with most of the data remaining the same. This meant that the virtual canvas was reviewed and adjusted according to the newest understanding of the data. This process concluded with interpreting the structure and content of the themes, whereby the categories were linked to the remaining categories to state various relationships of network, relationships, similarities, and sequences (Braun & Clarke 2006; Cropley 2021; Thomas 2003). This led to the writing of the final conclusions chapter.

### 3.6 Trustworthiness of the Data

Cutcliffe and McKenna (1999) assert that the researcher should make explicit what attempts and methods they have used to establish the credibility of their data interpretations. The section that follows details the measures undertaken by the researcher to ensure trustworthiness of the study and findings.



### 3.6.1 Credibility

To establish credibility (Cutcliffe & McKenna 1999) and trustworthiness (Nowell et al. 2017), data triangulation will be employed, whereby data about the sustainability practices of the research population of SA clothing and textile SMEs published through online sources will be used to corroborate the data gained from the interviews to strengthen the researchers' conclusions and prevent false interpretations (Hales 2010). Furthermore, investigator triangulation was employed by utilising a second researcher, the research supervisor, to confirm thematic findings and decrease bias (Hales 2010; Nowell et al. 2017). Credibility is achieved through the researcher's prolonged engagement with the data. By way of establishing trustworthiness, the researcher reached a deep familiarisation with the data through prolonged engagement by collecting and analysing the data, documenting reflective and theoretical thoughts throughout the data analysis process, and documenting thoughts about potential codes and themes. In addition, member validation was sought by way of sharing the interview transcript with participants for feedback on whether the data collected by the researcher accurately and truthfully represents the BMs and options of the interviewees (Jackson et al. 2007; Nowell et al. 2017; Ritchie et al. 2003; Thomas 2003). Participants A, B, C, E, G, H and I confirmed that the data collected was accurate.

### 3.6.2 Transferability

To demonstrate transferability, rich and detailed descriptions of participants' practices as well as the methods used to conduct this study will be outlined, to enable generalisability (Nowell et al. 2017). Thick descriptions have been established through the detailed description of the facets of participant BMs, and their beliefs about motivational factors and future considerations for the industry. Moreover, this study provides a detailed account of the data analysis process to compare the process and results of this study with that of other studies with similarities. Lastly, the interview transcripts provide a detailed account of the collected data that further contributes to transferability.

### 3.6.3 Dependability

Dependability and confirmability can be demonstrated through an audit trail of the research process (Nowell et al. 2017). Auditing enables the tracking of the procedure for data collection, analysis, and interpretation in sufficient detail to enable the replication of the study so that consistent results can be generated (Lincoln & Guba 1982). In support of an audit trail, the theoretical and methodological choices have been justified throughout the study; documents that detailed the potential participants

who were screened by the researcher and contacted to participate in the study have been stored; and interview transcripts that detail the first and second cycle coding processes and the development of the codes (name, description, meaning, relationship to the research objectives and review) have been recorded. The progression of the analysis has been recorded and stored through evidencing the development of the displays that show the progression of the analysis of first and second-cycle coding (Nowell et al. 2017). These measures contribute to enabling the process and the product to be audited to confirm dependability, as proposed by Lincoln and Guba (1982).

#### 3.6.4 Confirmability

The researcher established clear links between the research objectives and the summary findings to ensure that the links are both justifiable, given the research objectives, and transparent, to be demonstrated in similar studies (Thomas 2003). The link is evident through the relevance of the data to that of the research objectives in the way that the findings are in response to the research objectives and speak directly to them. In addition, the direct quotations of participants have been detailed for the reader to contextualise the findings through the data from which it was derived, in an unbiased manner. Cutcliffe and McKenna (1999) position that confirmability is concerned with using different methods in the same study for the one set of results to confirm the findings. Considering this, it was found that data of the product chains produced identical findings when coding methods of descriptive and process were employed.

### 3.7 Ethical Considerations

This proposal for this study was approved by the UNISA (University of South Africa) College of Agriculture and Environmental Sciences' ethics committee. Miles et al. (2014) state ethical considerations for research studies, emphasising the importance of providing participants with as much information as possible about the processes prior to and after data collection. Participants were initially searched for by the researcher using an online search engine and key words to result in potential South African businesses that could be suitable for the study. Potential participants deemed suitable were investigated using the participants' websites to confirm practice of any of the environmentally sustainable practices from the 9R Framework. Participants who were deemed suitable were contacted by the researcher with a phone call or an email to provide an outline of the study, the expectations, and benefits of the study, after which they were asked if they would be interested in participating. After participants confirmed their interest, they were sent an information document that detailed the

particulars of the study with a consent form. This document informed participants of the time and effort involved, the kind of data to be collected, that participation was voluntary and anonymous, the way data would be recorded, that all data collected would remain confidential and who and what the research would benefit, as cited from Miles et al. (1994) in Miles et al. (2014). In addition, participants were assured of the confidentiality of the collected data, as well as their personal information and that any personal identifying information would not be disclosed, resulting in partial anonymity. Participants were also informed that they could withdraw from the study at any given point in time, should they wish, without reason and/or penalty.

### 3.8 Conclusion

This chapter detailed the research methodology, paradigm, and design employed in this study. The methods applied to develop the research instrument, gather the research sample, collect data, and analyse the data have been discussed and justified. This chapter concluded with discussing the trustworthiness and ethical considerations undertaken to complete this study. The chapters that follow will discuss the findings of the data in Chapter 4, and conclusions drawn from the findings.

# Chapter 4 Findings - Part 1

## 4.1 Introduction

This chapter starts with the presentation of the demographic profile of the participants. The discussion then continues with the findings derived from the qualitative data gathered through interviews. The objectives and framework of this study have been drafted and employed to fulfil the research aims of this study, which are to investigate the environmentally sustainable practices of South African MSMEs operating within the clothing and textile industry, to investigate the barriers that these businesses face, and considerations for the clothing and textile industry's future. The 9R Framework is employed to guide the investigation of the environmentally sustainable practices. The interview transcripts were coded using provisional, attribute, descriptive, in vivo coding, holistic coding, pattern, and process coding (Saldana 2016), according to commonly found themes that align to the research objectives of this study. This chapter will discuss the data relevant to, and in the sequential order of, the research objectives, which will proceed an overview of demographic descriptions of the participant businesses. The demographic section is to provide context of the participants' ventures and assists in the transferability of the project. The discussion that follows presents displays of summaries and drawn conclusions with verbatim quotes from the transcribed interviews. These said collections and presentations of data are utilised as deemed most suitable for the respective investigative topic. The table that follows, Table 4.1, presents the results from the demographic information collected through the interviews.

## 4.2 Demographics

This section will introduce the participants by discussing the business demographics, naming their given pseudonyms, and depicting a given colour that is used to represent each business participant in the displays and tables. This section will provide an overview of the businesses by describing the business, the product and/or service, businesses age, whether they served a business or end consumer or both, and their size classification according to the South African Department of Small Business Development (2019). Found similarities and polarities of the participants will be discussed with a conclusion of the findings. Table 4.1 that follows summarises the participant demographic information, of which the raw data (quotations) can be referred to in Annexure A.

Table 1 Participant Demographics

<b>Business Pseudonym</b>	<b>Business description</b>	<b>Product or service description</b>	<b>Business to business or Business to consumer</b>	<b>Business age</b>	<b>Number of employees &amp; MSME categorisation</b>
Participant A	Resells high-end designer apparel	Product: Business sells pre-used designer apparel Service: Consignment sales service for clients wanting to sell	Business to consumer	1.5 years	3 - Micro
Participant B	Business processes clothing for reuse, upcycling and downcycling	Product: Business collects and sorts clothing for reuse and recycling. Business also does enterprise development	Mostly Business to business with some business to consumer	11 years	30 - Small
Participant C	Resells women's, men's and, children's apparel	Product: Business sells high-street apparel	Business to consumer	3.5 years	4 - Micro
Participant D	Collector and sorter of textile waste	Service: Textile waste management service, waste disposal service Product: Sales of textile waste, sales of imported fabric with environmentally sustainable attributes	Mostly Business to business with some business to consumer	3.5 years	Micro Exact number of employees unconfirmed by participant

Participant E	Environmentally sustainable apparel designer	Product: Business sells apparel with environmentally sustainable attributes	Business to consumer	2 years	1 - Micro
Participant F	Resells used school uniforms	Product: Business sells reused primary school uniforms Service: Consignment sales service for clients wanting to sell children's uniforms	Business to consumer	1 year	1 - Micro
Participant G	Operating out of a workshop, this business repairs, alters, refurbishes and remanufactures clothing	Service: Alterations, repairs, refurbishing and remanufacturing of clothing	Business to consumer	1 year	2 - Micro
Participant H	Retailer of outdoor sports gear	Product: Business manufactures and sells outdoor gear made from textile waste	Mostly business to consumer with some business to business	8 years	53 - Medium
Participant I	Retailer of women's and men's apparel, but mostly clothing	Product: Clothing sold through nationwide store chain	Business to consumer	7.5 years	45 - Small

- As shown in Table 4.1, Participant A sells high-end second-hand apparel to the consumer market, through an online retail platform. In addition, the business has a selling service that is consignment based for people wanting to sell their own item(s) through the shop. Initially, Participant A was selling lower end brands but shifted to selling only premium designer brands to make the costs associated with selling feasible for the business. Participant A is classified as a micro business with three (3) employees (South African Department of Small Business Development 2019).
- Participant B is a more established business, having begun 11.5 years ago. In a high-level process, this business collects and sorts clothing for reuse, upcycling and downcycling. Collection occurs as the result of a business partnership with an international clothing retail company that has a take-back system, whereby the donated items from consumers are sent to Participant B for processing. Donations are also received by Participant B through religious organisations and other organisations that collect unwanted clothing. Participant B's service evolved from processing clothing for reuse to upcycling and downcycling, with the inclusion of employing people with disabilities and enterprise development. This business deals mostly with businesses with some products created within the business sold directly to the end consumer. Participant B employs 30 people and is categorised as a small business (South African Department of Small Business Development 2019).
- Participant C identified as a 'high-street apparel reseller', meaning that this business resells used clothing of a particular quality and price point. This business began selling womenswear but diversified to include selling menswear and kidswear. Retailing the product through an online platform, this business deals strictly with consumers. The business began 3.5 years previously and is classified as a micro business with four (4) employees (South African Department of Small Business Development 2019).
- Participant D collects and sorts textile waste for further processing. Recognising a gap between waste generated through clothing manufacturing and textile recycling, this business has positioned itself to mostly serve clothing manufacturing companies by redirecting the textile waste produced by these companies on to a textile recycling business partner. This business has other, less significant, products and services that deal with resale and sale of textiles for use. Participant D mostly deals with other businesses with some consumer transactions. Participant D's business is 3.5 years old and is classified as a micro business with the exact number of employees unconfirmed (South African Department of Small Business Development 2019).

- Participant E identifies as an ‘environmentally sustainable apparel designer’ by selling apparel with environmentally sustainable attributes. This business began with fashionable, trendy products that it did not consider environmentally sustainable but has since shifted to offer apparel with environmentally sustainable qualities. This business has been in operation for two (2) years and consists of one (1) employee only.
- Participant F began the business of selling used school uniforms less than one (1) year before the time of the data collection. Like Participant E, this business only has one (1) employee. This business also sells the school uniform items on a consignment basis if these items are not received by the business as donations. The product is sold only to consumers.
- Participant G operates out of a workshop and serves the local community with services to alter, upcycle, repair, remanufacture, and refurbish consumer clothes. This business consists of two (2) employees, so is classified as micro (South African Department of Small Business Development 2019).
- Participant H retails outdoor gear for hiking, running, and other outdoor applications, which is constructed from textile waste produced from the retail and yachting industry. Participant H’s business is eight (8) years old and is classified as a medium-sized business due to its 53 employees (South African Department of Small Business Development 2019). This business deals mostly with retailing to an end consumer with some products sold by the business to other businesses.
- Participant I produces seasonal women’s and menswear clothing collections for retail that is sold through a nation-wide store chain. Participant I is a brand within a bigger organisation that houses similar brands that sell consumer apparel and goods. Participant I had been operational for 7.5 years at the time of data collection and is classified as a small business with 45 employees (South African Department of Small Business Development 2019).

This section provided an overview of the businesses within the research sample and discussed demographic information about each business. According to the South African Department of Small Business Development (2019), most participant MSMEs classified as micro with a few small and one medium-sized business, based on the number of employees working within the businesses. Most businesses were found to have a consumer focus, with some having a strictly business to business exchange and few serving both customer and business. Most of the participants have a retail orientation, whereby they are directly involved with the sale of apparel with some businesses focusing



on the processing of clothing and textile-related goods for further use. A recurring type of business within the research sample were businesses whose main product was selling or processing second-hand apparel and selling reused products. Most businesses catered to an end consumer and showed an age range of 1 – 11.5 years of existence. The next section will explore the found environmentally sustainable practices occurring within their businesses, labelled, and classified according to the 9R Framework (Potting et al. 2017).

### 4.3 Environmentally Sustainable Practices of South African Clothing and Textile

#### MSMEs

This section will address findings collected to answer the first research objective: *“To investigate the environmentally sustainable strategies of clothing and textile business models and product chains.”* This section firstly defines the nine (9) environmentally sustainable practices/strategies from the 9R Framework and then collates and discusses the found environmentally sustainable practices occurring with the research sample according to the 9R framework. A discussion of each R practice from the 9R Framework as found occurring with the businesses is followed by a discussion on relationships found between the practices. A product chain overview to investigate the linearity and circularity of resource flows of the businesses follows. The found practices are discussed within the context of gauging their sustainability, according to the said 9R Framework. The section will conclude with an in-depth investigation of product chain processes where environmentally sustainable practices classified with a R practice from the 9R framework were found in the businesses.

Definitions follow in Figure 4.1 of the R practices of the 9 R Framework, according to Potting et al. (2017).

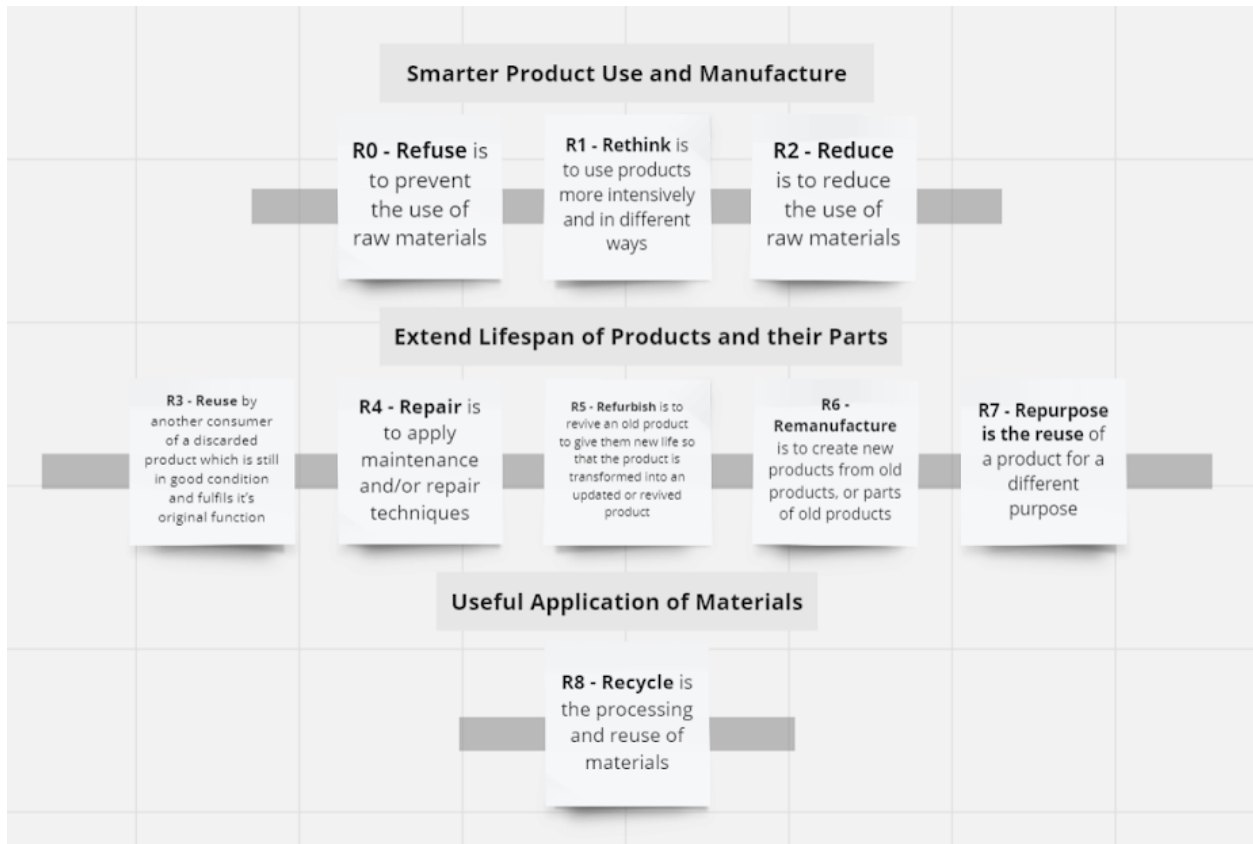


Figure 2 Definitions of R practices of the 9R Framework (Potting et al. 2017)

This section will explore the environmentally sustainable practices within the participant businesses and will begin with the said practise's summaries, collated in Table 4.2 that follows. The raw data of quotations used to formulate the summaries can be referenced in Annexure A, Table 1.2 Environmentally sustainable practices. A discussion that explores connections between the three (3) categories that collect and structure the R practices from the 9R Framework reveal relationships between three (3) overall groups of strategies. Then, a discussion of the found environmentally sustainable practices occurring within the businesses is grouped and discussed according to each R practice from the 9R Framework.

Table 2 R Practices of Participants

SMARTER PRODUCT USE & MANUFACTURE			EXTEND THE LIFESPAN OF PRODUCTS AND THEIR PARTS					USEFUL APPLICATION OF MATERIALS
REFUSE - R0	RETHINK - R1	REDUCE - R2	REUSE - R3	REPAIR - R4	REFURBISH - R5	REMANUFACTURE - R6	REPURPOSE - R7	RECYCLE - R8
PA: Refuse or limits packaging waste by only using recycled, repurposed packaging for transporting products	PA: Product sharing	PB: Reduces the use of raw materials through upcycling and downcycling practices	PA: Sells second-hand luxury apparel	PA: internal & outsourced repair and mending of second-hand luxury apparel	PG: Upcycle clothing service	PE: remanufactures new apparel from old apparel	PB: Collected garments are processed for repurposing by a business partner who repurposes the waste as parts for pavers	PB: Collected clothing is recycled with a business partner

PE: Refuses to use new materials by upcycling	PB: Product sharing	PE: Reduces production waste through the use of fabric scraps generated through another clothing product's manufacturing process	PB: Collects and sorts garments for reuse	PC: Items for sale are repaired as needed	PG: Colour restoration for faded clothing	PE: Uses textile waste (not explicitly for apparel) within apparel items	PE: remanufactures new apparel from old apparel	PD: Supplies textile waste to business partner as input for textile recycling
PH: Textile waste from retail industry is used as raw material for product	PC: Product sharing	PG: Reduces the quantities of clothing generated through fast fashion from going to landfill	PC: Second-hand sale of women's, children's and men's apparel	PG: Repairs garments once or twice in the garment's use	PG: Alteration of clothing service	PG: Uses clothing alteration off-cuts to create new garments/ parts of garments	PH: Uses textile waste from another industry as raw material	PH: Uses regenerated nylon that is recycled with an external partner
	PE: Rethinks what virgin materials could be (uses reused fabrics)	PI: Reduces the amount of waste by eliminating the spare button in plastic zip seal bag that is commonly attached to garments, or	PD: Textile waste off-cuts big enough for use are sold to designers and crafters for use	PH: Bags are repaired		PH: Product textile or components are reused in another product		PH: All textile waste generated through manufacture is recycled through an external partner

		just eliminating the plastic bag						
	PF: Product sharing		PF: Sells second-hand school uniforms			PI: Product development range sample file is donated to local university for samples and trims to be remanufactured		
	PH: Textile waste from different industries is used as bag raw material (uses reused fabrics)		PI: Product development and sourcing samples are sold at an internal sample sale or donated					
	PH: Reuse of returned bags (or parts) for products							

### 4.3.1 9R Framework Category Connections

The relationship between the categories that group the practices is explored in this section. As referred to previously, the Refuse, Rethink, and Reduce practices relate to smarter product use and manufacture, and these practices inform design decisions prior to production taking place (Geissdoerfer et al. 2018). This group of practices precedes strategies to extend the lifespan of products or their parts, such as strategies of Reuse, Repair, Refurbish, Remanufacture, and Repurpose, which retain finished goods and their parts while maintaining or improving their value (Geissdoerfer et al. 2018; Potting et al. 2017). The final category of practices for useful application of materials entails recycling materials (Potting et al. 2017). The practices identified in the participants that relate to smarter product use and manufacture were often found to link to a practice, or practices, that are classified in the group of R-Strategies that extend the lifespan of products and their parts. This relationship between the categories can be seen in the displays that follow.

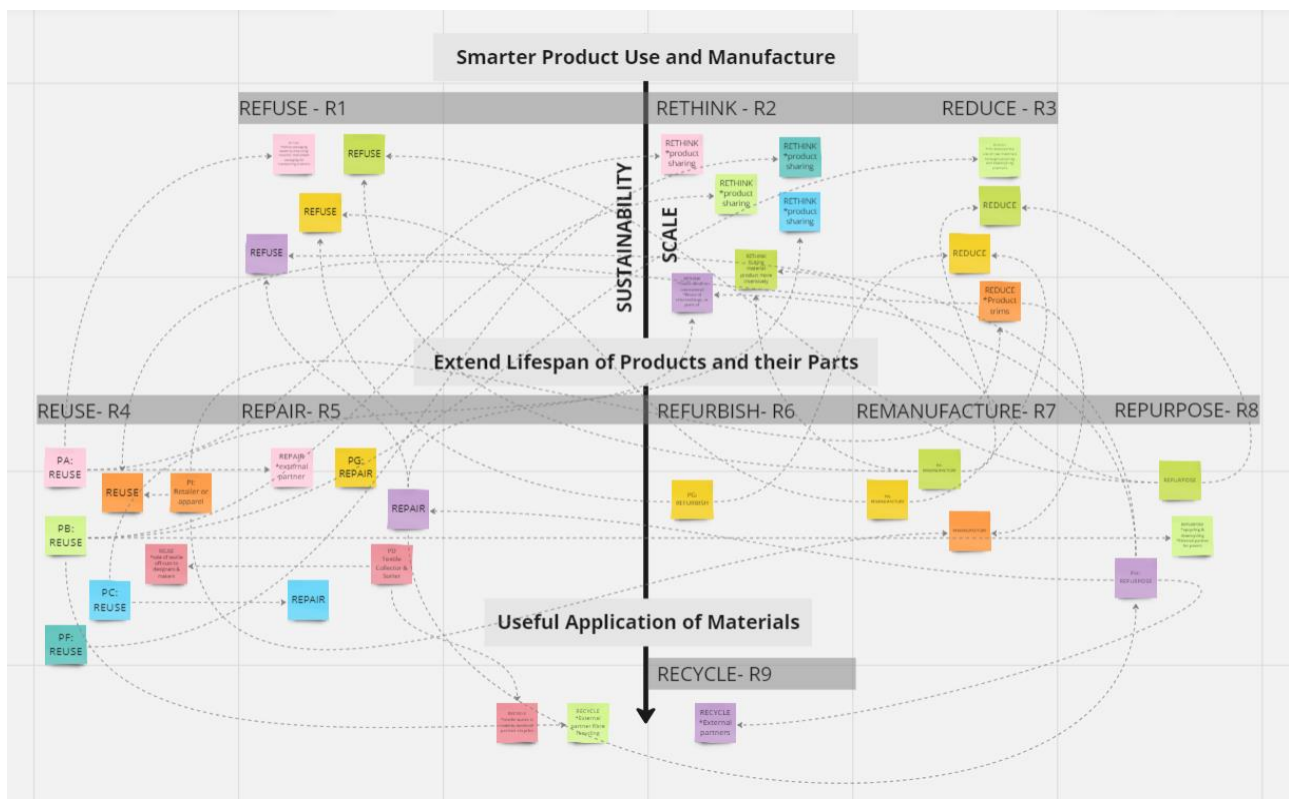


Figure 3 Circular Practices on Sustainability Rating Scale

The occurrence of strategies from two of the main categories that group the R strategies of Smarter Product Use and Manufacture, and Strategies to Extend Lifespan of Products and their Parts can be seen

in Participants A, B, C, E, F, G, H and I. Participant D was found to be practising a strategy from the 'Smarter Product Use and Manufacture' group and the 'Useful Application of Materials' group. These findings reveal that there was always more than a singular R practice occurring within each business product chain and that these multiple occurring practices dealt with different levels of sustainability (R0-R8) (Potting et al. 2017). This connection between multiple circular initiatives was found in a study that used the R Framework by Morsetto (2020), who found that circular initiatives can address more than one of the R-Strategies. Moreover, like in the study by Morsetto (2020), it was found that R-Strategies from the group of strategies to enable 'Smarter Product Use and Manufacture' (Reduce, Rethink, and Refuse) facilitate the remaining strategies, either from the strategies of the 'Extend the Lifespan of Products or their Parts' group, or the strategies from the 'Smarter Product Use and Manufacture', the third group. Therefore, many of the strategies found to be practised by participants facilitate other found environmentally sustainable practices with the business' product chains. Moreover, it can also be said that a connection was always found to be occurring between at least two (2) of the three (3) groups of the R-Strategies. The connected environmentally sustainable practices, or R practices, found within the businesses will be discussed in more detail in a sub-section to follow. It was found that most of the environmentally sustainable practises are occurring within the 'Strategies to Extend the Lifespan of Products and their Parts' tier, meaning that most participants were engaging in strategies to retain finished goods and their parts while maintaining or improving their value (Geissdoerfer et al. 2018). Moreover, these practices aim to reverse or postpone obsolescence (Geissdoerfer et al. 2018). The section that follows will explore which and how the practices from the 9R Framework occurred within the participant BMs.

#### 4.3.2 9R Framework Sustainability Practices

The section that follows will explore each practice of the 9R Framework, as found practised within the participant businesses. The discussion will begin with and follow the order of the nine (9) practices within the R Framework, and will begin with the group of Refuse, Rethink and Reduce, which are considered practices that enable smarter product use and manufacture. The definition of **Refuse** is to prevent the use of raw materials by the use of a product, or the product itself is no longer required in the product chain (van Buren et al. 2016). Participant A was found to refuse or intentionally limit the amount of 'virgin' or first-use packaging waste. The business would reuse packaging or would repurpose a bag as packaging. Both Participant E and G were found to refuse the use of virgin fabrics and rather used upcycled textiles to create clothing and apparel. The same repurposing of textile was found

practised in Participant H's product chain, preventing the use of raw materials to create the business' product. Participants E, G and H, therefore, used a textile for the second time as the products' raw material. The practices of Refuse as found in participants is shown in Figure 4.3

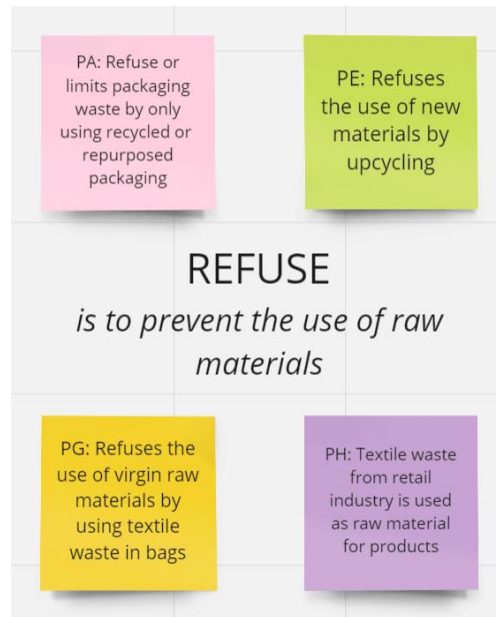


Figure 4 Practices of Refuse

The second option is that of **Rethink**. Rethink is to enable the use of products more intensively and in different ways (Potting et al. 2017). In addition, Kirchherr and Piscicelli (2019) and Potting et al. (2017) assert that product sharing is a practice that enables the increased use of a product. Activities of product sharing were found in Participants A, B, C, E, F, and H, as shown in the display that follows.



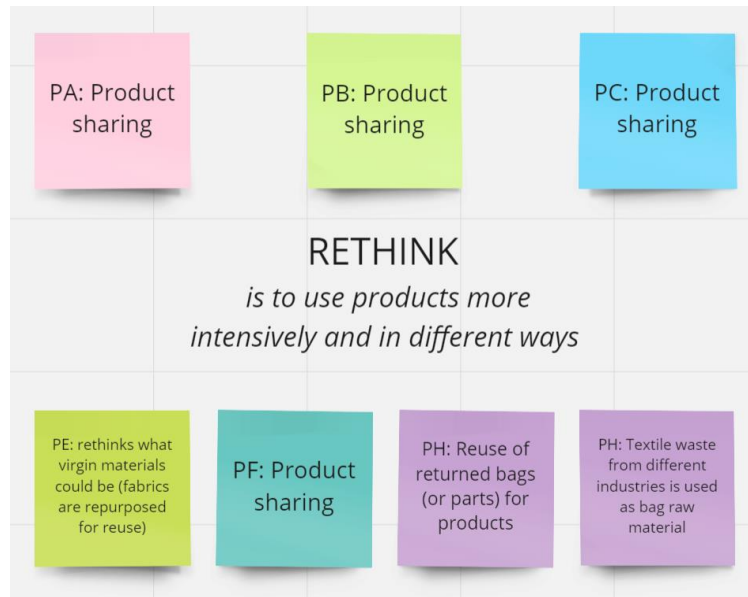


Figure 5 Practices of Rethink

A common factor of Participants A, B, C, and F is that these businesses' primary products and intention for these products is Reuse (Reuse enables product sharing, which is using products more intensively) and thus the businesses enable the sharing of a product through the sale of a previously owned product. Reuse is defined as the use of a discarded product that is still in good condition and fulfils its original function by second or subsequent consumers (Potting et al. 2017). Therefore, a product that is reused will always increase the intensity of a product's use. Participant E uses clothing products as a raw material for the businesses' product, which is a more intensive use of previously used clothing products, while Participant H reuses textile waste, which forms the primary material for its products. In addition, Participant H enables more intensive use of its products through the activity of Repair. In summary, Rethink was a commonly allocated practice to the found environmentally sustainable practices occurring within the participant businesses. Participants A, B, C, and F explicitly enabled product sharing through the second use of a previously used item, and Participants E and H reused clothing or textile as the primary raw material for their products.

The section that follows will explore the final strategy collected within the strategies that enable the extension of a product's, or the products parts' life span, which is the strategy of **Reduce** and is defined as the use of raw materials by prolonging the life span of products through the reduction of raw or natural materials and resources (van Buren et al. 2016). This practice was interpreted to mean that the participants in some way enabled the reduction of resources through practices found within their

product chains. Most gains for Reduce were the reduction of raw materials or materials used within the product chains. This finding is explored in the discussion that follows and shown in Figure 4.5.



*Figure 6 Practices of Reduce*

Participant B reduced quantities of resources required to produce products by using upcycled and downcycled materials, which were collected through the practice of Reuse. Participants E, G, and I all practice the reuse of existing materials or textiles in place of the virgin/first-use equivalent, thus reducing their reliance on raw materials to produce their products. Participants E and G upcycled and reused fabrics, thus reducing the need for raw materials. Participant I had measures in place to limit the amounts of samples produced through their product development process, thus a reduction of resources through decreased sample production. Most of the practices found to enable Reduce were the reduction of raw materials and resources through reuse interventions by the businesses themselves, or within the materials used that feature in the participants' product chains.

The section that follows will discuss practices found within the participants' product chains that retain finished goods and their parts while maintaining or improving their value. These practices intend to extend the life span of products and their parts (Geissdoerfer et al. 2018). The first practice that will be explored is the practice of **Reuse**, which is defined as using a discarded product which is still in a good condition and fulfils its original function again (Kirchherr & Piscicelli 2019; Potting et al. 2017).

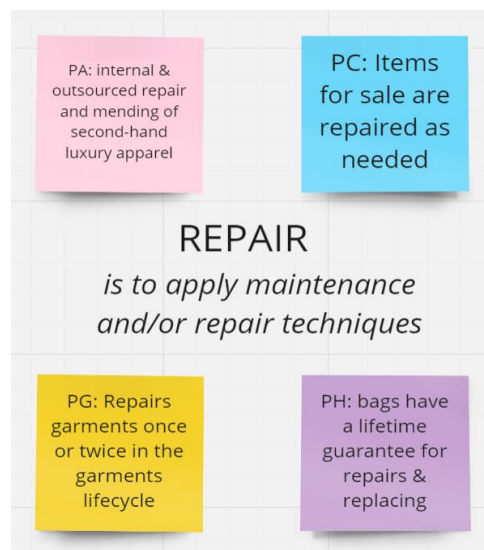


Figure 7 Practices of Reuse

Most of the participant businesses were found to be practising Reuse in some way, as found in Participants A, B, C, D, F, and I. A notable proportion of the businesses sold second-hand goods, as found in Participants A, B, C, and F. Participant D enabled the reuse of textile waste that was collected as part of the business' raw material intake and then sold. Participant I's activities of Reuse were found occurring within the product development part of their product chain, whereby samples produced through the product development process of their seasonal collections were reused through the sale or donation of the samples. There was a repetition of businesses found to incorporate strategies categorised as Rethink, as what were categorised as Reuse, as found with Participants A, B, C, and F.

The next section will discuss the practices of **Repair** found within the participant businesses. Repair is defined as applying maintenance and/or repair techniques to deficient or damaged products and their components to achieve increased longevity (Kirchherr & Piscicelli 2019; Potting et al. 2017; van Buren et al. 2016). Repair was found to be practised among Participants A, C, G, and H. In these businesses, the practice of Repair often occurs as a business practice or is enabled through a business partner, who is a key part to making and delivering the product or service offered by the business. Practices of Repair were mostly found to be linked to a necessary step in the preparation of the product for sale, and only Participant H offered repairs as part of the service of their products' lifetime guarantee. Among

Participants A, C, and F, Repair as a step in the product chain was not always required as these businesses sold goods that were in a suitable condition for sale as it was. However, Participant A and C would do activities of Repair where required to improve the value of the product. In addition, the practice of repairing, either as part of business practice or through a key partner, was found in the businesses whose product chain centred around Reuse, as found in Participants A and C. Participant G applied repair and maintenance techniques to products as part of the businesses' service offering and sometimes repaired a garment more than once. Participant H repaired its own products, which were sold and then returned for repair. Out of all the Participants, only Participant H engaged with Repair for products exclusively made by the business. Participant F's business also focused on Reuse, like Participant A, B and C, but was not linked to activities that would be considered repairing because Participant F did not accept any products into the business that required repair, eliminating the potential occurrence of this practice as displayed in Figure 4.7.



*Figure 8 Practices of Repair*

It is important to note that Repair was always found to be in connection to a garment or apparel, as opposed to textiles, and was used to improve the value and quality of a product, in cases where the product required improvement.

The next practice that will be discussed is **Refurbish**, which is defined as reviving an old product to give it new life so that the product is transformed into an updated or revived product (Kirchherr & Piscicelli 2019; Potting et al. 2017; van Buren et al. 2016). The practices of Refurbish can be viewed in Figure 4.8.



Figure 9 Practices of Refurbish

The least found practice occurring among the participants was the practice of Refurbish. Participant I was the only participant that had any business practices related to Refurbish. These found environmentally sustainable practices were realised as part of services offered by this business. What was unique about this business was that the business only offered services of colour restoration (overdyeing), clothing alterations, and upcycling to end customers, but did not sell products. Participant I operated out of a workshop setting and as the business exclusively offered services, did not require a retail setting to present products for sale, like the other businesses who sold products.

Environmentally sustainable practices of **Remanufacture** will be discussed next. This section begins with a brief description of the practices shown in Figure 4.9, followed by a discussion of the said practices.

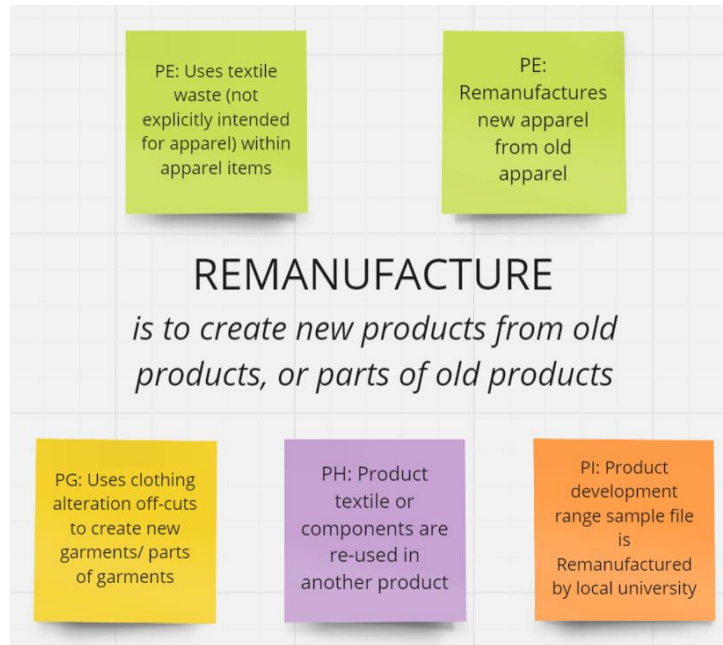


Figure 10 Practices of Remanufacture

Remanufacture, defined as creating new products from old products, or parts of old products (van Buren et al. 2016), was found to be occurring in four (4) of the business participants, all with a different type of product chain and product. Participants E, G, and H had practices occurring as part of the product chain, whereas Participant I gave part of the waste generated through production to a university to upcycle and use for clothing and textile application. Whereas Participants E and G did not have a set product outcome for Remanufacture, Participant H had an established product range that any product component could be reused within. Lemille (2021) states that remanufacturing has advantages of reducing volumes of durable materials, as found within the participant businesses.

The section that follows will discuss the found practices of **Repurpose**. Repurpose is defined as reusing a product for a different purpose or parts of a product for a different function (Geissdoerfer et al. 2018; van Buren et al. 2016). The practice of Repurpose was found to be occurring with Participant B, where garments were repurposed with a business partner who uses the clothing waste as a raw material for pavers. Participant E uses textile waste (not explicitly for apparel) as raw material for apparel products, while Participant H uses textile waste from another industry as the raw material to manufacture products sold by the business. Within these different practices that are classified as Repurpose, innovation in the design/product was found. This was because the application or use of the raw

materials is unconventional. Figure 4.10, which follows, displays descriptions of the practices of Repurpose.

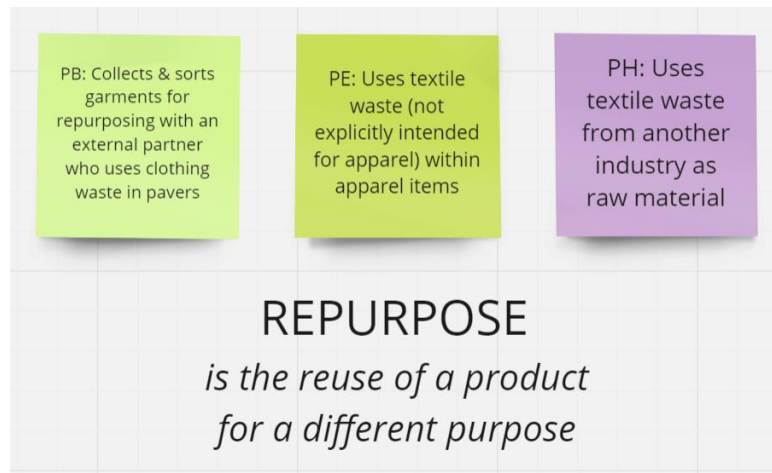


Figure 11 Practices of Repurpose

The various products that result from Repurpose as found occurring in the participants' businesses are made using unconventional methods, or unconventional raw materials for the product.

The next section will discuss the practices of **Recycling** as found within the participant product chains. Recycling is defined as the processing and reuse of raw materials (van Buren et al. 2016). The practice of Recycling was found to be a part of Participants B, D, and H's product chains. None of the businesses practise Recycle as a business practice, but the participants engaged with business partners who actioned the practices of textile recycling. This could be due to textile recycling being a new process within the South African textile industry, and also due to the required infrastructure and beneficiation required to sustain the produced fibre output. All these businesses that practise recycling have business to business dealings, within the context of either a B2B or B2C product/service offering. In addition, Participants D and H had a service part of the businesses' product offering that was connected to recycling, occurring as previously stated. The said findings are displayed in Figure 4.11 that follows.

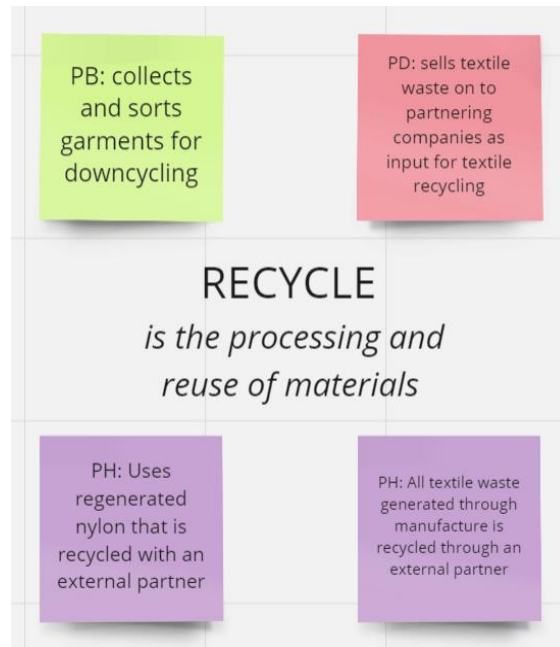


Figure 12 Practices of Recycling

In summary of the discussion of the individual R practices of the 9R Framework, it was found that the R practice allocated to each business was often fundamental to the products or services' product chain within all but one of the businesses. This means that the practice was often found to relate to the product or service itself, or the steps found occurring in the product chains of the product or service. The one business that this was not evident for (Participant I) had the allocated practices occurring in the earlier part of the business's product chain, occurring as reuse of sample products and selective inclusion of product trims to eliminate waste. Most businesses were found to be practising Reuse, with only Participant G practising Refurbish. A variety of business types and product/services were found to be practising Repair. Businesses who had Recycle as part of their product chain were enabled through a business partnership that actioned the recycling of textile to produce fibres. As is evident from the aforementioned, several of the R aspects were incorporated simultaneously in the various practices, and the section that follows will discuss these multiple R practices occurring in the participant businesses.

#### 4.3.3 Simultaneously Occurring Environmentally Sustainable Practices

In this section the participant businesses are explored to determine if and how multiple R practices occur and relate to one another. A study by Morsetto (2020) employed the R Framework and it was found that circular initiatives or priorities can address one or more of the R-Strategies, reiterating the possibility of the inclusion of multiple R practices simultaneously. It was found that in this study most



businesses had multiple practices from the R Framework occurring within the businesses. Therefore, multiple sustainable practices were linked to another sustainable practice for each participant (A-I), as seen in Figure 4.12 to Figure 4.20 that follow.

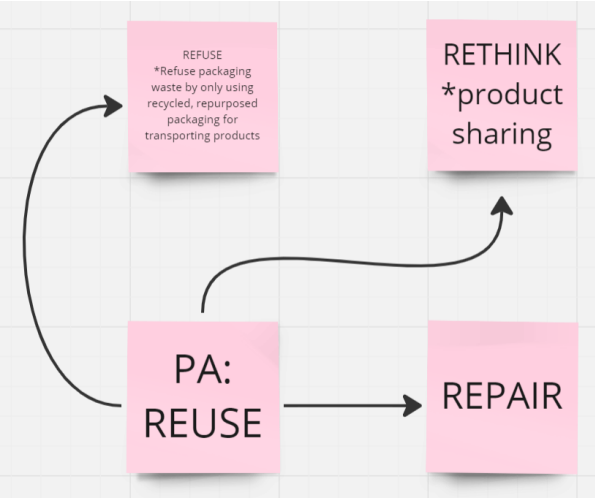


Figure 13 Simultaneous R Practices of Participant A

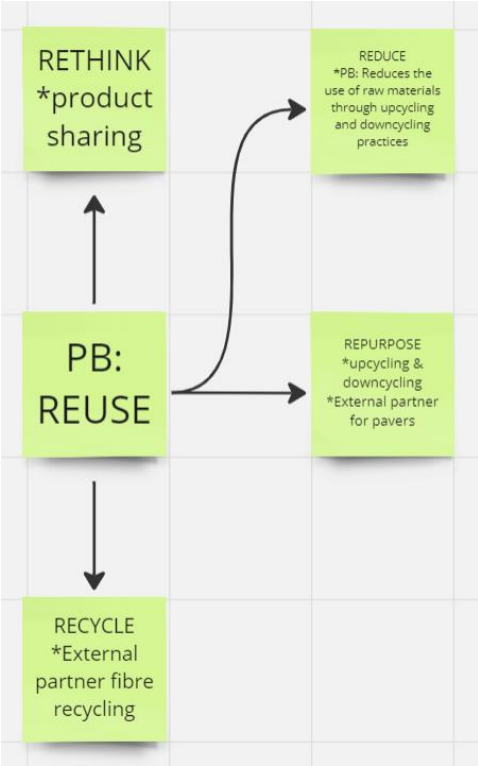


Figure 14 Simultaneous R Practices of Participant B

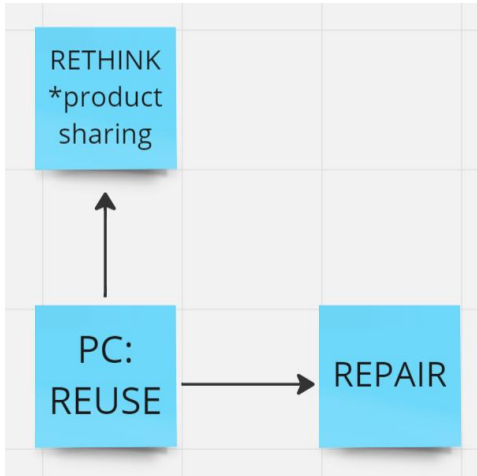


Figure 15 Simultaneous R Practices of Participant C

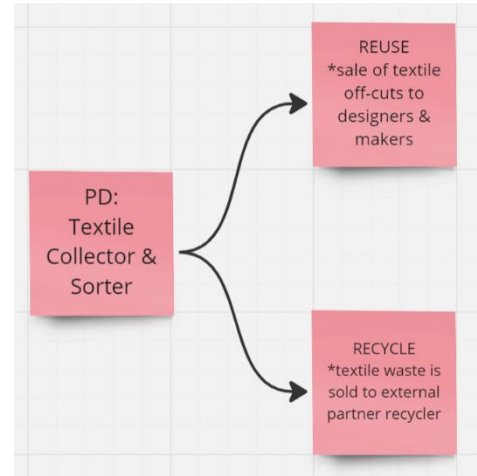


Figure 16 Simultaneous R Practices of Participant D

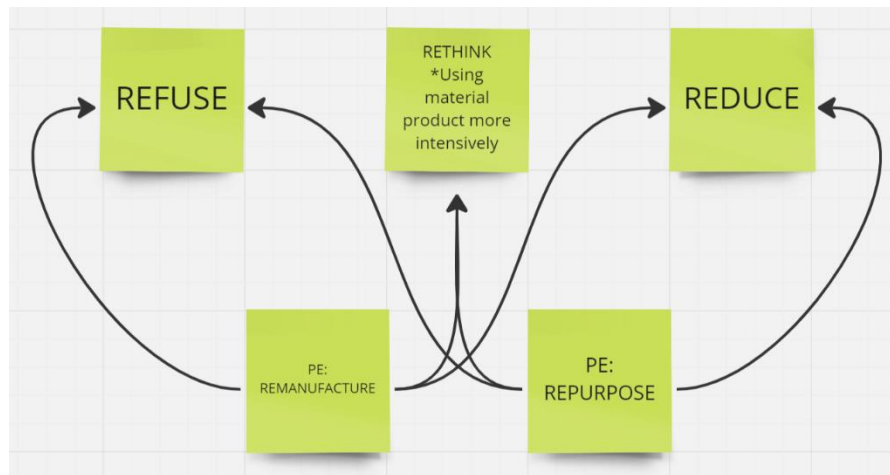


Figure 17 Simultaneous R Practices of Participant E



Figure 18 Simultaneous R Practices of Participant F

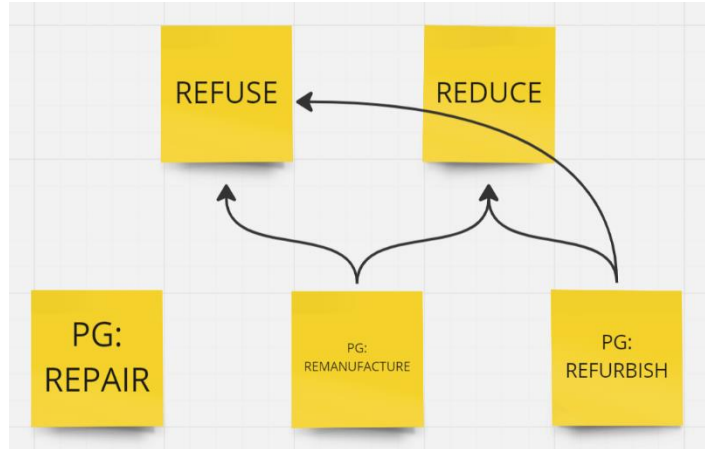


Figure 19 Simultaneous R Practices of Participant G

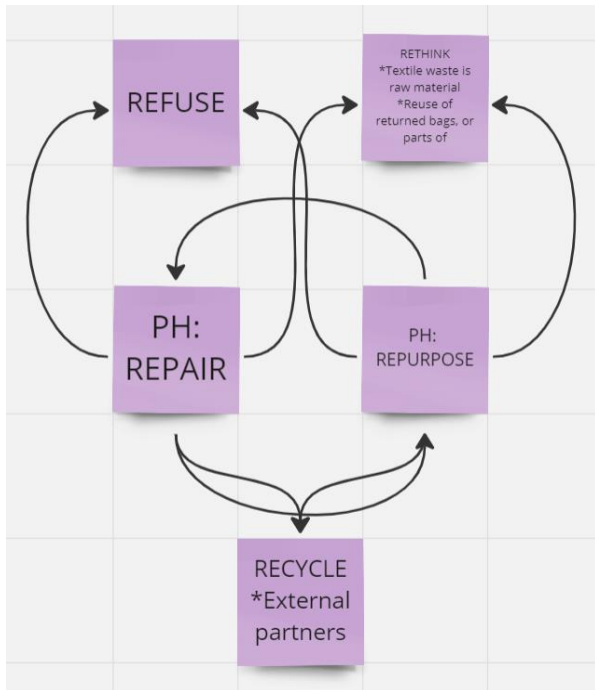


Figure 21 Simultaneous R Practices of Participant H

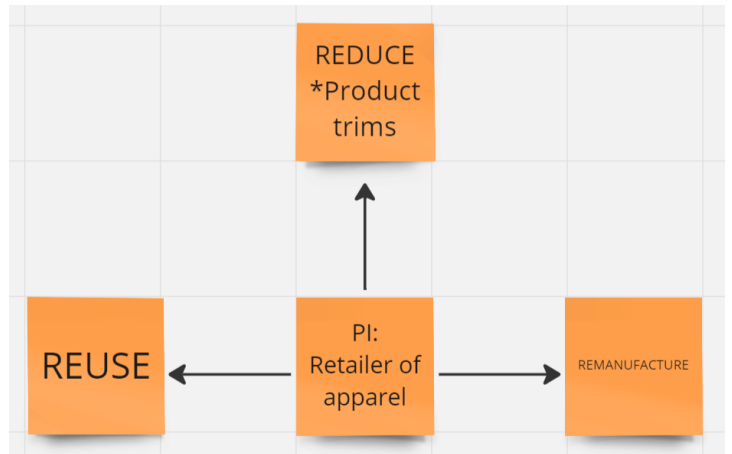


Figure 20 Simultaneous R Practices of Participant I

In Participant A's product chain, activities of Refuse, Rethink, Reuse, and Repair were found. A similar connection of practices was found for Participant C, whereby practices of Rethink, Reuse, and Repair were identified. A commonality between Participant A and C is that both businesses practise Reuse of previously used clothing, while a similar collection of practices was found for Participant B whose business also centred around the reuse of clothing (Participant B: Rethink, Reduce, Reuse, Repurpose, and Recycle). Reuse was the practice found to be occurring most commonly (by 6 of the 9 businesses), and businesses that practised Reuse were found to be practising Repair (Participants A and C). Within the context of practices to extend the lifespan of products and their parts, within which Reuse and Repair are classified, both the said practices prioritise maintaining the highest possible value of the raw material within the category. What the businesses practising Reuse had in common was the practice of selling, or processing for the sale of, a second-hand item, for a variety of price points, as found in Participants A, B, C, F, and I. The upper end of price points found within the context of this study were found to be sold through online selling platforms (Participant A, C, and H), while the lower price points were found to occur in a physical work premises settings (Participant B) and an informal shop (Participant F). Moreover, it was found that the online-based businesses were formal, established businesses of the Small and Micro classification (South African Department of Small Business Development 2019).

Most businesses were found to have business partners within their product chains, except for one (where the environmentally sustainable practices from the R Framework are concerned). For all the businesses that were found to require some sort of recycling within their product chains, however, recycling was always done as a process that was external to the business, through a business partnership. In summary, it was found that all the participant business had multiple practices from the R Framework occurring within the businesses. There was a common link between strategies for smarter product use and manufacture and strategies to extend the lifespan of products and their parts (found in Participants A, B, C, E, F, G, and H).

#### 4.3.4 Product Chain Linearity and Circularity

This section will outline the production chain of each business to determine the linearity or circularity of resource flows. EMF (2021c) state that there has been an increase of BMs that incorporate environmentally sustainable practices, or circularity, in the fashion industry. To determine the circularity of the participants' resource flows, each business' product chain was investigated by plotting the steps

and processes described by each participant to have been significant to the producing of the service or product. It was found that most business had linear flows, as can be seen in the displays that follow of Participants A, B, C, D, E, F, and I. The said figures that follow consist of summaries of raw textual data, referenced in Annexure A, Table 1.3 Product Chain.

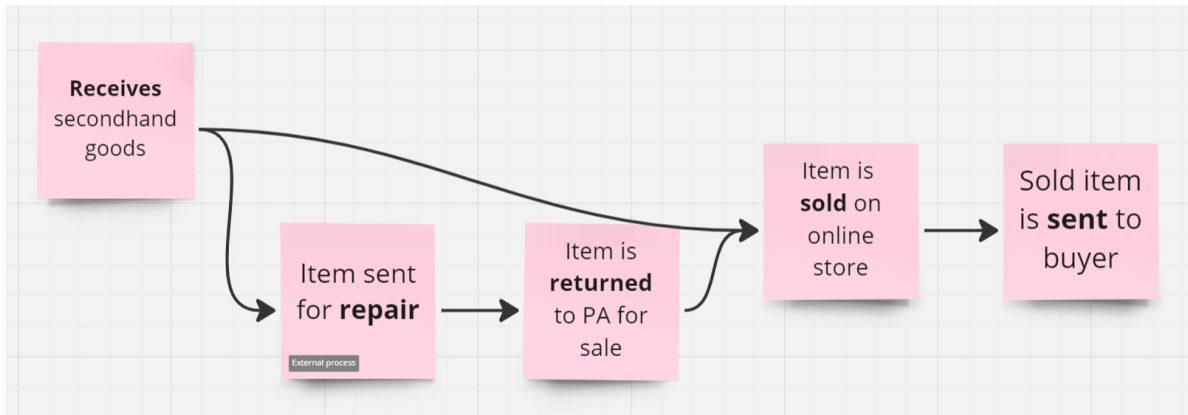


Figure 22 Resource Flow of Participant A's Product Chain

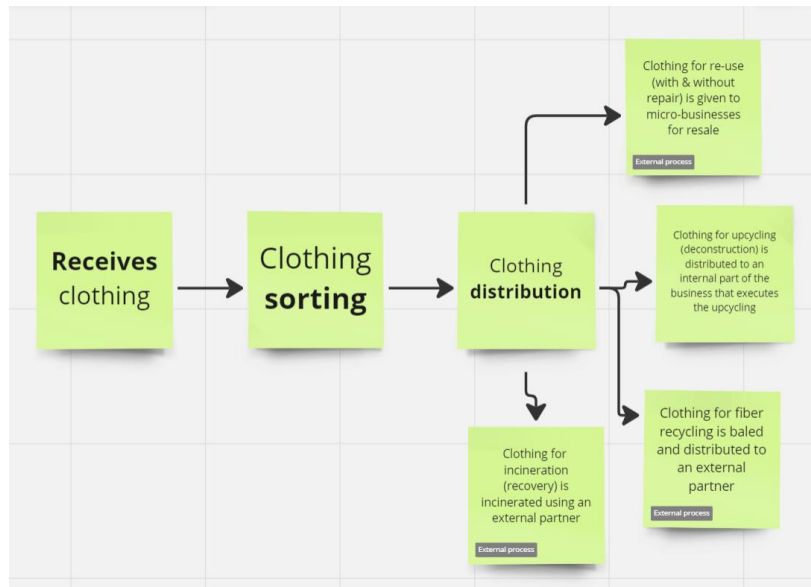


Figure 23 Resource Flow of Participant B's Product Chain



Figure 24 Resource Flow of Participant C's Product Chain

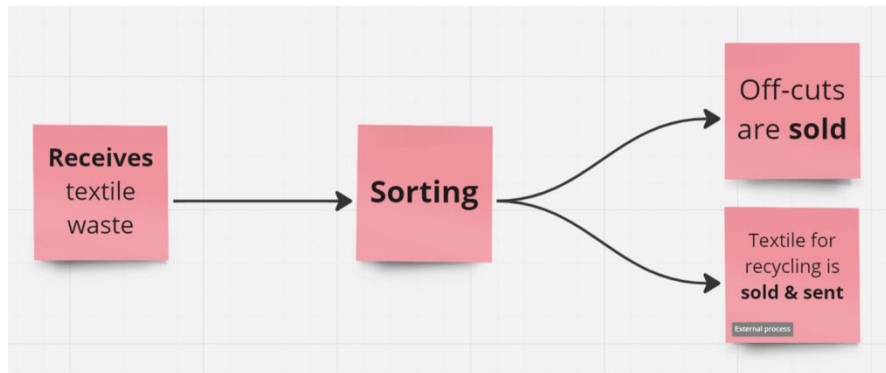


Figure 25 Resource Flow of Participant D's Product Chain



Figure 26 Resource Flow of Participant E's Product Chain

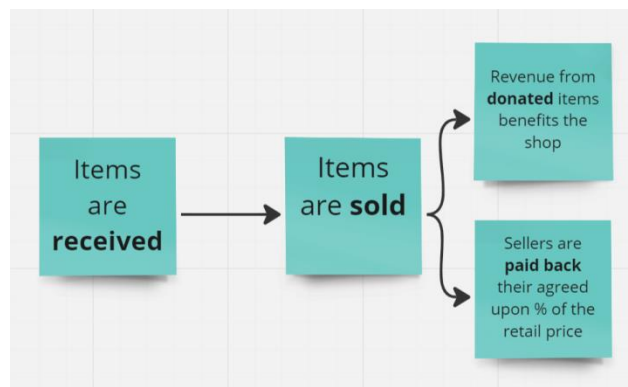


Figure 27 Resource Flow of Participant F's Product Chain

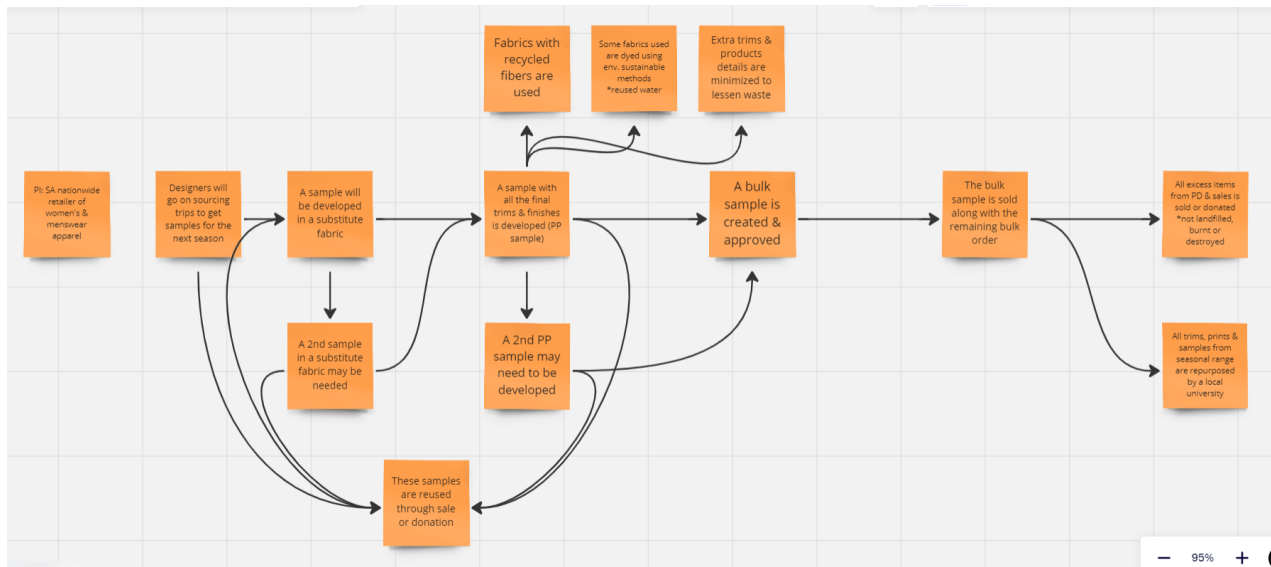


Figure 28 Resource Flow of Participant I's Product Chain

However, with two of the business participants, it was found that there were indeed circular resource flows occurring within the businesses. This circularity was due to the practices of Refurbish, where a product can be altered or repaired more than once as in the case of Participant G, and Repair, which occurs as part of Participant H's business product guarantee. The circular flows can be seen in Figures 4.29 and 4.30 which follow, from Participants G and H.

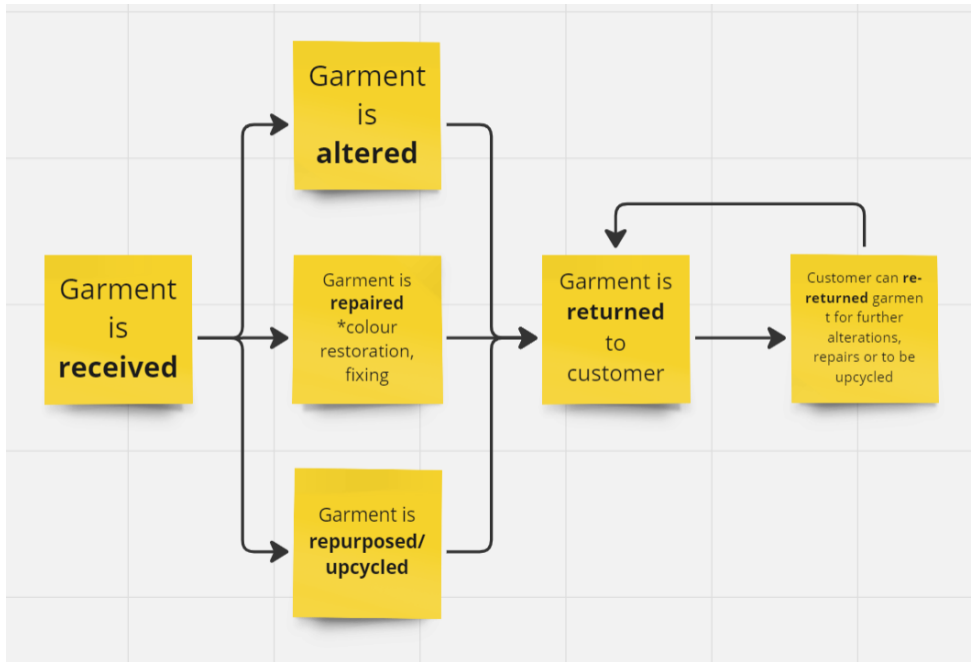


Figure 29 Resource Flow of Participant G's Product Chain

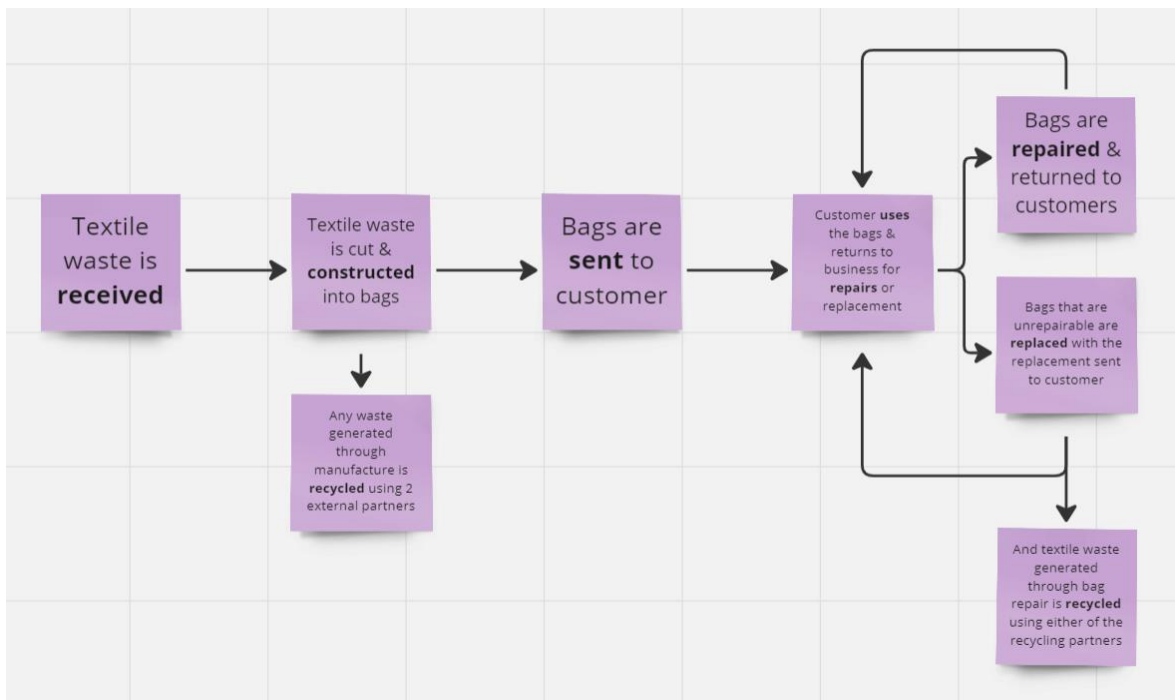


Figure 30 Resource Flow of Participant H's Product Chain



In both cases of circular resource flows of Participants G and H, it is important to note that the end user of the product enables the circularity of flows, due to their participation in returning the product to the businesses. With both Participants G and H, once the product has been returned to the business, the circular flow is actioned by the business as an internal process, without the input of a business partner. Therefore, the consumer is an enabler and actor participating in the circular flow of resources. This finding is consistent with the recognition of the consumer as an actor in enabling sustainability (Ceschin & Gaziulusoy 2016). This circularity found within the product chains is based on a product rather than parts of the product or raw materials. However, the products are disassembled in both the cases of Participant G and H, to produce parts of products that could then form part of a circular flow due to their reuse. A study by Claxton and Kent (2020) revealed that clothing businesses predominantly incorporate sustainability initiatives that address the material and production aspect of the said businesses' supply chains. This is in line with how the sampled population of BMs in this study have incorporated sustainability, as the initiatives mostly deal with better fabric and raw material selection, and the manufacturing phase of the product or service.

In summary, it was determined that the majority of participants have linear flows of resources within their product chains, as found in Participants A, B, C, D, E, F, and I. However, Participants G and H were found to have circularity within their product chains due to the circulation of resources enabled by the reworking of a product that was manufactured by the business. The circularity was actioned by the businesses as an internal business process, but initiated and enabled by the end consumer. The role that the end consumer plays, as stated, is concurrent with the notion that environmental sustainability requires actors like users to enable environmental sustainability practices (Ceschin & Gaziulusoy 2016).

#### 4.3.5 Product Chain Processes of Environmentally Sustainable Practices

The next section will discuss each business' process of the circular practices/s occurring. This section will also discuss the enabling factors of the environmentally sustainable practices. It should be stated here that some businesses' product chains are centred around the found circular practice, as found with Participants A, B, C, D, E, F, G, and H, while Participant I's circular practices affect only the initial part of their products' product chain. This section will group and explore similar practices occurring within the businesses and will begin with the most identified practice of Reuse. The figures in this section comprise summaries of raw textual data that can be referred to in Annexure A Table 1.3 Product chain.

Participant A's business is centred around the practice of Reuse and begins with the 'seller' engaging with the business to sell an item (product) on a consignment basis. The product is cleaned, repaired if needed, professionally photographed, marketed, and listed on the online store. When the product is sold, it is couriered to the purchaser and the seller is paid the agreed upon price, minus the agreed upon commission. A similar product chain process occurs in Participant C's business. Both Participant A and C sell second-hand items through an online store while there are differences in the initial selling terms, and product price and quality. Participant C 'buys' the products at 40% of the value the item will be sold for. The seller of the item is given a credit/voucher for the equivalent value of 40% to purchase from the remaining products sold by the business. Received products are then repaired, photographed in the businesses' studio, and added to the online selling platform for sale. With Participant C, consumers' purchased products are couriered to them, and they have the option to return the purchased item, as can be seen in Figure's 4.31 and 4.32 that follow.

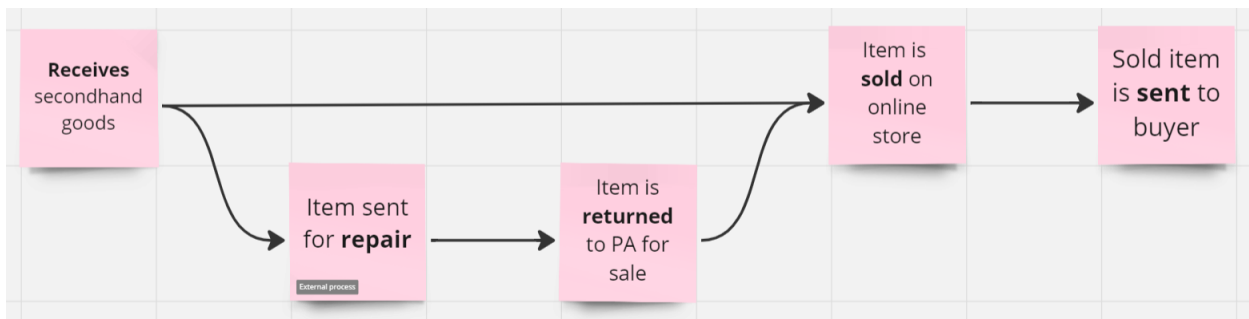


Figure 31 Product Chain Process of Participant A



Figure 32 Product Chain Process of Participant C

Another business centred on the practice of Reuse is Participant F's, which sells second-hand school uniforms. This business has a more informal setup where a simple brick and mortar shop has been established. Parents and children who are interested in purchasing an item will visit the shop to see what items are available. Products are received into the business either by donation or parents wanting to sell the school uniforms that their children no longer need, with the latter taking on a consignment

arrangement with the seller. Profit from donated items benefit the business, while items sold through the consignment arrangement benefit the sellers of the items, as seen in Figure 4.32 that follows.

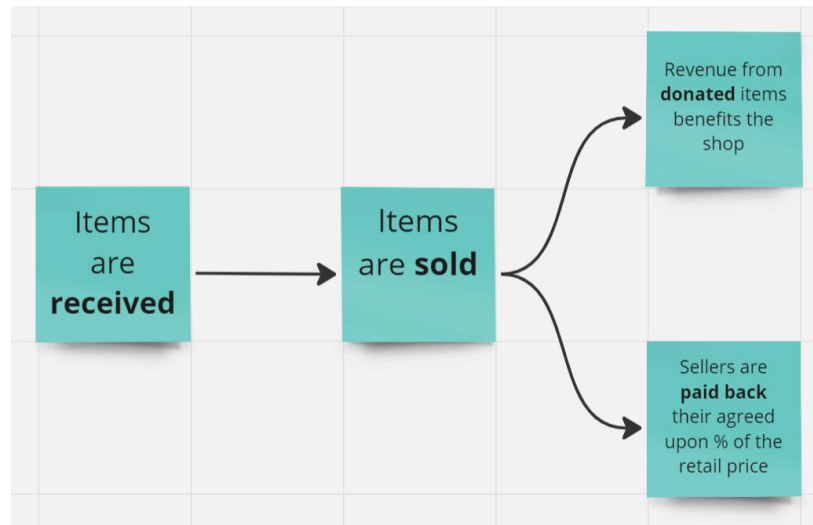


Figure 33 Product Chain Process of Participant F

An important observation to note about the Reuse practice found to be occurring within Participant A, C, and F's businesses is that the intervention to resale the used item is initiated by the consumer and executed by the business. This means that the end user of the item, within the context of the first use (parents in the case of Participant F), have the desire to resell the item and initiate the transaction with the participant businesses. This finding is supported by the recognition that sustainability requires actors like users to enable sustainability practices (Ceschin & Gaziulusoy 2016). The reliance on the end user (consumer) to provide the businesses products can also be seen with Participant B, who practises Reuse. Participant B receives clothing into the business through donations directly and via a business partner's take-back programme. Once the clothing is received into the business, it is sorted into various categories with the intention to maintain the highest resource value possible (Potting et al. 2017). Participant B sorts clothing received into the business according to which clothing items can be reused as is; which clothing items can be reused but require minor repairs; clothing for disassembly and repurposing; clothing intended for processing to create textile fibre; and textile/clothing for incineration. Clothing that can be reused without intervention is sold to micro businesses connected to Participant B through Participant B's enterprise development initiative, intended for resale. Clothing requiring repairs has the same destination, but the micro businesses execute the required repairs prior to selling the clothing. Clothing for disassembly is distributed to an internal part of the business for upcycling into products that

are created within the business. Clothing destined for fibre recycling is processed, baled, and distributed to an external partner for processing with the eventual use to be recycled. Clothing for incineration is distributed to a business partner for incinerating. Incinerating is the least sustainable R strategy, whereby embedded energy is recovered through the incineration of materials (van Buren et al. 2016). An overview of Participant B's product chain can be seen in Figure 4.33 that follows.

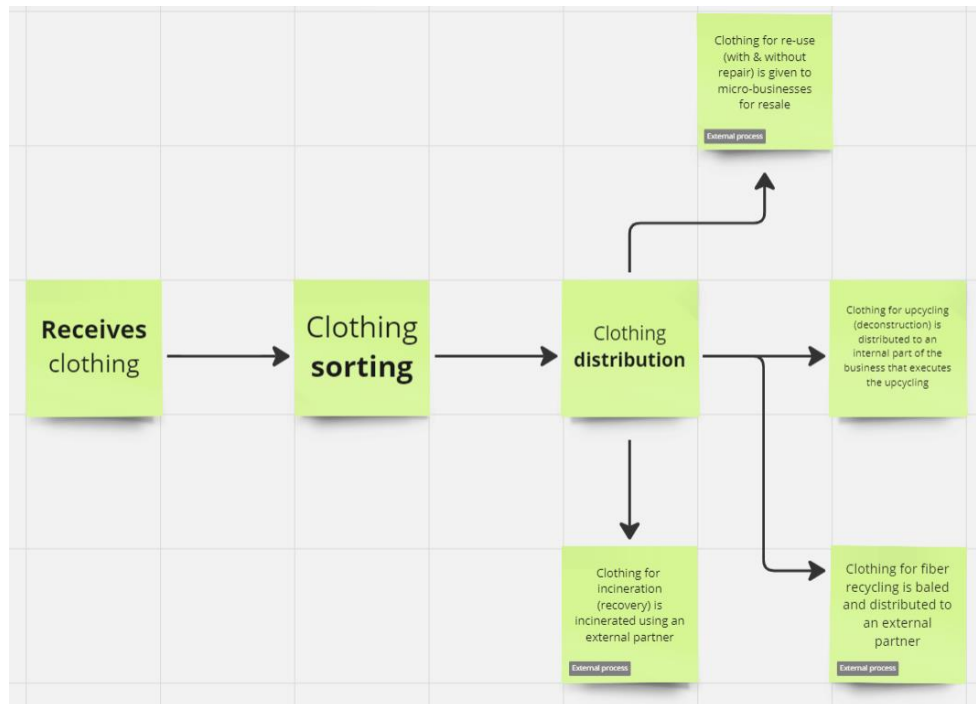


Figure 34 Product Chain Process of Participant B

Participant D has been allocated the practice of Reuse and Recycle for this study, even though the business does not actually recycle. Recycle plays a significant role in Participant D's product chain as a textile waste collector and sorter. Reuse is enabled by Participant D's selling of textile waste (received from manufacturing off-cuts) for use in smaller scale clothing manufacture. Participant D receives textile waste into the business through clothing manufacturing waste generated by clothing and apparel manufacturing factories and through end consumers, who donate unwanted textile products. All textile waste received into the business is accepted with the requirement that the type and specification of the textile can be processed by the business for recycling. Textile waste received into the business is sorted into off-cuts that can be sold as end-of-roll fabric in a limited quantity, different fabric types, and textiles that can be sold to the business partner for fibre recycling. Fabric destined for recycling is prepared for recycling, baled, and sold to the business partner for fibre recycling. This recycled fibre becomes a raw

material for "automotive companies, construction companies, blanket companies, dog-beds...[and] the toy industry". The product chain process of Participant D can be seen in Figure 4.34 that follows.

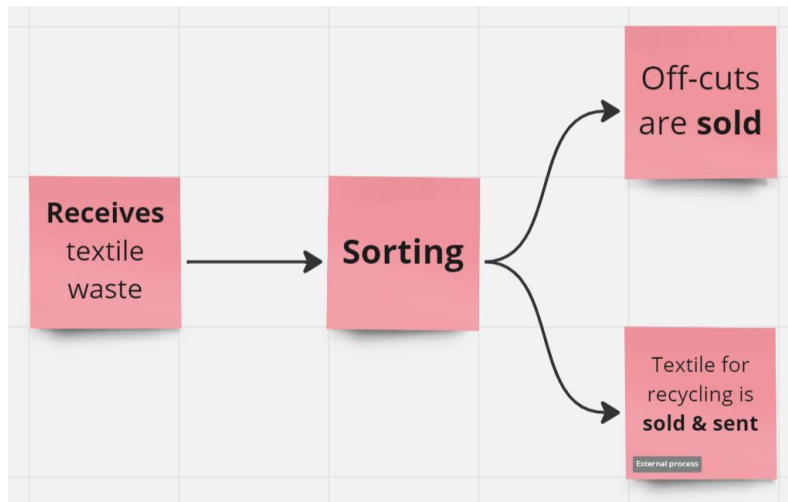


Figure 35 Product Chain Process of Participant D

Participant E remanufactures new apparel from old apparel. The journey of creating the products sold by Participant E begins with sourcing fabrics that will be used in the creation of the product. Fabric off-cuts are sourced from local clothing manufacturers like factories and niche designers. Inexpensive second-hand apparel and products made from textiles suitable for household use are also sourced. The fabric and textiles are then sorted into fabrics that are considered usable by the business and fabrics considered unusable by the business. Usable items are deconstructed and processed in preparation for use. These processes include colour and texture sorting and pressing. These material pieces are then grouped and processed to become a patchwork-like new textile. The created textile is cut and constructed to create garments. This process is depicted in Figure 4.35 that follows.

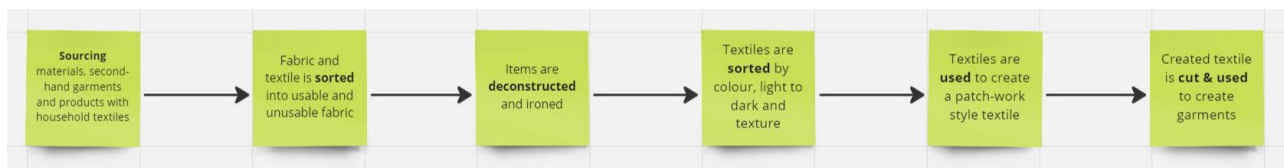


Figure 36 Product Chain Process of Participant E

Participant G receives clothing into the business directed by the owner of the clothing item (customer) as a request for a service offered by the business. Clothes received into the business are repaired,

refurbished or remanufactured. The found practices allocated to the Repair strategy are when the business repairs a garment that has a damaged part. Practices that are categorised into the Refurbish strategy include a clothing upcycling service, colour restoration of faded clothing, and alteration of clothing. Participant G was also found to be practising a service that is categorised as being Remanufacture, whereby off-cuts generated through the altering and upcycling of clothing are used to create new garments or parts of new garments. These said practices occur as agreed upon by the customer and employees working for Participant G, and then the new product (clothing item) is returned to the customer, as shown in Figure 4.37 that follows.

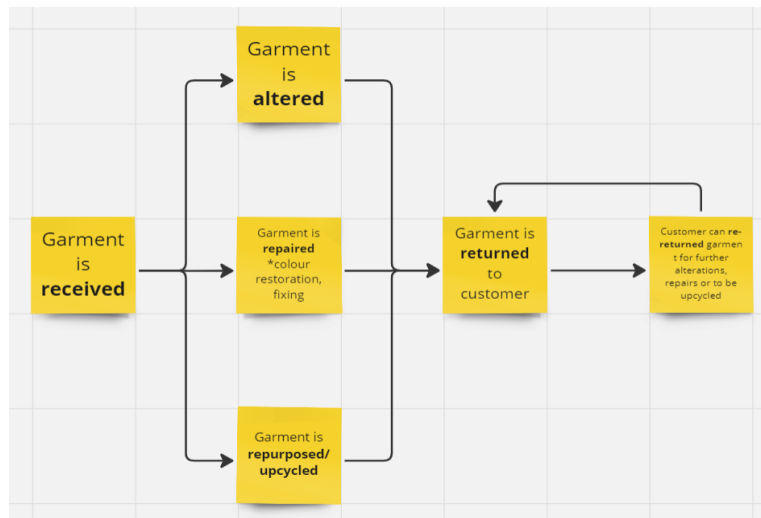


Figure 37 Product Chain Process of Participant G

Participant H creates apparel from textile waste that is sourced from the retail industry and yachting industry. Any wastage generated during the manufacturing process is either recycled through business partnerships, or kept to use within manufacturing of the businesses products. Bags are purchased and sent to the customer, who can return the bag to the business for repair or replacement, due to a lifetime guarantee product attribute. These items that are received are either repaired and returned to the customer, or replaced if repair is not feasible. Any textile waste generated through repair or from products deemed unsuitable for repair are recycled, using either one of the business' recycling partners. Business processes of the product chain of Participant H follow.

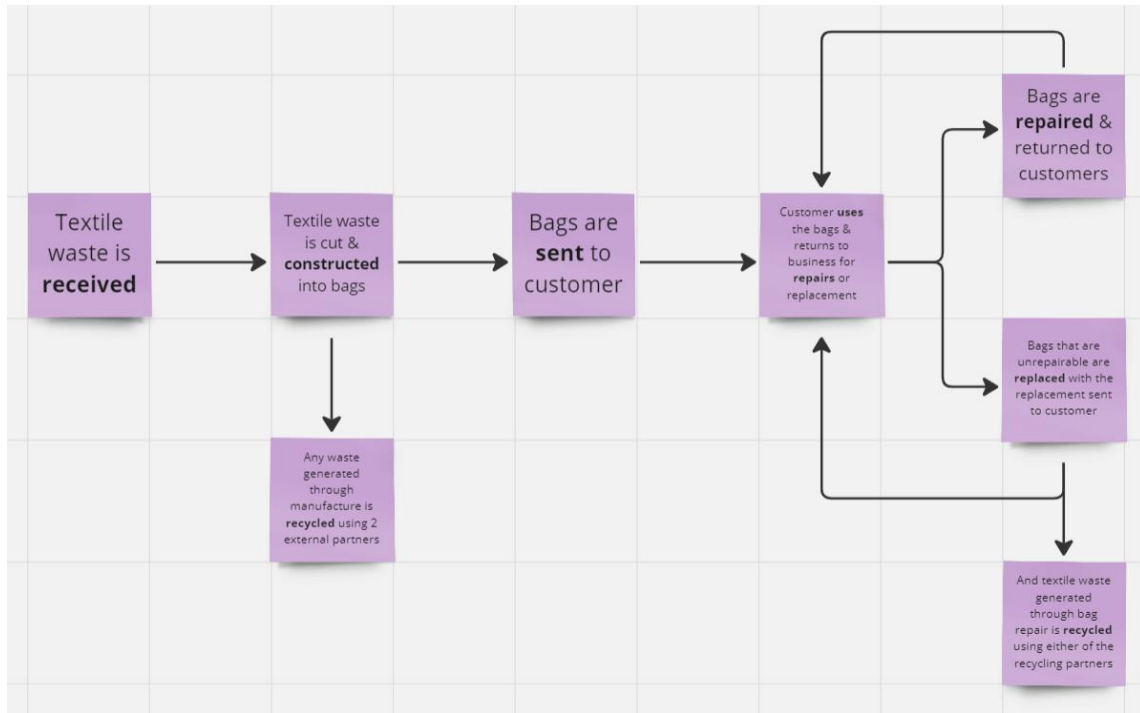


Figure 38 Product Chain Process of Participant H

The environmentally sustainable practices occurring within Participant I’s business mostly occurred within the research and development phase of the seasonal collections sold by Participant I. All waste generated through the sample development phase is sold or donated, these practices are interpreted as Reuse. All trims, prints, and samples from the development and production of the seasonal collections are repurposed by a local university’s fashion design department in the South African city where Participant I is located. The business processes of Participant I’s product chain can be seen in Figure 4.39 that follows.

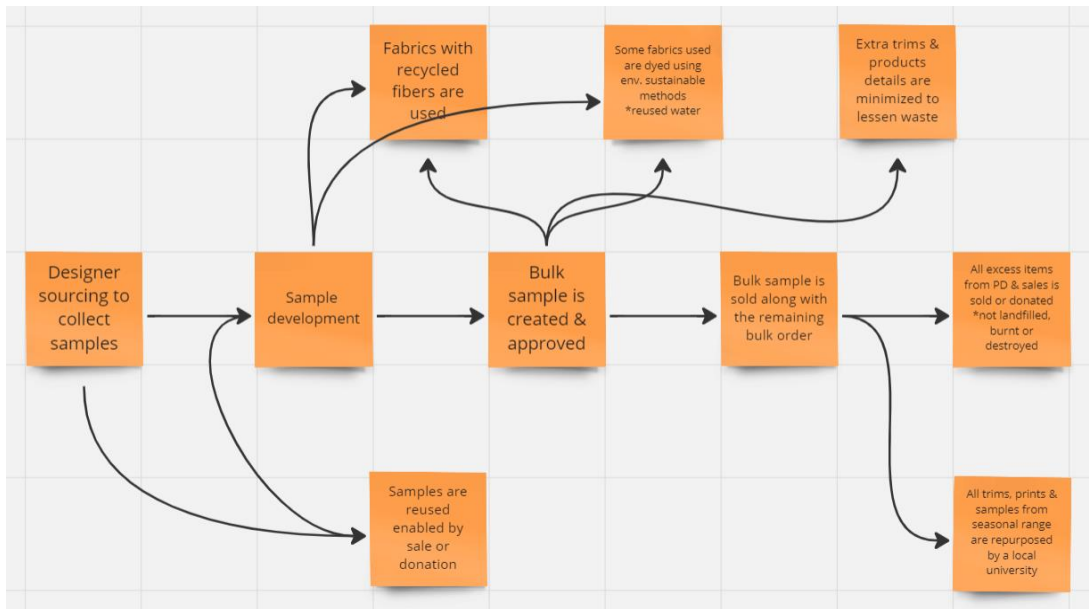


Figure 39 Product Chain Process of Participant I

This section discussed the businesses product chains and connections around the identified environmentally sustainable practices occurring within the participant businesses. Similarities were identified around the commonly found practice of Reuse and Repair with a discussion of how the remaining R Practices were found in the business participants' product chains. The enabling factors of the businesses and individual consumers who participate in the environmentally sustainable practices were discussed.

#### 4.4 Motivation for Environmentally Sustainable Practices within MSMEs

The next section will discuss the findings to meet the second research objective, which is *"To explore the reasons why circular strategies feature in clothing and textile MSMEs"*. The data was assigned codes of 'Motivation for Circular Practices' and 'Product/Service Benefit', analysed, and found to include data that related to environmental, social, and economic considerations with the addition of personal motivation. Data that describes the motivation for the circular practices will be categorised and discussed, followed by data stated for the beneficiaries of the environmentally sustainable practices occurring within their businesses, as proposed by the participants.



#### 4.4.1 Motivation for Circular Practices

Data that addresses the motivation of participants for practising and incorporating the sustainable practices within the businesses will be displayed and discussed in this section. The data was analysed for similarities and four (4) common themes emerged, namely data that concerned people, planet, profit, and personal motivation. People, planet, and profit concern sustainable development, while the fourth theme of personal motivation was found to encompass personal motivational factors for the participants to include the environmentally sustainable practices within the businesses.

*“Sustainable development strives to meet the needs of developing countries seeking to achieve a more sustainable world. [It] addresses the needs of the present moment without compromising current and future generations to meet their own sustainable lifestyles.” Safdie (2023).*

The goals of sustainable development are to address three key areas of economic, environmental, and social development (Safdie 2023). These goals match the goals of a CE, as discussed, which is said to enable opportunities for low-carbon, sustainable, and resilient economic growth for South Africa (Nahman et al. 2021). In the context of MSMEs, sustainable development requires that a company contributes to economic growth and social progress, and promotes environmental sustainability. Table 4.3 that follows represents data of motivational factors stated by the participants that dealt with the motivation to benefit people.

Table 3 Participant Motivation Coded 'People'

Participant	Summary/	Quotation
A		"my whole philosophy is 'I'm a local small South African-based business', let's try keep things as local as possible, let's make a difference to our home first and then we can go and make a difference to the rest of the world"
B		"it was about impact so my always, my passion was always exiting people from poverty"; "we're an empowerment company and we...have a very clear focus on mothers of children with disability, who are the most marginalised"
B		"...touched a lot of people's hearts. Organisations like [lists well-known international fashion brands] want to be part of that. They also want to be part of inclusion...so they, they get involved in our social enterprise"
C		"the business model is based on widening, and kind of educating people on the benefits of second-hand, shopping second-hand"
C		"our job to educate shoppers of the benefits of shopping second hand. Benefits to the planet, benefit to your own wallet and obviously it's much more cost effective"
D		"how can fashion be a source of development in the future"
F		"...after Covid we realised that South Africa...is financially distressed. So...we said: 'what can we do to the community, to the parents, to the children and to the school?'"
H	Wanted to create local employment with ethical production, upskilling, and professional development opportunities for their employees.	

Within the sub-category of People, there were numerous participants who expressed the desire to create a positive difference in the lives of South Africans through local business to benefit the workforce involved, through creating empowerment opportunities and addressing how sustainable practices in the fashion industry could be a source of development for South Africa. The motivation of the participants aligns to the overall perceived benefits of a circular model, which is asserted to be a key driver of post-pandemic economic recuperation toward sustainable and resilient economic growth (Nahman et al. 2021). The desire to benefit the local economy was evident by the quotation of Participant A, who stated *"my whole philosophy is 'I'm a local small South African-based business', let's try keep things as local as possible, let's make a difference to our home first"*. Similarly, Participant B affirmed that *"we're an empowerment company and we...have a very clear focus on mothers of children with disability, who are the most marginalised"*; and *"our intention...is to exit people from poverty and to create a maximum inclusion"*. Meanwhile, Participant D stated that they considered *"how can fashion be a source of development in the future"*. Participant F said: *"After Covid we realised that South Africa...is financially distressed. So... we said: 'what can we do to the community, to the parents, to the children and to the school?'"*

Another theme that emerged within the sub-category of People was the desire to create employment and create benefit, by way of upskilling opportunities, as motivation for including the circular practices within the business. Participant H motivated that creating benefit for people is central to the business and this is actioned through ethical production, employee upskilling, and professional development opportunities for employees within the business. Moreover, Participant D affirmed their concern over unemployment by stating the following: *"I was always passionate about... unemployment, inequality, what's going on in...Africa."* This shows the participant's interest in the issue of unemployment within the African context. The said motivation of participants is justified by the anticipated job creation prospects of a circular model, which could benefit the issue of unemployment in South Africa (Potgieter et al. 2020). Another prospect to consider is the labour-intensive nature of the clothing and textile industry, which would also contribute to increasing employment in this sector (GRID-Arendal 2021).

The final theme that emerged around the motivation to benefit people was the desire to educate consumers. Participant C felt the responsibility of needing to educate people (consumers) about the benefits of purchasing second-hand apparel as opposed to the virgin counterpart. This finding is motivated by the following quotations, *"the business model is based on widening and kind of educating people on the benefits of second-hand, shopping second-hand"* and *"our job [is] to educate shoppers of*

*the benefits of shopping second-hand. Benefits to the planet, benefit to your own wallet and obviously it's much more cost effective".*

In summary, the participants expressed that the benefits to the local economy, by way of employment, ethical production, and education, were contributing factors for the motivation of the circular practices within the businesses. Participants also stated that they were motivated to include the environmentally sustainable practices to educate consumers on more sustainable consumption and use practices, and give them a positive experience of such practices. The section that follows will discuss findings of motivational factors to incorporate environmentally sustainable practices that have an environmental benefit. Table 4.4 presents summaries and quotations of participants of the said topic.

Table 4 Participant Motivation Coded 'Planet'

Participant	Summary	Quotation
B		"it started by accident but I always had a passion for the environment"
B		"our intention...is to...care for our environment and divert every kg of clothes from landfill we can"
B	The sustainable practices within Participant B are contingent on each other, meaning that waste from the practices categorised as Reuse are used with the practices categorised as Repurpose and Recycle.	
C		"second-hand is the most sustainable item you can wear"
H	One of the two pillars that guide the business are 'Planet', meaning that the sustainable practices are actioned for the circularity of resources used within the products.	
I	Business is transitioning to a more 3D based product development system in an attempt to lessen the amount of physical samples created through the product development process.	
I	Motivation for sustainable practices is in response to creating awareness of the effects of pollution.	
I	Eliminated the spare button from garments as the consumer does not use nor recycle the button or accompanying bag.	

The emerging theme of 'Planet' within the context of the findings will address all data interpreted to include an agenda to preserve the planet's ecosystem and circulation of resources. Participant B stated that *"I always had a passion for the environment"*, which can be interpreted as motivation to act in accordance with preserving the environment. A fact to note about the BM of Participant B is that the numerous practices from the R Framework (Reuse, Repurpose, Recycle, and Repair) are contingent on each other and in some cases, the R practice was practised within the business in order to make better use of the products (apparel) entering the business. This can be interpreted as wanting to increase the circular flow of resources within the business, or that of a business partner, for environmental gains of lessening waste (Lin 2020). Participant C motivates that second hand is the most sustainable item that one can wear, which is directly translated to the waste saving benefits of using something that is still in good condition but is not considered 'new' (Dissanayake & Weerasinghe 2022). Participant H's business model is centred around the pillar of 'Planet', which is represented by the business' ethos to repurpose waste to lessen the pollution found in the natural environment. A similar finding was noted with Participant I, who asserted that the motivation for the sustainable practices was in response to creating awareness of the effects of pollution caused by the clothing, textile, and retail industry. Moreover, Participant I has eliminated unnecessary trims from their products to lessen the waste created through the sale and use of Participants I's products. This finding was coupled with the recognition that consumers aren't typically going to recycle these trims and accompanying bags.

In summary, the participants stated that the motivation to include the environmentally sustainable practices was to benefit the environment through the actions of lessening waste and circulating resources. This motivation is bolstered by the gains of waste reduction and more sustainable product chains anticipated of clothing and textile businesses within a CE (EMF 2017b). Creating awareness of environmental pollution caused through the clothing and textile industry was also a driving factor of the sustainable practices of the business.

The next sub-category will discuss findings interpreted to benefit, or have a connection to, the final pillar of the three pillars of sustainability, namely 'Profit'. The data of this theme discusses the motivation for sustainable business to financially benefit South Africa and local businesses as a motivating factor for including the sustainable practices within the business models.

Table 5 Participant Motivation Coded 'Profit

Participant	Summary/	Quotation
A		"I really want to create a sustainable business and the entire business model is based off...creating a circular fashion economy in South Africa and growing that"
C	Participant C's motivation is to encourage buying second hand.	
D		"we realised that there's a business case" — for textile recycling in Africa/SA

Businesses that practise sustainability are expected to bring about economic gains and profit due to their growth, which has the potential to benefit the South African clothing and textile sector (Bizvibe 2018; EMF 2021a). In the same way, Participant A stated that she wanted to create a business model to support a CE in South Africa, which is affirmed in the following quotation: *"I really want to create a sustainable business and the entire business model is based off...creating a circular fashion economy in South Africa and growing that"*. Moreover, Participant C asserted that through their business, they want to encourage buying second hand. Meanwhile, Participant D stated that *"we realised that there's a business case"* for textile recycling in Africa and South Africa, motivating the profit potential of BMs that practise environmental sustainability.

In summary, the participants asserted that the motivation of the practised environmentally sustainable aspects of their product chains was to create financial benefit for their own as well as their partners' businesses, while supporting business growth in South Africa.

The section that follows will discuss the personal motivation by the owners and business representatives from the sample for why the sustainable practices were part of the participant businesses. The findings of this section are collected in Table 4.6.

Table 6 Participant Motivation for Including Environmentally Sustainable Business Practices Coded 'Personal Motivation'

Participant	Summary	Quotation
A		"personal passion"
B		"it was about impact so my always, my passion was always exiting people from poverty"
C		"it's unnecessary to be buying so much new stuff when there's so much beautiful, good quality items, products, clothing, everything in existence already. Why not reuse, recycle, upcycle"
D	Personal passion to live and practise more environmental sustainability.	
E		"the ethos is to slow fashion down. I come from a background...of fast fashion design work"
F		"I think it's a vision that was birthed because of the experience of retail"
F		"I made an oath to myself that I would never allow anyone to suffer while I'm there because I have my degree today because of people that I never knew. So I'm just giving back because of that."
H	The two owners of the business wanted to create outdoor gear from waste material.	
I	Sub-management employee introduced and drove the sustainable practice of using materials with environmentally sustainable attributes.	



To conclude this section, which discusses the emerging themes found within the data that address motivational factors impacting the desire of participants to incorporate environmental sustainability practices within the business models, the final theme of personal motivation will be discussed. A finding to note was that seven (7) out of the nine (9) businesses participants cited a personal motivating factor for wanting to include the sustainable practices within the businesses they founded, owned, or represented. Some participants were the owners and founders of the businesses, while others worked within bigger organisations and were able to influence change towards increased environmental sustainability. Participant A stated that starting a business of reselling pre-used luxury goods was grounded in a *“personal passion”*. Participant B also cited a personal passion for wanting to practise sustainability. This is evident in the following two quotations, *“I always had a passion for the environment”* and *“it was about impact so my always, my passion was always exiting people from poverty and the environment”*. The quotations from Participants A and B suggest a personal desire and will to act in a way that is positive for environmental conservation, while Participant B refers to their ‘passion’ for people, suggesting a desire to make positive change to economically disadvantaged people. Participant D cited a personal passion to live and practise more environmental sustainability, which can be considered to influence the participants’ personal choices of the type of company they founded. Another detail impacting the motivation of Participant D’s inclusion of environmental sustainability practices was the use of one of the founders’ research study to support that there was a gap in the market for the type of business that Participant D founded. Participants E and G both affirmed a personal desire to participate in the slow fashion industry, whereby apparel is designed to be used for longer. This is asserted by the following quotation from Participant E: *“The ethos is to slow fashion down. I come from a background...of fast fashion design work.”* Participant G is the owner and founder of the business, and the participant expressed their personal motivation to create sustainable, slow fashion. These findings support the motivation of the participants to create apparel that has less negative impact on the environment, which can be asserted to be practising in accordance with environmental sustainability. Participant F shared an experience where they received financing to support the completion of tertiary education from anonymous donors, and this has created the personal desire to do good for others. This finding is affirmed by the following quotation: *“I made an oath to myself that I would never allow anyone to suffer while I’m there because I have my degree today because of people that I never knew. So, I’m just giving back because of that.”* Moreover, Participant F also had the personal experience of working in the retail sector of the clothing and textile industry and noted this experience as influencing the motivation to incorporate the practice of Reuse in their

business. This is motivated by the following quotation: *“I think it’s a vision that was birthed because of the experience of retail.”* Participant I had a personal motivation to improve the environmental sustainability of materials used within the sampling and production of seasonal retail collections. The participant introduced and drove the practice of using materials with environmentally sustainable attributes within the smaller brand that the business representative works for. As an employee, the representative proposed fabrics that are more environmentally sustainable but did not necessarily carry a financial or product benefit in comparison to the unsustainable, more common counterpart.

In summary, most of the participants described a personal motivation and drive to create benefit through the acts, decisions, and implementations surrounding the environmentally sustainable practices within the participant business product chains. The personal influence to act towards enabling environmental sustainability within business practice was also found in a study by Monyaki (2022), who investigated business owners in the Cape Town manufacturing sector. Monyaki (2022) found that owners of small niche apparel manufacturing businesses acted in accordance with a motivation to enable sustainability within their lives, meaning a personal motivation to practise sustainably. Therefore, there is a common link between businesses that practise in accordance with environmental sustainability and personal motivation by the owners or critical staff involved in the business. In addition, this finding demonstrates the importance of owners or employees in driving the adoption and practices of environmentally sustainable practices within MSMEs.

#### 4.4.2 Benefit from Circular Practices

This section will describe the benefit of the circular practices, as perceived by the participants. As discussed, CE has been poised as a solution to a more regenerative and sustainable economic model for opportunities of environmental and economic benefit (EMF 2015; International Institute for Sustainable Development 2020; Sariatli 2017; McDonough and Braugard, 2002:91; Wijkman et al. 2017). The data will be categorised into the three (3) pillars of sustainability framework as common themes of ‘People’, ‘Planet’, and ‘Profit’ emerged. Most businesses identified with an environmental and people benefit from the circular practices, with profit less of a benefitting factor within such a circular model. The subsection that follows will discuss data coded with ‘People’, as it is understood within the sustainable development framework, as ethical labour practices, and a company’s focus on educational and development opportunities (Safdie 2023). Table 4.7 that follows presents data as summaries and quotations that describe the participants’ perceived benefit to people from the environmentally sustainable practices within the product chains.

Table 7 Benefit of Sustainable Practices (People)

Participant	Summary/Quotation
A	The product and service gives consumers a more sustainable purchase option due to the products' reuse.
	The business benefits a community of people who plant trees to offset carbon emissions generated from business activities.
B	The business upskills and employs people living with mentally disabilities.
	The business creates employment through fostering micro-businesses (enterprise development) owned by women who have children with disabilities.
C	The business educates the consumer about more sustainable shopping through reuse shopping experience.
D	The participant benefits the local community through less waste, employment, and is an accountable textile sorting service that facilitates textile recycling.
	"a focus on providing employment, for youth, for people of colour, for women, for people who find themselves homeless"
F	There is a financial and service benefit to the sellers of the school uniforms, whereby the sellers are able to gain monetary value for the reused products, through the service offered by Participant F.
G	There is a benefit to the community through the services of repairing and giving clothes a new life.
	Consumers benefit from guidance from the participant on how to care for clothing after the products have been repaired, repurposed or altered.
H	Benefits the local community by creating ethical employment within the business, as well as through the outsourced manufacturing partner.
I	The environmentally sustainable practice of reducing resources benefits consumers as there is less waste transferred to the consumer.

Many of the participants expressed a benefit of their businesses as creating employment for the local community or a disadvantaged community of people. In South Africa, MSME businesses are said to contribute significantly to employment (Kalidas et al. 2020; BASA 2021; IFC 2018). The employment benefits found in the participant businesses were either through activities occurring within their own businesses or through a South African business partner used in the production of the business product. This is evident through the activities of Participants A, B, D, and H. Moreover, Participant B also created upskilling and development opportunities. This is beneficial due to the labour-intensive nature of SME BM types, which is important towards the creation of employment (Ayandibu & Houghton 2017). Participants C and G motivated a benefit to the consumer where the consumer benefited through receiving new information or a new experience, which could be likened to an educational experience. Similarly, some participants also motivated that consumers were benefiting from an experience provided through the participants' efforts, these were Participants A and I. South African SMEs are said to be pioneers in the local sustainable economy by providing innovative solutions in response to the challenge of sustainability (Marks & Hidden 2017). The participants have approached the challenge of limited consumer knowledge of sustainability with the antidote of an educational experience to inform consumers. Such an experience could aid in promoting a circular flow of clothing consumption, instead of the current linear process of manufacture, use, and then discarding. By taking cognisance of the benefits of a circular model, consumers can try to mitigate their negative consumption patterns to promote better use of resources in the clothing industry.

The next section will discuss the findings of the perceived benefit to the environment, allocated by the research according to prominent themes, as stated by the participants. Findings of the perceived benefit will be collected in Table 4.8.

*Table 8 Benefit of Sustainable Practices (Planet)*

Participant	Summary
B	The business reduces the amount of clothing waste through the practice of collecting, sorting, and processing for further beneficiation.
C	The business enables the circulation of clothing, which reduces the amount of clothing left unused.
D	The business benefits the environment by diverting textile waste from landfill for further use.
E	Benefits the local environment through the reuse of textiles and garments already in existence.
F	Benefits the environment with the reuse of school uniforms.
G	Materials considered textile waste are used rather than remaining unused, becoming textile waste, or the use of virgin materials.
H	Textile waste is reused rather than remaining unused.

Almost all the participants motivated an environmental benefit from the business practices with the benefit leading back to a reduction of textile waste within the environment. This is supported by the notion that a CE in Africa could help to reduce pollution (Potgieter et al. 2020). These benefits found in the participant businesses occurred along the value cycle of the products with Participants B, C, and F engaging with the circulation of clothing; Participants B, E, and G circulating textiles that are the raw material of clothing; and Participant D and H involved in the circulation of textile waste or textile fibre. Williams et al. (2018) recognise that circular flows inherent to CE allow businesses operating within this model to reduce material and resource inputs and generate revenue from waste which would aid in lessening waste, as in the case of the said participants. Moreover, these practices reduce the negative impact on the environment and assist in meeting climate commitments (DSI n.d.).

The next section will discuss the findings of the perceived benefit to the participant businesses or their business partners in terms of financial gain, as stated by the participants and collected in Table 4.9.

*Table 9 Benefit of Sustainable Practices (Profit)*

Participant	Summary
A	The environmentally sustainable practices benefit the business through growth for the participant business, and other business partners.
B	The business supports external partners with the participant's supply chain.
B	The business is an accountable clothing and textile sorter which benefits business partner for textile recycling.
B	The business supports other organisations who are collecting clothing for reuse, upcycling, and recycling.
D	The business products and services provide a positive economic benefit for the business.

Participant A stated that the business' environmentally sustainable practices benefited the business through financial growth, as well as for their partnering businesses. This finding was also asserted by Participants B and D, who motivated that their business partners benefit from their business processes as these generate feedstock into their partnering businesses' product chains. This finding is affirmed by Mokwana (2021), who states that clothing and textile SMEs in South Africa are a significant contributor to the growth of the South African economy. Another point raised by Participant D, and I, was the concern of accountability. Greenwashing is a prominent concern within sustainability practice and the participant businesses must consider how accountable their business partners are with the services and products provided to the participants. Participant B asserts that their business practices of sorting are accountable, and that this is a beneficial factor to their business partners, as Participant B provides a crucial step of sorting and processing textile waste in preparation for textile recycling (PACE & Accenture 2021). The quality of textile recycling output is contingent on accurate sorting, which Participant B asserts their position within (Dissanayake & Weerasinghe 2022). A similar finding was stated by Participant D, who asserts their accountable processing of textile waste by giving customers who provide their feedstock with a certificate of authenticity to confirm that the given textile waste is processed responsibly.

In summary, the participants asserted similar beneficial factors of the circular practices to those stated as motivational factors for including the circular practices within the BMs. The link can, therefore, be

made that the perceived benefit of the sustainable practices is closely tied to the motivation to implement and practise the environmentally sustainable practices.

However, not all clothing and textile businesses are employing a circular model as this is not yet common practice, and to include such mechanisms, a MSME inevitably faces barriers regarding implementation. The next section will address findings of the challenges of current clothing and textile MSMEs, within the South African context.

## 4.5 Challenges of Clothing and Textile MSMEs

This section will address findings that speak to the 3rd research objective of exploring the challenges and opportunities of current and future circular strategies (practices) in clothing and textile BMs. The section that immediately follows will address data that speaks to challenges experienced by the participant clothing and textile MSMEs, who practise environmentally sustainable practices within their product chains. The section that will follow after will speak to opportunities for businesses to increase their competitiveness within the South African context through such implementation. The final subsection will discuss opportunities of environmentally sustainable practices for clothing and textile MSMEs with data that outlines what future clothing and textile business models should be, as proposed by the participants.

### 4.5.1 Barriers of Clothing and Textile Business Models

This section will discuss findings of the barriers identified by the participants within the scope of clothing and textile MSMEs in South Africa. The discussion on barriers that follows speaks of general barriers that are not specific and unique to the found environmentally sustainable practices. The data for this section is displayed in Figure 4.40 and consists of summaries of raw textual data that can be referred to in Annexure A Table 1.4 Barriers of clothing and textile MSMEs.



Figure 40 Barriers of Clothing and Textile MSMEs

Participant A cited that the poor current state of the South African economy as a barrier hindering the growth of the business. This was stated in the context of the current experience of economic decline in South Africa and connected to the high cost of fuel, and issues around a continuous and reliable electricity supply. On the matter of electricity supply, South Africa is experiencing power outages of up to eight (8) to twelve (12) hours per day, causing significant damage and financial loss to the local economy. An issue raised by Participant B was limitation of financial support for businesses by financial institutions due to the limited proven track record of sustainability-oriented businesses. This finding was stated in the context that the local financial institutions still prioritise funding to traditional BMs that focus on maximum profit potential, which is often tied to virgin resource input and lowest cost of labour. The barrier of financial struggle is recognised by Ekins et al. (2020), who assert that BMs with circular supply chains deviate from their conventional counterparts, so they don't have a proven track record, resulting in increased difficulty in procuring financing. Moreover, Participant B asserts that some of the environmentally sustainable practices that occur within the business are not as profitable in comparison to the business' primary revenue stream of Reuse, making these practices less attractive. Ekins et al. (2020) makes the case that sometimes CE initiatives are simply not cost effective due to the costs of materials, labour, and insufficiently high rates of return on investment, as found with the said practices occurring in Participant B. This factor of low return on investment could also contribute to the general unattractiveness of this sort of business model to financial institutions in terms of financial



support. In addition to financial considerations, Participant B stated that downcycled fibre produced through recycling has a low profit margin. Clothes that pass through Participant B's business that are deemed unsuitable for resale or upcycling are downcycled. Much of the challenges put forward by Participant B relate to profitability and limitations of procuring financing. The final barrier stated by Participant B was limitations in recycling practices and infrastructure, as textile and clothing sorting is still heavily reliant on sorting done by skilled people, as opposed to equipment. This barrier of infrastructure limitations is asserted by Dissanayake and Weerasinghe (2022). Participant C described challenges of access to the market to grow the customer base that is served by the business. This could be interpreted as a barrier in consumer markets' willingness to engage with the CE (Kirchherr et al. 2017; Koszewska 2018), exacerbated by limited knowledge and awareness of CE by consumers (Ekins et al. 2020).

Within the realm of limited knowledge and awareness, Participant C also motivated that there is a lack of customer education around shopping and practising sustainability with regards to clothing. This is supported by a general lack of public awareness and understanding of CE (SWITCH Africa Green and UNEP, 2020). Participant C motivated that the high price of local production in comparison to the low cost of imported goods is a barrier inhibiting consumer adoption. This barrier also refers to a price-sensitive consumer that would favour the cheaper product over the locally produced, and often more costly, equivalent. Therefore, the consumer can be regarded as an immense barrier. This limitation is enabled by the current fast fashion model that produces low-quality goods at a lower price point than what can typically be produced within South Africa. Consumers are removed from the potentially harmful production of their purchased goods as they are not aware of the conditions that the goods were produced in, or the environmental impact of production (Koszewska 2018; Kirchherr et al. 2017). Participant G motivated a similar barrier whereby the current fast fashion model and significant quantities of imports into South Africa hinder the growth of South African clothing and textile MSMEs. Moreover, Participant G also stated that the quantities of waste generated by the practices of the clothing and textile industry (including consumers) are a barrier due to the significant quantities of poor-quality resources that are generated by this industry, and in particular the fast fashion part of the clothing and textile industry. The issue of low-quality raw materials is recognised by Dissanayake and Weerasinghe (2022) and PACE & Accenture (2021) as an inhibiting factor regarding the recovery of resources. Participant D stated lack of knowledge of textile recycling by the current South African clothing and textile industry as a barrier. This has led Participant D to educate manufacturers who generate the participants' feedstock about textile recycling. The issue of limited education and

knowledge is well recognised as an inhibiting factor facing the transition of circular supply chains (Kazancoglu 2020; Kirchherr et al. 2017; Koszewska 2018; Monyaki 2022; SWITCH Africa Green and UNEP, 2020). This is reiterated by The Department of Environment, Forestry and Fisheries, Republic of South Africa (2020b), which states that education and skills are critical for the adoption of CE.

#### 4.5.2 Challenges of Environmentally Sustainable Practices

The next section will address challenges experienced by the participants regarding practising the environmentally sustainable practices within their BMs. This section will be organised according to the framework used to structure the barriers discussed in the literature review. This framework was developed by Kazancoglu et al. (2020) as barriers to overcome to implement circular supply chains. The discussion of the challenges are summarised in Figure 4.40 that follows. The raw textual data used to create the summaries can be referenced in Annexure A Table 1.5 Challenges of environmentally sustainable practices.

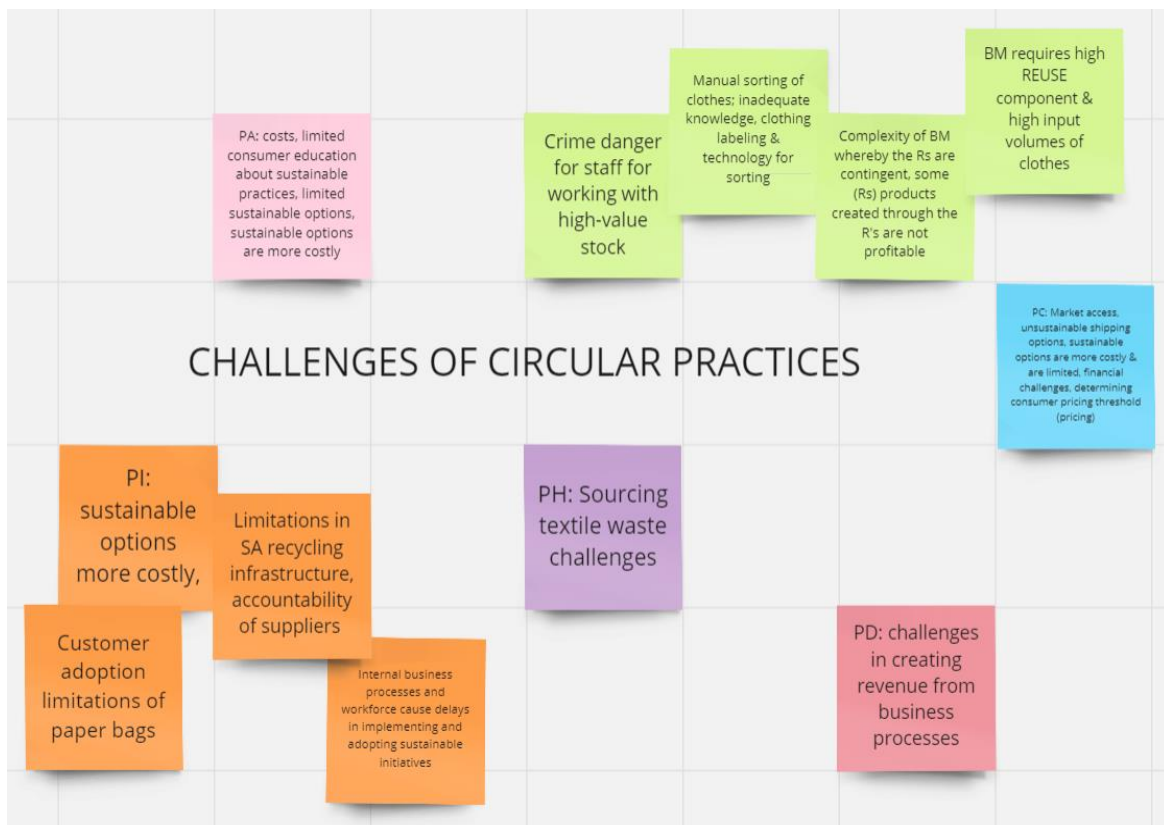


Figure 41 Challenges of Circular Practices

### *Management and decision*

Participant C discussed issues with determining how much to price the goods sold on their online store. While this point raised by the participant does not directly impact the circularity of their supply chain, incorrectly pricing goods will hinder sales if priced too high or incur a loss of financial benefit if priced too low. In the context of Participant C's BM being based on Reuse, and this being new to the South African commercial landscape, it seems that there is limited knowledge and experience around pricing thresholds for the sale of a Reuse product. Moreover, there could be conditions within the business regarding how the value of the products are determined that inhibit establishing appropriate pricing (Ekins et al. 2020). In support, Dissanayake and Weerasinghe (2022) state that a lack of appropriate company policy hinders an organisation's transition to a function within a CE. This means that there could be a lack of policy by Participant C that negatively impacts how the pricing is established. Participant I discussed challenges with the hierarchical structure of the greater organisation that Participant I fits within, whereby environmentally sustainable interventions take a significant length of time to implement as interventions need to be approved by management prior to their adoption. This challenge was acknowledged by Ekins et al. (2020), who state that institutional conditions regarding material management regulations could inhibit the environmentally sustainable actions within clothing and textile related entities, such as Participant I.

### *Labour*

Participant B stated that there is a lack of skills and appropriately qualified people who can guide environmental sustainability within the labour force, and action practices for circularity. Participant B asserted that this lack negatively impacts sustainability gains. This is due to the environmental impact of decisions around sorting and processing for further use not being fully considered (Dissanayake & Weerasinghe 2021). The barrier stated by Participant B is supported by Dissanayake and Weerasinghe (2022), who cite lack of awareness and education within the workforce as a barrier to implementing a circular supply chain.

### *Design challenges*

Participant A discussed challenges around a lack of sustainable resources in South Africa. This was said in the context of factors impeding the improvement of sustainability of the environmentally sustainable practices occurring within the business. The sustainable resources mentioned relate to services or products provided by external partners who do not include environmentally sustainable attributes

within their products or services, a barrier also found by Govindan and Hasanagic (2018). Participant B experienced challenges of limited profitability of some of the practices within the business. These practices were found to relate to a specific product produced by the business and a process established within the business to create the product. Participant B experienced that these products and practices require a lot of resources that are collected over a period with the primary resource having a low monetary value. Moreover, the structure of Participant B's BM is that the numerous sustainability practices are contingent on each other but due to the said limitations, the interconnected reliance of the practices means that there are limitations on overall product profitability. These challenges experienced by Participant B could be resolved by reconsidering the design decisions on how and where the raw materials for these less profitable products are found, and how these products are manufactured within the BM. Further issues relating to design challenges were experienced by Participant D, who found it difficult to make the process of collecting and sorting textile waste for further beneficiation profitable at the business' inception. This challenge of profitability is supported by Ekins et al. (2020), who make the case that CE initiatives are simply not cost effective due to the costs of materials, labour, and insufficiently high rates of return on investment. Both Participants B and D have experienced limitations that relate to the cost of the raw material that is used in further processing or manufacturing. From this, an issue around the value of reused fibre or material has emerged. This issue could be further exacerbated by current limitations on recycling different fibre blends due to the required separation, which is technically challenging, costly, and energy intensive to achieve. In addition, textiles made from unseparated fibre blends yield low quality products (Dissanayake & Weerasinghe 2022; PACE & Accenture 2021). Participant E is hindered by South Africa's high manufacturing costs (in comparison to the global standard) with the added time implications of manufacturing limited runs. These challenges are experienced because of the businesses product offering of a niche product produced within South Africa. Ekins et al.'s (2020) assertion that sometimes sustainability initiatives can be infeasible due to the costs of materials and labour required can also explain the said challenges of Participant E. Participant F stated that the branded products sold by the business could not be donated or sold without permission of the holding company of the brand. This finding is considered in the context of other branded apparel and the implications of branding on resale (Reuse) practices for the industry. This challenge as described by Participant F was interpreted as a design challenge as there is not a standard practice on how to debrand branded goods so they can be resold without legal implications.

### *Materials*

Participant B stated that not knowing what fibres are used within textile production is a limitation inhibiting practices of Repurpose and Reuse. This challenge has potential ties to textile mislabelling and the lack of fibre identification technology, which has implications on the recyclability and quality of output (Dissanayake & Weerasinghe 2022; PACE & Accenture 2021). Participant E found limitations in access to quality raw materials that have environmentally sustainable product attributes. Participant G asserted that plastic pollution created through the fashion industry is a challenge for sustainable clothing and textile BMs. The said pollution could be in the context of clothing and textiles, as this relates to Participant G's product chain. Polyester and other synthetic fibres are considered plastic and make up a significant percentage of what clothes are comprised of. In addition to this, clothes with this fibre composition cause pollution due to wash and care impacts and polluting disposal practices (Kazancoglu et al. 2020; Resnick 2019).

### *Rules and regulations*

Participant B stated a limitation in South African statutory business models due to the lack of recognition of social enterprise. This participant included social development through educational efforts to support disadvantaged women who have disabled children. Thus, Participant B is registered as a PTY and non-profit. Moreover, Participant B stated that: *"It's lowest cost, least resources, highest profitability. That equation doesn't work in this world, right. So, as long as the virgin product is cheaper and easier to get, even though it might be more pollutant, using a lot more water, and all of those things."* This means that the current prioritisation of profit inhibits businesses with a different measure of success and challenges the current understanding of traditional business within the context of success. Govindan and Hasanagic (2018) state that the government has a key role regarding how CE is implemented in supply chains and should intervene to guide organisations (like financial institutions) to be more accepting of businesses with a sustainability orientation. Participant I raised the issue of accountability of suppliers where sustainable attributes of the products provided by suppliers are concerned. Participant I stated a lack of visibility to ensure the accountability of suppliers, but this statement has been interpreted as impacting rules and regulations in this study. This association is based on a lack of rules or regulations governing the production and labelling of products with so-called sustainable attributes. Sustainability assurance is currently considered an optional value-added benefit rather than a requirement.

### *Knowledge and awareness*

From the challenges stated by the participant businesses, data found commonly referred to the consumer, with data relating to knowledge and financial support was found. Challenges associated with knowledge and awareness on the part of the consumer, therefore, remain a concern. Participant A stated that consumers don't know enough about sustainability and the current issues plaguing the clothing and textile industry to make less negatively impactful decisions. Similarly, Participant C and I discussed challenges related to the customer, whereby the customer was a challenge impacting the businesses' circular practices. Participants A and I both mentioned that the customer has limited education about sustainable practices. Participant I added that this was a constrictive factor to the business increasing the environmental sustainability of their product packaging, as the customer still favoured the unsustainable packaging option. This lack of knowledge was also stated by Participant G. SWITCH Africa Green and UNEP (2020) acknowledge a lack of public awareness and understanding of CE, and the encompassing sustainable interventions that would occur within CE BMs. Participant B asserted that bigger clothing brands are beginning to phase out the use of synthetic fibres in their product offering. However, this transition is impeded by a price-sensitive consumer, who favours the cheaper clothing outcome made with synthetic fibres (Resnick 2019). Speaking of the barrier of knowledge and awareness, Participant D motivated that manufacturers, retailers, designers, fashion school students, and consumers had limited knowledge of textile recycling. A lack of awareness by stakeholders of sustainability practices is also reiterated by Koszewska (2018) and Kirchherr et al. (2017) as a barrier. Participant B brought up limited knowledge and awareness of businesses with a social beneficiary agenda being profitable on the part of financial institutions. This statement was supported by the claims that access to growth funding for businesses that focus on social good is limited as banks don't recognise social entrepreneurship, resulting in limited funding opportunities and lack of access to low-cost capital (Ekins et al. 2020; Kazancoglu et al. 2020).

### *Integration and collaboration*

Participant B motivated that the traditional supply chain should transform into a value cycle, interpreted in this study as the circulation of resources between stakeholders. Participant C addressed challenges of not having the resources, or opportunities, to neutralise the business' carbon footprint due to limitations of their business partners' environmental sustainability products and service attributes. This

resulted in Participant C's decision to rather offset the carbon footprint caused by the business. Accenture (2020), Shivarov (2020) and Kirchher and Piscicelli (2019) collectively agree that circular BMs will not be successful in individual industries and, therefore, will require collaboration between value chain segments, as is the case with Participant C and their business partners. Participant E spoke of retail limitations caused by the product that is produced by the business not being a common product within its product category, as it does not share similarities to its well-known equivalent. As Participant E's product is made with unconventional construction materials and methods (Remanufacture and Repurpose) and has an unconventional appearance, it lacks common interest by consumers. This presents challenges in finding and using suitable retail platforms. Participant G cited challenges with accessing a consumer to purchase the business' services. This participant also discussed challenges in consumer awareness and acceptance of refurbishing, remanufacturing, and repairing of clothing. Kirchherr et al. (2017) and Koszewska (2018) state that the consumer market's willingness to engage with the CE is a barrier. The consumer, in the cases of Participant Es and G, is a barrier that prevents the adoption of garments with the environmentally sustainable product attributes of Repair, Repurpose, and Remanufacture. Participant I criticised local clothing and textile manufacturers and business for not prioritising environmentally sustainable practices and ethical production. In support, Jenkin and Hattingh (2022) state that only some South African manufacturers have begun to switch to organic materials or increase the recycled content in their materials. The barrier between value chain segments is recognised by Accenture (2020), Shivarov (2020), and Kirchherr and Piscicelli (2019), who state that collaboration is required to make gains toward a CE for the clothing and textile industry, meaning that textile manufacturers and mills should adopt more sustainable practices to enable the transition as a collective effort.

### *Cost*

Participant A discussed rising fuel costs and other expenses as cost-related challenges impacting the business. Both Participant A and B cited cash flow and high capital requirements as challenges, while Participant C also cited business expenses and financial challenges as issues. Kazancoglu et al. (2020) and PACE & Accenture (2021) assert that BMs that focus on Reuse may have higher costs for additional transport, cleaning, and distribution compared with the conventional retail equivalent, as is the case with Participants A and C. Moreover, Ekins et al. (2020), Kirchherr et al. (2017), and PACE & Accenture (2021) stated that financial challenges are the result of businesses with circular supply chains that veer from traditional businesses, as found with Participants A and B. A further inhibiting factor is the likely

resulting high upfront investment (Ekins et al. 2020). Participant A also questioned the financial feasibility of a business with the structure and product based on enabling Reuse. Ekins et al. (2020) make the case that sometimes CE initiatives are simply not cost effective due to the costs of materials, labour, and insufficiently high rates of return on investment, as could be the case with Participant A. Similarly, Participants A, C, H, and I described the challenge of higher costs for a product or service with environmentally sustainable attributes, as opposed to the common equivalent that does not prioritise sustainability, meaning that products with sustainable attributes need to be priced higher for feasibility. This is supported by Kirchherr et al. (2017) who found a similar instance of low virgin material prices in comparison to the higher priced recycled counterpart, and Monyaki (2022), who acknowledges the increased cost for sustainable goods. The barrier of sources of funding was also raised by Participant E, as were challenges of a price-sensitive consumer in relation to the high cost of production and sales found with the business of Participant E. The South African clothing and textile manufacturing industry has focused on remaining cost competitive, which has kept the cost of commercially produced goods low, which is in turn favoured by the said price-sensitive consumer (Jenkin & Hattingh 2022).

#### *Technical infrastructure*

Participant B motivated that the clothing and textile industry has a lot of progress to make towards a regenerated fibre that can be used and recycled in a circular flow. This finding was discussed within the context of technical infrastructure limitations that are present in the global industry, but even more so within the African and South African context. Dissanayake and Weerasinghe (2022) state that there are barriers to effectively collect and sort textile and clothing whereby current practice does not include sophisticated sorting technological infrastructure to enable accurate and speedy sorting. Furthermore, PACE & Accenture (2021) state that a transition to circular supply chains is dependent on a common vision between manufacturers, retailers, and governments, implying the general industry buys in and supports regenerative fibre.

In summary, challenges impacting the environmentally sustainable practices of the participants were discussed while segmented using a framework of barriers to overcome to implement circular supply chains, as stated by Kazancoglu et al. (2020). The section that follows will investigate business practices changes that could lead to increased competitiveness for clothing and textile businesses.



## 4.6 Environmentally Sustainable Opportunities for Future Clothing and Textile Business Models

### 4.6.1 Business Practice Changes for Increased Competitiveness of Clothing and Textile Businesses

This section will focus on changes suggested by participants for clothing and textile business to be more competitive. This section will precede a discussion around what and how future clothing and textile business models should be. Within aforementioned changes suggested by participants, two main themes of education and communication, and organisation emerged. The data is segmented and discussed accordingly. Summaries of the suggestions can be seen in Figure 4.42 that follows. The raw textual data used to produce the summaries can be referenced in Annexure A Table 1.6 Business practice changes for increased competitiveness.

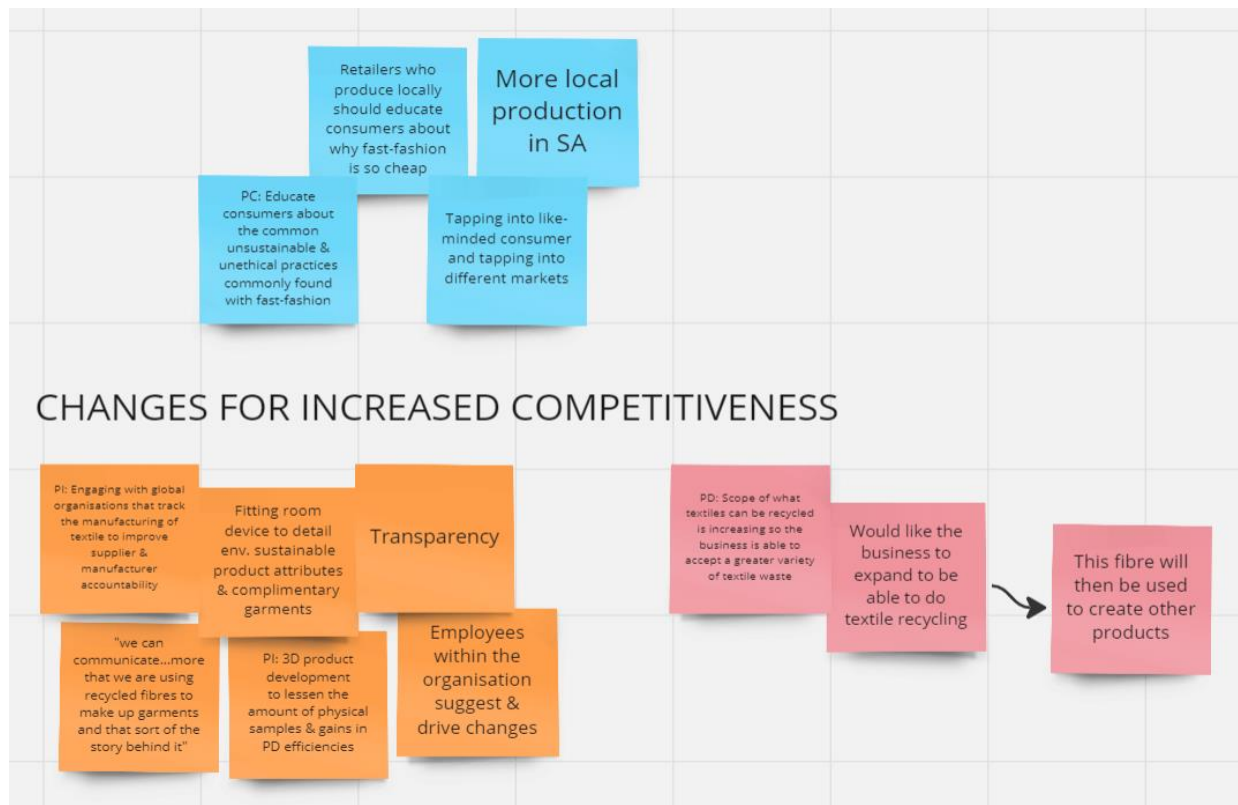


Figure 42 Business Practice Changes for Increased Competitiveness

### *Education and Communication*

Participant I raised the suggestion of increasing communication about products' environmentally sustainable attributes to the customer. Similarly, Participant C expressed the advantage of educating consumers about the unsustainable and unethical practices commonly found in the fast fashion industry with the intention of positioning the more sustainable Reuse option as a better and more attractive consumption option. In addition, Participant C motivated that South African retailers who produce locally should educate consumers about why fast fashion is so cheap in comparison with the locally produced counterpart, also with the intention of repositioning the locally made equivalent as a better choice. This suggestion is contingent on the consumer re-evaluating the priorities that influence consumption choices as price, as a primary motivating factor, would need to be reordered in favour of purchasing locally made goods that are produced ethically. However, consumers are increasingly recognised as having increased appeal to businesses with a significant social and environmental agenda as these consumers want to create impact using goods and services (Peterson 2021). Therefore, educational efforts along with increased communication of environmentally sustainable attributes would advantage a business. The finding concerning educational efforts for and towards the consumer is shared by a study by Monyaki (2022), who found that business owners in the apparel manufacturing sector had the desire to educate the consumer. This is shown in the following quote: *"Most...of the [business] cases seemed to agree with the idea of educating people to buy repurposed vintage and locally produced clothing, sharing their unused skills and experience through education platforms, and creating awareness of fast fashion in the environment. The analysis identified the eagerness to educate, create awareness or advocate for more sustainable practices in our daily activities. The findings are suggestive of the SMEs' more active role in sustainability."*

### *Organisational*

Participant I suggested that there should be increased transparency into production and product development processes. This compliments the suggestion made by the participant to increase communication about a product's environmentally sustainable product attributes. The barrier of lack of transparency was cited by Dan and Østergaard (2021) within the context of barriers that a designer would need to overcome within an organisational setting, like the case of Participant I. Participant I also discussed that there should be a greater drive by employees within the bigger organisation that Participant I is situated within to suggest and drive changes towards environmental gains. Dissanayake and Weerasinghe (2022) recognise that employees within an organisation can create barriers through a

limited perception of sustainability coupled with a limited understanding of CE. However, between 80% and 90% of the environmental impact of a product is determined through decisions made during the design phase of a product's production (Andrews, 2015; Vecchi, 2020), meaning that there are potential gains to be made by Participant I's employees to drive the environmental sustainability of the products produced, and how the products are produced. Participant I also asserted that businesses could modernise their product development process to achieve a decrease in waste generated from this process, as was done by Participant I through the introduction of a virtual product development application. Participant I adopted an innovative, less wasteful method of product development, which is an innovative solution to the challenge of sustainability (Marks & Hidden 2017).

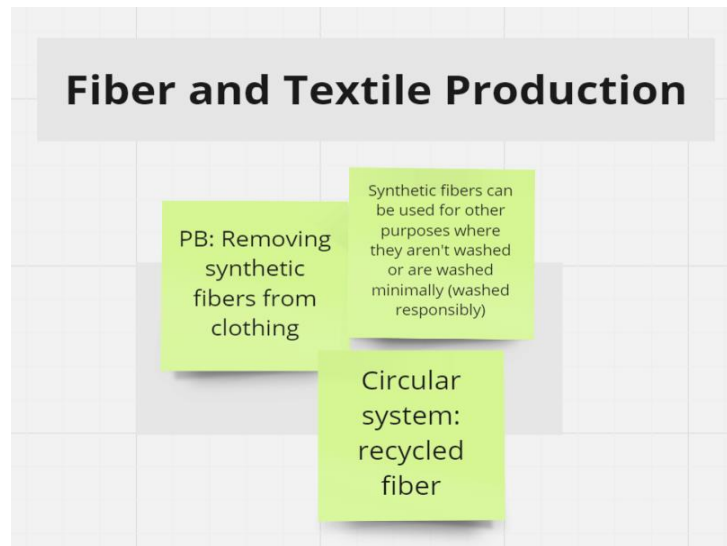
Participant C discussed targeting consumers who have already expressed an interest in more sustainable consumption habits as an opportunity for growth. This suggestion is related to market access and targeting a like-minded consumer. Participant C expressed the belief that increased local production would offer businesses a competitive advantage. While this would benefit the local economy and industry, a product with the value-added benefit of being produced locally is only a benefit if local production is prioritised by the consumer, meaning that this suggestion is contingent on a consumer to assert this as valuable.

Participant I stated the value in better assurance of sustainable product attributes. This was discussed within the context of increased accountability of sustainability assurance by well-known global organisations that track and monitor manufacturing and production practices to certify credibility. Participant D suggested changes to increase the business' competitiveness by way of expanding their practices to include textile recycling as part of the business' practices. Recycling would also enable an additional revenue stream for Participant D as the resulting fibre from recycling could be sold to be utilised in other products. Participant D also discussed that increasing the scope of what can be recycled in South Africa would give the business, and others of this nature, a competitive advantage. However, Lemille (2021) criticises recycling within a circular model as the sustainable mechanism of recycling is designed to recover waste, rather than prioritise exploiting the highest possible resource value, as prized within a circular model.

This section discussed potential changes for businesses that could give them a competitive advantage. All the suggestions incorporated environmental sustainability in some respect. Suggestions were raised that address education, communication, and organisations. Opportunities that lie in environmentally sustainable practices will follow.

#### 4.6.2 Opportunities of Environmentally Sustainable Practices

This section will discuss opportunities to advance or develop the environmentally sustainable practices occurring within participants' businesses, but also for businesses that incorporate similar practices, as proposed by participants. The findings are organised according to a typical product chain for clothing production segmented by fibre and textile production, manufacturing processes, retail activities, and post initial-use opportunities that prioritise sustainable interventions according to the hierarchy of the 9R Framework. Summaries of the discussions that address fibre and textile manufacturing are displayed in Figure 4.42 that follows. The summaries were produced using raw textual data that can be referenced in Annexure A Table 1.7 Opportunities of environmentally sustainable practices for fibre and textile manufacturing, manufacturing, retail and post-initial use opportunities.



*Figure 43 Opportunities of Environmentally Sustainable Practices for Fibre and Textile Manufacturing*

The discussion will begin with textile manufacturing. Participant B suggested that opportunities lie in removing synthetic fibres from clothing and that that synthetic fibres should rather be repurposed and used for other products that don't carry the wash care requirements of clothing, this would therefore aid in lessening microfibre water pollution. This gain is asserted by the said goal, as proposed by EMF (2017b), to phase out microfibres as part of a CE for the clothing and textile industry. Participant B also spoke of gains for a circular system where more fibre is recycled, and to phase out the use of synthetic fibres in clothing overall. However, Fazluddin et al. (2021) assert that the clothing and textile sector requires significant circular interventions to alleviate the industry's resource demand.

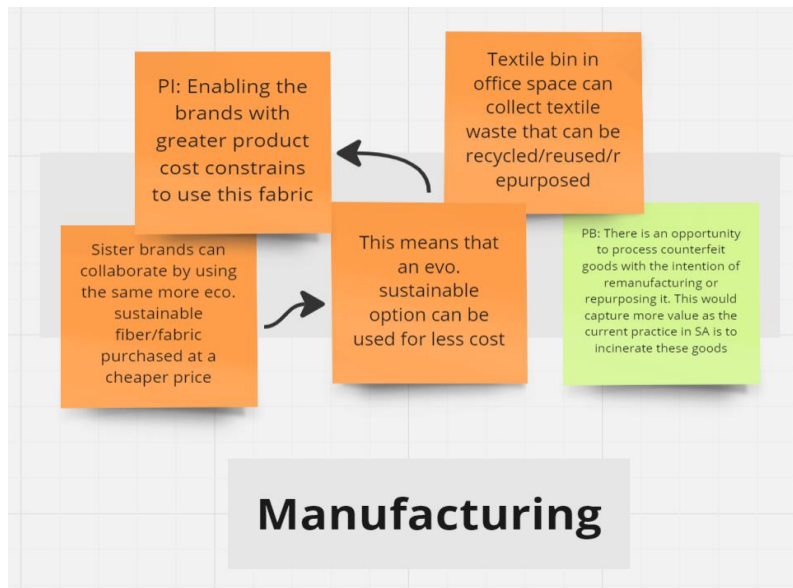


Figure 44 Opportunities of Environmentally Sustainable Practices for Clothing Manufacturing

Participant I's collaborative suggestion is considered in the phase of clothing manufacturing. This participant asserted that sister brands within the bigger organisation have opportunities to collaborate by using identical (environmentally sustainable fibre) fabric with environmentally sustainable product attributes that can be dyed to individual colours as per each brands' seasonal direction. Benefits for the collaborative purchasing of fibre mean a decreased cost, which affords brands that would have previously been unable to purchase the sustainable fabric due to its higher cost the opportunity to use this fabric for a decreased price because of the larger quantities purchased. Participant I suggested that a textile bin within the corporate office space could collect textile waste produced through the product development to be recycled, reused, or repurposed to decrease waste generated through this process. These practices would enable the use of textile waste generated by Participant I, which is in accordance with the waste reduction inherent to a circular model for the clothing industry (Geissdoerfer et al. 2018). Participant B spoke of an opportunity to process counterfeit goods with the intention of remanufacturing or repurposing the product rather than the current practice of destroying. The global fashion industry is known to destroy goods no longer deemed suitable for sale. Luxury fashion brands burn or mutilate goods, resulting in a significant loss of resource value (Cernansky 2021). While destroying it could harness some energy from the product, remanufacturing or repurposing the product would bring about gains in maintaining a higher resource value than the destroyed equivalent, as is current practice of dealing with counterfeit goods in South Africa (Kazancoglu et al. 2020; Kirchherr &

Piscicelli 2019; Potting et al. 2017). Complimentary to Participant B's suggestion, Jenkin and Hattingh (2022) recommend that the South African clothing industry focus on implementing sustainable interventions like increased local production to generate employment.



Figure 45 Opportunities of Environmentally Sustainable Practices for Retail

Participant I spoke of the opportunity of a retail setting within clothing/apparel to influence and guide the consumer to more environmentally sustainable practices. This could be through the decisions of product packaging options, wash and care practices, and what consumers do once they no longer have a use for their purchased product. Regarding suggestions for retail, Participant C asserted that there is an opportunity for businesses to grow the second-hand clothing trend that this business is centred around. This opportunity is supported by the finding of EMF (2021c) that BMs that incorporate circular practices in the global fashion industry have shown significant growth since 2019. Participant C also spoke of technical infrastructure improvements to the primary selling platform of the website, whereby products similar to those that have held consumer interest are recommended to the consumer. Participant A discussed that there are opportunities for courier services that support South African online businesses to become more environmentally sustainable. This would favourably contribute to the reduction of environmental impact of products sent to customers. However, this potential gain is contingent on collaboration between value chain segments (Accenture 2020; Shivarov 2020 and Kirchher & Piscicelli 2019).



Figure 46 Opportunities of Environmentally Sustainable Practices Post Initial Use

The suggestions that follow consider opportunities for clothing or textile products after the initial use, ordered according to the 9R Framework. Participant I motivated that take-back systems would bring about gains to reduce waste and could present other opportunities, due to the extensive considerations and steps of a take-back system. This finding is supported by the gain of increased resource efficiency potential of end-of-life products through a more circular system, of which a take-back system would be part of (OECD 2018b). Participant I also suggested gains that could be made through repairing and selling products returned to the business within the local community. Current practice is to donate or sell these items but as these have defects, there is an issue of quality that impacts the overall value of the item. Participant I made the suggestion with the intention of adding value to the returned item towards gains of improved quality and use, which is recognised as an intervention to increase the longevity of a product (Potting et al. 2017). Participant F discussed opportunities to expand the business centred on Reuse by doing similar operations at other schools within the same brand, and even other private school brands within South Africa. In support of potential gains of environmental sustainability for this suggestion, PACE (n.d.) state that if garment use is doubled, a 44% reduction of greenhouse gas emissions could be achieved, while Jenkin and Hattingh (2022) also encourage Reuse for the South African industry. Similarly, Fazluddin et al. (2021) state that a pre-worn clothing market would be a feasible opportunity for South Africa. Participant G asserted that there is an opportunity to increase the value of textiles used to create clothing through the repurposing of clothing waste for use in soft furnishing applications for household use. Similarly, Participant B discussed opportunities for Repair and Remanufacture to improve the value of textile resources used in clothing manufacture. The said opportunities cited by Participants G and B would enable the increased use of the textile resources required of clothing manufacturing as secondary materials are substituted for primary raw materials

(Department of Environment, Forestry and Fisheries, Republic of South Africa 2020b; Shivarov 2020). Participant B motivated that there are opportunities to increase textile and material sorting within Participant B's business, but also as industry practice. This suggestion is in line with the prospect of clothing (textile) sorting and cutting for further processing to eventually become fibre (EMF 2017a). EMF (2017b) asserts that improving recycling is a goal towards realising a circular textile and clothing system, within a CE. Participant B motivated that fibre has appeal for further beneficiation due to pre-processing that can then be processed and manufactured to become material once again. Unique to Participant B's business are the opportunities for increased textile sorting categories to better harness the embedded energy of the raw material resource and for collaborating with businesses that can share resources or have partnering supply chains. However, fibre recycling should not be prioritised as recycling is not designed to prioritise the highest possible resource value, but to recover waste (Lemille 2021).

This section discussed opportunities for product chains of clothing and textile businesses. More specifically, the findings discussed opportunities for fibre and textile manufacturing, clothing manufacturing, retail of clothing, and opportunities for post-use prioritised according to the 9R Framework. The section that follows will discuss sustainability attributes of clothing and textile businesses, as proposed by the participants.

#### 4.6.3 Sustainable Attributes of Future Clothing and Textile Businesses

This final section looks forward and discusses what sustainability attributes future business models should include, as proposed by the participants. From the data collected, three themes emerged. The first of these themes collects findings of sustainability attributes related to a clothing or textile product, the second deals with suggestions for retail, and the final theme groups findings for business practices. Summaries of the participant suggestions are displayed in Figure 4.46. The raw textual data used to produce the summaries can be referenced in Annexure A Table 1.8 Sustainable attributes of future clothing and textile businesses.





Figure 47 Sustainable Attributes of Future Clothing and Textile Businesses

The first theme that groups findings for a clothing or textile product will be discussed in this section. Participant B motivated that products produced by the textile industry should use natural fibres and less harmful products. This finding is in accordance with PACE & Accenture’s (2021) objective for a circular textile industry whereby inputs for textile manufacturing are safe. Moreover, Jenkin and Hattingh (2022) propose an intervention of reduced use of hazardous chemicals, towards achieving a more circular clothing and textile industry. In addition, Participant B asserted that better clothing products should be produced by the clothing industry. This assertion means that the products’ life cycles should be considered for longevity as part of strategies to achieve gains of resource efficiency (Lemille 2021.). Moreover, the suggestion of better clothing products is a general, encompassing idea that could be tied to an overall better quality product output that considers the said environmental issues caused by the clothing and textile industry need (Jenkin & Hattingh 2022). Participant A stated that the clothing industry has potential to grow the practices of repurposing, remaking, reusing, refurbishing, and recycling clothing or parts of clothing. This assertion would enable Ghosh et al.’s (2017) suggestion of five types of BMs for a CE that deal with circular supplies; resource recovery; product as service; and produce life extension and sharing, all of which complements Participant A’s suggestion.

The second group of findings collectively addressed adaptations for retail with Participants A, F, and H proposing recommendations that centre on product reuse. Reuse is poised to be a significant contributor to a circular clothing system. In support, Nahman et al. (2021) motivate that South African business entities should move towards product sharing, renting, repair, refurbishment, and upgrading, all of which enable Reuse. Moreover, Dalberg et al. (2021) identified that activities related to recycled garments present immediate opportunities for job creation in Africa (GRID-Arendal 2021).

The final section of findings will discuss suggestions for business practices of environmentally sustainable clothing and textile MSMEs. Participant G proposed an all-encompassing attribute of responsible business practice where products produced by the clothing and textile industry do not negatively impact the environment. An enabling factor would be that businesses better consider the environmental impact of their products, as proposed by Participant E. Participants A and C asserted that transparency of supply chains should feature within future clothing and textile businesses. In addition, Participant A suggested that tracking of ownership become practice, which could be enabled with the said transparent supply chains. There are fashion brands that tag garments towards enabling traceability and transparency (Freudenreich & Schaltegger 2020), which could be an initiative to answer to Participant A's suggestion. Another practice suggested by Participant A was a take-back system, which would enable the possibility of product reuse. Participant E said that future clothing and textile businesses should engage more with consumer education on the unsustainability of current practice.

In summary, suggestions for more sustainable production of clothing and textile products were proposed, along with support for BMs that focus on clothing Reuse. The suggestion for increased supply chain transparency and take-back systems accompanied the assertion of better consumer education driven by businesses within the clothing and textile industry.

## 4.7 Conclusion

This chapter presented and discussed the findings to speak to the said research objectives. The chapter began with a presentation of participant demographic information where it was found that most participant MSMEs were classified as micro businesses and were found to have a consumer focus with a BM centred on Reuse. The chapter continued with the discussion of how all the participant businesses were found to have practices occurring within two (2) of the three (3) categories that segment the practices of the 9R Framework. A discussion about what and how the practices from the 9R Framework were practised within the participant businesses followed, which revealed that for most of the

businesses, the R practices were often fundamental to the product or service product chain. This finding is in line with studies by Colucci and Vecchi (2020), Monyaki (2022), and Todeschini et al. (2017), who investigated clothing businesses that centred on incorporating sustainability, whereby sustainability was fundamental to the business' operations. It was also found that the participant BMs had sustainable interventions within their product chains, but also as part of the network of suppliers and business partners, mirroring the findings of Carissimi et al.'s (2023) investigation of SME supply chains during their transition to become circular. In this study, most businesses were found to be practising Reuse, which was most often connected to practices of Repair, both of which are enabled by the consumer. In addition, it was found that most participants have linear flows of resources within their product chains with some businesses having circularity within their product chains due to the circulation of resources through business processes, but these businesses weren't completely cyclical in nature. This was followed with an investigation of the steps and processes of the businesses' product chains, which proceeded with a discussion of motivational factors for the environmentally sustainable practices. It was found that the motivational factors, and perceived benefit took on a sustainable development agenda as findings centred on the three (3) pillars of sustainability, with the addition of personal motivation. A discussion on barriers that hinder the participants revealed that there are many challenges to be overcome that mostly deal with current clothing and textile industry practices, with the consumer frequently mentioned as a hindrance. In response to the third research objective, the chapter then explored changes for increased competitiveness of, and future considerations for, clothing and textile BMs. Most of these findings dealt with recommendations for more sustainable fibre production and post-consumer use by way of take-back systems and strategies to extend the life of clothing. There was the assertion for Reuse BMs and increased consumer education driven by businesses of the clothing and textile industry. The chapter that follows will develop and discuss pertinent factors for proposed BMs for a CE in South Africa.

# Chapter 5 Findings - Part 2

## 5.1 Introduction

This chapter will propose and discuss BMs that form part of CE for South Africa. While there is particular focus on clothing and textile BMs, suggestions for other product-centric BMs and industries that can also make use of clothing and textile waste are included in the discussion. This chapter will discuss findings towards the development of a framework making use of the 9 Rs, from the 9R Framework, and how this could be realised within the context of the South African clothing and textile industry. Based on the results of the previous chapter, this section will develop potential approaches and considerations for a circular model with justification from similar practices found occurring within the clothing and textile industry, some being from developing economies, like South Africa. This section will begin with a discussion of how the 9Rs could be realised within the South African industry with BM practices for environmentally sustainable strategies for a product chain, and will conclude with a discussion of considerations that would enable the implementation and transition to a circular (multi/interconnected clothing and textile) industry.

## 5.2 Business Models for a Circular Economy in South Africa

This section will propose circular BMs for the South African clothing and textile industry that could function within a CE. The circular product chain begins with BMs and environmentally sustainable practices that are considered during the design phase of clothing or textiles, which can be considered as strategies for smarter product use and manufacture, as part of the 9R Framework (Potting et al. 2017).

### 5.2.1 Strategies for Smarter Product Use and Manufacture

As practices of smarter product use and manufacture take place within several industries as a result of the sustainability prerogative, when a product or service is conceived, designed and developed, focus has shifted to now include several of the Rs from the 9R Framework. Much of the discussion for this section addresses such considerations for product and service design, while considering the role of the designer/maker/producer from the 9R perspective. The discussion will include and propose strategies and considerations to Refuse, Rethink, and Reduce the use of resources that impact design decisions towards realising a CE for the South African clothing and textile industry, but will also include

complimentary industries, to realise sustainability within the clothing and textile industry's CE BM within this multi-faceted approach to sustainability.

The first R to be discussed is that of Refuse. **Refuse** is to prevent the use of raw materials (van Buren et al. 2016), whereby the use of a certain product, or the product itself, is made redundant. This means that the function of the product is abandoned, or the same function should be offered by using a different product (Kirchherr & Piscicelli 2019; Potting et al. 2017). The strategy of Refuse as practised within the South African clothing and textile industry could be to refuse the use of blended materials (new items and or second hand) due to the South African textile recycling industry's inability to recycle blended fibre materials (Green Cape 2023; Freudenreich & Schaltegger 2020). South African clothing producers can refuse to use blended materials, or other specific types of materials, where possible until such a time that recycling of these materials is feasible for clothing and textile BMs. Participant E limits the use of fabrics with a particular fibre, as evidenced in the following quotation, *"I've tried to limit as far as possible...my use of polyamide polyester fabrics within manufacturing"*, while Participant H has prioritised the use of regenerated nylon within the products, due to the recyclable attribute of the fibre, as shown in this quote, *"the outside of our bags...is a regenerated nylon, not a recycled nylon"*.

Another strategy to prevent the use of raw materials is to refuse virgin fabrics in production, and only use existing garments or textile waste, as practised in the BM of Participant E and explained in the following quotations, *"I take thrifted items or old items of my own and I'll reuse them in a new way"* and *"I recreate new textiles from factory scraps that I get from designers and other factories in South Africa, so, it's a rethinking what a new virgin material, or resource could look like"*. The practice of refusing virgin material was also found occurring within Participant H's business, as explained in this quote, *"all of our bags are made using waste material, which is essentially what we would call our raw material"*. Small-scale BMs that produce niche luxury products can design and produce their products by exclusively using existing apparel and textiles. As seen in Participant E, this method of production requires a different and lengthier manufacturing process, as described in the following quotations:

*"I purchase those garments, deconstruct them, and make something completely new from them."*

*"I'll cut them up and re-piece them together and make something new."*

*"Once I receive those raw materials there's a sifting and sorting process that happens internally with me in my studio. And that's literally just sifting and sorting through what's usable, what's not usable and then it's like pilling."*

*“Sifting and sorting and then like ironing pieces out and then there’s a big process of colour coordinating...so...separating all my colours from lights to darks, fabric texture...I create this entire bank of usable...‘paint’....And that’s kind of my library that I work from....my actual manufacturing process...constructing textile from that. So, from those pieces, I would layout my designs, work out what I really want to do with them, cut and prep and then sew up metre, probably, two metre pieces of fabric and then I cut my patterns out of that.”*

As described in the quotations, there is a complexity to designing within the constraints of existing apparel or textile products. There are also issues of wear and tear for existing garments and unknown fibre compositions due to inaccurate labelling of fibre compositions (PACE & Accenture 2021). In addition, there is also creativity and skill required to consider producing using this method (Dissanayakea & Sinha 2015). Material sourcing can be more costly and the process of procuring materials and textiles can be more lengthy, as shown in the following quotation from Participant E: *“There’s a collaboration, reaching out personal connection that needs to happen first with vendors...So a lot of the factories I reach out to, and start building connections with them and start saying, you know, ‘do you need someone to dispose of your waste for you? Your fabric waste?’”* The production process for this of method of material use produces one-off designs or designs of a limited quantity due to limited material quantities.

Another trend commonly practised by BMs wanting to add environmental sustainability practices to clothing and textile products is to refuse materials that don’t have environmentally sustainable attributes. The favoured materials have water saving benefits, organic fibres, or reduced chemical use in production, to name a few attributes. While there is a growing awareness of materials with environmentally sustainable attributes for the clothing and textile sector, these materials are more costly to produce and have a higher purchase price. This is correlated with the greater appreciation that products and services with environmentally sustainable attributes are more costly, as asserted in the following quotation by Participant H: *“Going sustainable is slightly more expensive to whatever you’re buying and...it depends on if you can pass that cost onto your customer or not. And if you can’t, then that’s gonna be a problem.”* The resultant financial implications create challenges of feasibility for incumbent brands and BMs that have products and services with established price points and minimal margins. This raises the question if materials with environmentally sustainable attributes are a feasible approach for these established BMs and their fixed supply chains. However, due to this practice’s popularity, it is proposed as a consideration to replace refused materials that do not have sustainability

attributes, mixed materials that are not recyclable (yet), and or virgin/new materials. This sort of intervention towards increased sustainability has market relevance due to its popular use and is not unfamiliar to consumers who purchase sustainable products.

The second option is to **Rethink**, which is to use products more intensively and in different ways, such as product sharing (Kirchherr & Piscicelli 2019; Potting et al. 2017). Product sharing was not found to be occurring within the investigated BMs in this study and thus requires further investigation within the South African context for implementation towards a CE in South Africa. There are South African rental BMs and clothing and textile businesses that enable product sharing, as stated in the literature review section of this study. Due to this, this sort of BM will be positioned as a sustainable alternative and investigated for implementation of circular BMs in South Africa, as this is a rethink of what is possible with second-hand items that are no longer desired by their original owners.

BMs that centre on product sharing in the South African context could take the form of clothing rental businesses and other types of businesses that provide use of a product for a period of time only. These types of South African BMs provide use of an item for a period and are reused after return for another rental period. Rental businesses in South Africa can assist in more intensive use of goods. BMs can be formal and informal, with higher quality items found in the formal and cheaper alternatives in the informal rental businesses. This statement is based on the finding that participants that were enabling product reuse, another practice that enables product sharing, were formalised businesses that sold higher quality and higher priced products (Participants A and C), in comparison to the informal BMs that sold cheaper products (Participants F). Current practice in South Africa is for clothing and apparel rentals to offer special occasion, bridal and menswear products, but there is opportunity to expand existing rental BMs for the South African market. Hu et al. (2014) assert that rental businesses don't require substantial upfront costs in comparison to the traditional sales model. However, in calculating expenses for an apparel rental business in comparison to the procurement model, Hu et al. (2014) found that expenses were better for the traditional procurement BMs due to more careful use and care of the item when the product is owned by the consumer. In the rental model, the leaser is responsible for the upkeep (repair) and laundering of the garment, incurring an additional cost along with the logistical expenses and cost of sales (Hu et al. 2014). Therefore, these kinds of BMs have additional expenses in comparison to the 'linear-based' procurement BM of clothing businesses. However, there is the benefit of reconsidering ownership in relation to product use, especially where a product or asset is not, as in the case of other industries, required to be owned for use.

The third option is to **Reduce**, which is to reduce the use of raw materials or natural materials and resources by prolonging the lifespan of products (van Buren et al. 2016). One way that the South African clothing and textile industry could reduce resources and raw materials is to recycle all recyclable fibres when it is feasible to do so, thus producing fibres for use without the virgin resources required for production. South Africa already recycles materials like paper, glass, metals, and polystyrene (Quill 2018). In addition, South Africa provides textile open-loop recycling and is in a position to leverage the existing network to increase textile recycling (Green Cape 2023). Open-loop textile recycling means that the material is not recycled indefinitely and will at some point be excluded from the circular flow of resources. This is due to the degradation of the raw material resulting in reduced quality, and because of the use of the recycled raw material into a product that is not recyclable (Muthu 2016). This factor of recycling poses an issue not just for textile recycling, but also the greater recycling network in South Africa. Industries and manufacturers could also think more strategically about how manufacturing waste is dealt with and work towards gains eliminating waste as a strategy to reduce.

A strategy that would reduce the resources required to produce clothing and apparel is to consider manufacturing processes and gains to be had during manufacturing. Repurposing pre-consumer waste produced through cutting, as part of garment and apparel manufacturing, presents an environmentally sustainable approach to use cutting waste in the manufacturing industry (Haq & Alam 2023). This approach would extend the use of the fabric product considered waste. In addition to the environmental benefit, there is the potential for this pre-consumer waste to be purchased, creating an additional revenue stream for the manufacturer. Therefore, this solution has economic and environmental sustainability gains. De Meillon (2019) makes the case for 'zero-waste garment production', which prevents pre-consumer textile waste from being landfilled. While repurposing textile waste has benefits for the environment and participating manufacture, there are challenges for the designer/manufacturer that should be stated. Pre-consumer textile waste that is the correct size to fit the pattern piece it needs to be cut from needs to be procured, or smaller pieces need to be combined in a patchwork style to create a sheet of fabric prior to pattern pieces being cut (De Meillon 2019). This has implications of time and an increased labour cost, which need to be considered for product costing. Haq and Alam (2023) motivate that the use of pre-consumer textile waste is more cost effective in comparison to recycling, which requires spinning, knitting and/or dyeing stages. In addition, the use of generated pre-consumer textile waste would decrease the waste management expenditure incurred by the manufacturer (Haq & Alam 2023). In this light, there may be opportunities for other industries to



repurpose waste. Participant H sourced material used to produce their products from the retail industry, thus preventing the requirement of raw materials and prolonging the use of the material product. This is evidenced in the following quotation: *“We have a partnership with one of SA’s largest retailers where we actually get...tonnes of their waste materials shipped to us every month.”* Industrial symbiosis would enable the utilisation of resources for other industries, a known attribute of a circular model (Williams et al. 2018), as is the case of Adidas using material made from recycled fishing nets to produce shoes (Mohabuth 2017).

A practice to reduce resources for the clothing and textile industry is to use fabrics that are produced with environmentally sustainable attributes. Participant I used fabrics that required less water during production, while also using fabrics with recycled polyester, as described in the quotes that follow, *“what we have done is we’ve now tried to...use different dye methods...so instead of just doing like the normal dye methods that uses so much water”* and *“they’re also...using...a recycled polyester”*. From this it can be deduced that there are potential gains for South African BMs to select their production resources more selectively to limit the resources used by prioritising materials with recycled or waste-saving attributes. Participant I also eliminated the use of trims attached to their products as they considered the trim not to be of use to their customers, which results in waste. This is described in this quotation, *“in terms of the product itself, we are trying to not use, you know those little bags that you put that extra button into”*. A strategy to reduce production resources would be to revise the product and eliminate any unnecessary parts or components. For the greater South African manufacturing industry, this could take the form of eliminating unnecessary packaging waste or parts that accompany products but can be bought separately as needed.

As found in this study, Claxton and Kent’s (2020) investigation of fashion brands revealed that most of the investigated businesses have implemented sustainability strategies that mostly address the material choices and production stages of their circular approach. This raises the question of how other industries in South Africa are implementing initiatives for environmental sustainability. The question is whether there is also an isolated approach that only considers the limited part of the product chain as just described, or if there are further gains to address the entire product chain. The authors of the study also found that there was a movement within these investigated businesses to consider strategies for sustainable intervention in the remaining aspects of the products’ life cycle. However, the authors stated that interventions for the remaining product life cycle required the involvement of the product development teams. Therefore, it is recommended that South African businesses follow this guideline

whereby production teams are involved in investigating and employing sustainable interventions, not just the designer. The bigger production teams within South African clothing and textile businesses should see technologists, buyers, and sustainability specialists participating in design decisions for increased environmental sustainability of the product or service outcome. The same approach can be asserted for BMs in other manufacturing sectors and industries that produce a product or service as part of their value proposition, resulting in an inter-collaborative effort between various industries, all making use of clothing and textile waste.

Claxton and Kent (2020) recognise that designers require more concrete foundations of technical knowledge of fibres and textiles, especially those that are poised to enable a more sustainable outcome. The authors go on to state avenues for potential growth for designers that are relatable and would benefit South African designers and employees participating in the design and product phase of products and services. These opportunities for growth are to evaluate sustainable materials to select the most relevant market, find feasible and design-appropriate textiles, to use tools to assist in making impactful design decisions towards increased sustainability, to apply creative thinking to address issues of waste that consider the sampling and production phase (pattern design, manufacturing), and to consider the user by designing a product that makes it easier for the consumer to act in accordance with sustainability principles. This last point could be aided by producing products with increased longevity to assist with product reuse and repair, by designing for disassembly, by designing with better quality materials in mind, by creating timeless designs for increased longevity, by considering the bigger supply chain of the product and potential avenues for increased use, and by eliminating waste from production (Claxton & Kent 2020).

The previous section discussed strategies for smarter product use and manufacturing through addressing three of the 9 R's in the Framework, however, the issue of planned obsolescence upon which the current industrial system is based, results in a short lifespan of textiles and the resultant products from which textiles are made from (Hu et al. 2014). Hence, strategies to extend the lifespan of products and their material parts should be considered. The section that follows will explore practices to extend the lifespan of clothing and textiles in the South African context, while addressing relatable strategies that speak to product chains for industries in the greater South African landscape.

### 5.2.2 Strategies to Extend the Lifespan of Products and their Parts

While industries grapple with how to produce products with less harmful environmental impacts during the design and conception phase, it is valuable to consider how to extend the life span of products and their parts while in use by the consumer. Extended producer responsibility positions manufacturers as responsible for the post-consumer stage of a product's life cycle (OECD n.d.). Therefore, considering how to maximise the lifespan of products and services has benefits for industries within South Africa. The discussion that follows will consider how practices of Reuse, Repair, Refurbish, Remanufacture, and Repurpose (additional five Rs) could be practised by BMs within the South African clothing and textile industry, but will also include general relatable factors that speak to partnering industries within South Africa. As stated in the literature review, collaboration is critical in pivoting the South African economy to that of a CE. Therefore, connections and networks form part of this discussion in terms of industry collaborators.

Potting et al. (2017) describe **Reuse** as the reuse of a product that is still in good condition and fulfils its original function by another consumer. There are many commonly owned assets like houses, cars, and even furniture that are sold for use by a second consumer. However, in recent years, the boundaries of reuse are being negotiated to include a more expansive group of products and, therefore, requires investigation. Reuse within the context of clothing is the practice of a second user acquiring and wearing clothing that was previously worn. The act of reuse reduces the amount of new clothing produced as existing clothing or an apparel product is used rather than the virgin counterpart. For the customer, the act of reuse extends the time span between acquiring and discarding a garment and in turn, reduces the number of garments used over time (Freudenreich & Schaltegger 2020). Reuse was found to be the most commonly occurring environmentally sustainable practice from the 9R Framework, as found in the participant businesses. These participants' BMs were made up of a range of product price points, differing quality, and were informal and formal businesses. This finding raises the question of how the practice of Reuse is developing within non-typical industries due to the trend of product sharing within the South African context. As Reuse was central to most of the participant businesses, it is important to consider how it could be expanded further in the South African clothing and textile industry and potentially other product-based industries.

A commonly found Reuse BM in South Africa are bridal and special occasion rental businesses, which includes the equivalent for menswear. These product types are typically for a handful of occasions in a particular time of a consumers' life. With the rising trend of thrifting among the younger generations, it

is evident that these generations are more likely to use second-hand clothing (Liang & Xu 2017). A study by Liang and Xu (2017) found that younger generations of Chinese consumers were more likely to use second-hand clothing than older generations. This finding could be relatable to the South African market. The study also found that Chinese consumers had comparable concerns over using second-hand clothing, which included concerns over hygiene and an associated fear of financial and status inferiority. A point raised by Participant C described the challenge of reaching their target market of women aged between 35 and 55, evident in the following quotation, “...we’ve really capitalised on women in our...age group, like 35 to 55, who are thinking sustainably”. The differentiation of the sustainably minded customer excludes a portion of the South African women population. In addition, Participant C asserted that younger generations are sustainability minded and, therefore, more likely to reuse clothing than older generations. This is evident in the following quotation, “...the youth...sort of 16-25...they are really the market that are thinking sustainably now...I think the environment and being conscious is much more ingrained in that generation than in our [older] generation”. If the South African market was to see similar trends, it would be safe to bet on a younger and eco conscious 35 to 55 year old segment of the market. The range of age presents a variety of ages and life stages to consider for a sustainably minded consumer. Based on Liang and Xu’s (2017) findings, and their relatability to the South African consumer, there could also be the potential for products that target younger generations to be reused.

For this discussion, opportunities for Reuse have been considered in relation to the kinds of reused clothing BMs currently found in South Africa. The suggestions that follow propose recommendations for clothing and textile product longevity. While wedding and special occasion product type BMs currently feature in the South African market, there is potential for kids and baby clothes’ Reuse BMs to grow. Considering the participant business that sold second-hand school uniforms, there could be an opportunity for reuse of common kinds of workwear and uniforms. A possible niche could be denim wear due to the longevity of the fabric, enabling a longer period of use (Abraham 2011). Reuse BMs can be formal or informal, both with considerations and limitations to state. Used clothing markets in Ghana and India were found to be informal businesses that sold cheaper goods of a low quality. The stores were informal or took the shape of a street vendor, they sold mixed product types from mixed brands, were independent, were mom and pop-type businesses, the physical nature of the retail-setting allowed for customers to feel and experience the product prior to purchase, and the price could be negotiated (Abraham 2011; Business Insider 2022; O’Reilly & Kumar 2015). Informal clothing businesses could also offer only a specific type of product. In some ways, this is happening in South Africa. Street vendors can be seen selling clothing displayed on a blanket or similar means on the roadside, while thrift stores and

hospice shops have a more informal business of this nature. Informal Reuse BMs in South Africa could take the shape of the stated practices, but there is the issue of sourcing that should be navigated to prevent an increase of waste, as occurring in Ghana and India (Business Insider 2022; O'Reilly & Kumar 2015). Freudenreich and Schaltegger (2020) assert that used clothes can be targeted towards less affluent customers, rather than the current practices of low-quality virgin garments. The authors go on to suggest settings like flea markets or swapping for informal Reuse BMs to be practised.

Participants A and C were found to sell second-hand apparel and clothing products. Both businesses sold high-quality products through formalised online businesses, they offered specific types of products with one reselling purchased goods and the other through consignment arrangements, as shown in the following quotations:

*"We do pre-loved...second-hand luxury and premium branded clothing, accessories, shoes for men, women and children...then, alongside that, the service aspect of it is that we...take it on consignment...we...offer the service of helping someone sell their pre-loved on a consignment basis."* (Participant A)

*"Women that have sold clothes to us, we pay them back with a credit which is approximately 40% of the resale value, and then they can shop again at [name of business]."* (Participant C)

*"Quality is of the utmost concern. Everything, our entire collection is highly curated."* (Participant C).

The consignment arrangement of Participant A produces 40% of the profit for the participant BM, while products are purchased by Participant C from users (customers) at 40% the resale price. Formal settings for Reuse BMs in the clothing and textile industry could focus on selling luxury and high-quality products, enabling longevity, while offering only specific product types or niche product types, and procuring product stock through purchasing and consignment arrangements. This consignment arrangement could also be practised in other product-based industries that deal with high-value products. There are, however, considerations for Reuse BMs. Businesses of this type require staff members who are trained and skilled to effectively select and price goods. While pioneering owners are feeling their way through a niche entrepreneurial venture, the limitations of knowledge hinder the Reuse business' success. This also means that processes around these businesses are decidedly non-standardised, and depend on the employees' judgements and decisions (Hedegård et al. 2020).

There are other types of BMs that centre on the practice of Reuse, but don't have a sales and retail component. These businesses are engaged in a secondary supply chain through which the products for

reuse are procured, i.e. a collector or collection point (Freudenreich & Schaltegger 2020). Participant B's BM processed consumer donated clothing of which a significant quantity of the input ended up being sold as second-hand garments (Reuse) by informal micro businesses. This business received its feedstock (clothing and apparel), in part, from an international fashion retailer that procured its clothing and apparel from a nationwide consumer-targeted take-back system, as justified in the quote that follows, *"we source from retail..."*. Participant B was also reliant on religious institutions for feedstock donated by the congregation, saying *"we source from...church"*. The business processed on average 20 tonnes of clothing and apparel per month to sustain a small business of 30 employees, *"we do, on average, 20 tonnes"*. An important finding to note is that the feedstock is solely reliant on user (consumer) donations procured via the said primary sources, and the business was not dealing with products with a high value. The conversion around the donated goods was as follows:

*"So, if we're not empowering people, I don't think people would be sourcing it, we wouldn't be getting the clothes."*

*"Because...we're an empowerment company and we...have a very clear focus on mothers of children with disability who are the most marginalised... [it] touched a lot of people's hearts. Organisations like [lists well-known international fashion brands] want to be part of that. They also want to be part of inclusion"*.

The aspect of donation directly impacts the feasibility of the BM. If this sort of collection-based BM were to occur in another industry, it is likely that the donated goods would also not have a high value. Another consideration is that the nature of donation allows for consumers to give products that aren't of a high enough quality for reuse as is, and thus require intervention to add value for reuse, or will become waste if there isn't a feasible value-adding intervention. Therefore, similar BMs to Participant B in different industries should consider this outcome and plan on how to maximise the value of the products received and how to deal with the waste.

Laitala (2014) found that convenience was an important factor for consumers when donating their clothes. In addition, reasons for donating were wear and tear, boredom, and ill fit. These factors mean the requirement of a convenient location to donate the unwanted clothing and apparel, as the retail partner who supplies Participant B's feedstock has created, and include the potential for worn garments that are of poor quality and have limited and costly opportunities for value creation, negatively impacting profit potential. The said factors of convenience of donation and aspects of the product that make ownership undesirable for the initial consumer are relatable factors for any products received

through donation and, therefore, require consideration for other product-based industries within the South African context.

A critical requirement that enables product reuse is that it is of a good enough quality to enable a second use. This, therefore, requires the producer to produce products of satisfactory quality and the user to care effectively for the product, or specifically within the context of this study, clothing and apparel to enable reuse. Freudenreich and Schaltegger (2020) motivate that clothes should be designed with reuse in mind. The authors suggest that knitwear can be produced in continuous threads to enable unravelling and reuse, and blended materials should be avoided to enable extracting the most value through recycling. Recycling blended materials is still a challenge in the global clothing and textile industry and not yet possible in South Africa (Green Cape 2023). There is also the requirement of an educated consumer who is willing and acts the donation itself. Low-quality garments present a challenge as they are likely not suitable for reuse and are more costly to extract value from as there is a level of intervention required through repurposing, disassembly, remanufacturing, or recycling to become a resource in another product. Therefore, the most feasible strategy to extend the lifespan of clothing products and their parts is Reuse, but this requires a reverse supply chain with numerous actors (user and businesses) (Hedegård et al. 2020), logistical infrastructure, and volume for feasibility, as evident with Participant B. A Reuse BM would, in theory, affect the demand for new clothes as the circulation of existing clothes reduces the amount of clothing purchased, impacting the perceived quantities required to be produced (Freudenreich & Schaltegger 2020). A reverse supply chain is required for any product-based BM dealing with goods intended for reuse, be it part of the BM or connected to another business as partnership, while there is some debate around the cannibalisation of sales, which should be considered.

Freudenreich and Schaltegger (2020) assert that fashion businesses should take responsibility for the end-of-life part of their produced goods through reuse and reselling platforms, but this requires having a return mechanism, like a take-back system, which would require a reverse supply chain. A similar mechanism to a take-back system was found in the product chain of Participant H, described in the quote that follows: *“We have an evergreen guarantee, so if there's ever an issue with the bag...we will repair it. If we can't repair it, we will replace it and then if it is replaced and the bag comes back to us, we'll either strip it and use components onto a different bag...or go through like a sort of a larger repair.”*

In support, Mishra et al. (2020) state that companies should initiate strategies for take backs for further use, and have an ‘extended producer responsibility’ approach to extend a clothing and apparel product’s

life cycle, as found in the BM of Participant H. In a study of clothing BMs within the Italian fashion industry, Carissimi et al. (2023) found that a small number of businesses had implemented environmental sustainability practices, meaning that there was a need for these SMEs to further explore how environmentally sustainable practices could capture more value from their products. The same can be asserted for the South African market. This finding is supported by the minority of BMs within the South African landscape who have some sort of practice to enable sustainability, in comparison to the business-as-usual counterpart. Businesses with sustainable attributes are considered niche while traditional businesses have linear supply chains as part of the current greater linear economic model. To conclude the discussion on Reuse, one final thought is for the very important enabler that is the consumer. An investigation of studies by Laitala (2014) found that consumers would prefer to donate clothing rather than to throw it away as part of rubbish. In addition, it was found that some consumers were not aware of potential options to recycle their clothing. This means that although the consumer is willing to donate towards potential reuse, there is a lack of education of how these items could be processed. This factor should be considered for BMs that are in some way connected to a consumer-donated product, for clothing and textile BMs and BMs in other industries that deal with different products. The section that follows will explore how the practice of Repair can be realised in the South African clothing and textile industry, as the next best option after Reuse for resource preservation.

**Repair**, as defined by Potting et al. (2017) is to apply maintenance and/or repair techniques to deficient or damaged products and their components to achieve increased longevity. To provide scope for the level of intervention or repair, Stahel (2010) motivates that repairs are to correct minor defects and wear and tear. It is common practice for consumer products of mid-high value to be repaired, as seen with electronic products. However, consumers' disengagement with the actions of garment care and repair has contributed to the short usable lifespan of clothing (McQueen et al. 2023), along with the poor quality of fast fashion clothing. Repair enables clothing to be used beyond damage and wear, and allows for clothing to be returned to usable or presentable condition (McQueen et al. 2023). Garments for repair can either be mended or have some form of alteration (Freudenreich & Schaltegger 2020). Practices of Repair for the South African clothing and textile industry could take the shape of service-orientated BMs, to echo the already occurring small repair and alteration service commonly found as part of a laundromat, or similar shoe repair business, etc. These businesses could be formal or informal with both presenting opportunities for skills development of unemployed people. Informal retail settings or workshops would be suitable for informal businesses, as was the case of Participant G, explained in this quote: *"Our main focus is to provide services, which is why it's our day-to-day work we*



*do at the workshop.*” However, formal repair businesses could partner with businesses engaged with a reverse supply chain or take-back mechanism to produce feedstock, as was the case with Participants A, C, and H. In this study, it was found that practices of Repair were commonly linked to practices of Reuse. In this vein, it can also be asserted that repair businesses, or services, could partner with businesses centred on Reuse. This would provide a stream of feedstock for repair, and it is, therefore, motivated that these two practices be considered together and or connected through a close and beneficial partnership. This partnership could easily, and often already does, occur in other product-centric industries. Businesses where products are purchased often have a repair service, even if it is outsourced through a business partner, as opposed to an in-house feature. A limitation impeding Repair for the clothing industry is the customer’s resistance to engage with practices of Repair for clothing products. Based on the finding of convenience as an important factor impacting customers donating clothing (Laitala 2014), convenience can be positioned as a critical aspect in the consumer engaging in practices of Repair. It is, therefore, recommended that repair services be part of a clothing retail or sales experience as found with Participant H. Whether the service is in-house or outsourced, consumers should be presented with a convenient option to repair. Based on the premise that Repair is accepted, and part of other product-centric industries, clothing and apparel products should mirror the mid-to-high value of these accepted repairable products. This is, therefore, contingent on the perception that repair would reinstate value, requiring a product of suitable quality as a starting point.

**Refurbish** and **Remanufacture** are similar in the way that the practice of Refurbish involves reviving an old product to give it new life so that the product is transformed into an updated product (Kirchherr & Piscicelli 2019; Potting et al. 2017; van Buren et al. 2016), often using new product parts, while Remanufacture is to create new products from old products, or parts of old products (van Buren et al. 2016), with some form of product transformation. In addition, Atasu et al. (2008) describe remanufacturing as using components of used products that are replaced to bring the product to like-new condition, which is like Refurbish. Therefore, the discussion that follows will speak to both Refurbish and Remanufacture due to the said similarities and shared attributes. The stated similarities were also found within the identified environmentally sustainable practices occurring in the participant BMs, an additional motivating factor to couple these practices for the discussion that follows.

Colucci and Vecchi (2020) found that practices of remanufacturing are not yet commonplace in the fashion industry. This is true for the findings of this study as there were three participants (Participants E, G and H) engaging in practices of remanufacturing for niche, limited edition and or one-off designs.

Atasu et al. (2008) position remanufactured products as typically being a cheaper alternative to the new product equivalent. However, this is not specific to clothing and textile products but includes general products. Products with this intervention usually have a lower perceived value by consumers. However, the practice of remanufacturing is considered environmentally sustainable due to the reduction of waste by the reuse of old materials (Sinha et al. 2016), which speaks to a growing sustainably minded customer segment (Atasu et al. 2008). For practices of Remanufacture to be sustainable, consumers are required to engage (as users) in reverse supply chains, but also to purchase remanufactured products (Colucci & Vecchi 2020). A study by Adigüzel and Donato (2021) found that consumers were favourable towards remanufactured clothing or apparel luxury products in comparison to the virgin luxury equivalent, motivating the potential for remanufactured high-quality luxury items. In this case, the remanufactured product had no difference in quality and durability in comparison to the virgin product. In addition, the authors assert that businesses can increase their brand value through remanufactured products and position themselves as being socially responsible. Moreover, they state that luxury remanufactured products should creatively reuse materials to produce products of a high aesthetic quality, and this in turn has benefits for selling these types of products more effectively. This last point is of particular importance as these types of products in the fashion industry are considered niche and will require flawless execution and quality to convert the unsupportive consumer to this new kind of luxury good. The same could be anticipated for the South African consumer. Adigüzel and Donato (2021) also motivate that marketing efforts of these products should focus on excellent craftsmanship, quality, creative reuse, and the environmental benefits of sustainable luxury. They state that young female consumers are an appropriate target, as well as the environmentally conscious consumer. New, sustainable-born businesses can focus on selling products of this nature while existing luxury brands can pilot these products to test their feasibility and adoption. The study found that consumer attitudes towards existing brands decreased after a remanufactured product's introduction, meaning that luxury businesses should consider these sorts of products well prior to their introduction. In this light, there was even a recommendation for established luxury brands to rather focus on products with a recycled material or textile (Adigüzel & Donato 2021). Businesses within the South African clothing and textile industry could adopt and adhere to the said recommendations for remanufactured products.

Within the context of remanufactured clothes, Freudenreich and Schaltegger (2020) motivate that unfashionable garments can be reused by cutting parts out of existing products and re-using the fabric. This includes buttons and other trims that could potentially be introduced to the garment production process. The reuse of trims and clothing parts is enabled by the longevity of the said raw materials'

quality, which extends beyond the period that the clothing product is on-trend (Sinha et al. 2016). Another benefit to Freudenreich and Schaltegger's (2020) suggestion is the usefulness of these unfashionable garments, which results in less generated waste. Participant G was the only participant found to be practising environmentally sustainable strategies of Refurbish. The said participants' BM offered customers services of colour restoration and alteration of clothing, in addition to clothing upcycling services, which have been considered as practices of Remanufacture. Both Participant E and G use existing apparel and clothes to create new clothing products, as described in the quotes that follow:

*"I've always been using fabrics that were intended for apparel end-use to manufacture clothing."*  
(Participant E)

*"From remanufacturing, we go as far as using the process where we use off-cuts to make something new."* (Participant G).

Participant H exclusively used existing products made by the business to remanufacture their products, evidenced in the quote that follows: *"We'll take that other bag and we'll sort of use the components of the bag where we can. You know, if there's a buckle on there, we'll strip the buckle, use it on another bag, and depending on how bad it is, we'll do the best you can to repair it"*. Participants H's approach requires a uniform and consistent approach to the use of trims and materials for product production for the remanufactured product to share common visual aesthetics with that of the originally virgin produced product. Meanwhile, the product outcome of Participants E and G varied as the materials differed and depended on the application. However, the role of the designer and maker, as in the cases of Participants E and G, was significant to the product outcome.

A study by Dissanayake and Sinha (2015) investigated the product development process of businesses that remanufactured clothing and found limitations to the product development process that are important to consider for remanufactured products. The authors found that the designer, or maker, has a significant role to play in the outcome of the product. Second-hand clothes were the raw materials for the remanufactured products and the designers were mainly inspired by the fabrics of the second-hand clothes, spending a significant amount of time analysing the available materials for their suitability. The factor of inspiration was shared by Participant E, who practised remanufacturing, as stated in the following quotation: *"I'm quite drawn to beautiful, interesting textures. I purchase those garments."* The materials present constraints to developing design ideas, whereby there could be a large variation of colours and issues of quality. The analysis and product outcome of the remanufactured product is

largely dependent on the designer's creativity and ability to judge the suitability of materials (Dissanayake & Sinha 2015). Therefore, in this case and the case of luxury remanufactured products, a lack of designer or maker's skills and experience limit the analysis and success of the product outcome. Should remanufactured clothing products be pioneered in businesses in the South African clothing and textile industry, there should be consideration for the designer/craftsman/artisan or maker creating the product. It is likely that additional skills and education would be required as these sorts of design techniques are not commonplace. There is also the issue of the increased production time and limitation of garments for reuse. As with the case of the luxury remanufactured product, products for the South African consumer should be of a high quality, hold high aesthetic value, and market the sustainable product attributes to stimulate buy-in from the local consumer. India is the biggest importer globally of second-hand clothing (Business Insider 2023), which sustains a clothing remanufacturing industry upon which sources for this section focused upon. Therefore, the quantities of imported clothing sustain a commercial remanufacturing aspect of the industry. While South Africa should not follow suit, the recommendation of luxury remanufactured products provides an avenue to use textile products already in circulation for the luxury market where there is greater potential to accommodate the more costly production.

Freudenreich and Schaltegger (2020) motivate that remanufactured products can take the shape of a 'redesign/reworking' service for single users who initiate the transaction and pay a fee for the remanufacturing service. Within the sample group, Participant G was the only BM with remanufacturing practices offered as a service, in the manner described by Freudenreich and Schaltegger (2020). Meanwhile, Participants E and H remanufactured products that were sold as products, without consumer consultation. Both the service-based product outcomes and products without out-service attributes hold potential for the South African industry. While remanufacturing is still at a nascent stage within the global clothing and textile industry, a sustainable, circular version of the clothing industry requires new approaches for remanufacturing that surpass traditional designing and production methods (Sinha et al. 2016).

Formal and informal BM opportunities exist for the practice of Remanufacture in the South African market. As is evident with Participant G, an informal setting could operate out of a workshop or informal retail setting to create consult-based bespoke designs, in the case of remanufacturing as a service, or limited edition or one-off products. Formalised opportunities can be like those found occurring in Participants E and H to create specialised product types with an opportunity for consult-based bespoke

designs. To conclude the discussion of remanufactured clothing products for the South African clothing and textile industry, a discussion of considerations for a network of suppliers and supply chain will be addressed. Dissanayakea and Sinha (2015) propose that a suitable network would consist of clothing and textile collectors, local craft entrepreneurs for second-hand clothing, and manufacturing facilities that can supply clothing to retailers. They go on to state that clothing is obtained from the user (consumer) in a reverse supply chain that then forms part of a forward flow supply chain where the clothing is remanufactured, transported, and sold from a retailer. The proposed network could work for the South African clothing and textile industry, but it is recommended that clothing be sourced locally to prevent unsuitable (low-quality) clothing imports, as seen in other developing economies. In addition, there are opportunities for formal and informal-type manufacturers who could provide products for the equivalent retail environment. As with Participant E, manufacturing can take place in the same business where the product is later sold. There is the same requirement of the consumer to initiate the required reverse supply chain by donating or reselling their clothing, an issue in the current industry due to the small number of enabling BMs in the South African landscape. However, the growing culture of Reuse in younger generations does contribute to the prospect that remanufacturing could be feasible for South African clothing BMs.

**Repurpose** is the reuse of a product for a different purpose or parts of a product for a different function (Geissdoerfer et al. 2018; van Buren et al. 2016). This can be through creating a new product from a discarded product to re-establish its functions or use of purpose (Kirchherr & Piscicelli 2019; Potting et al. 2017). Repurpose can enable an original product or parts of the product to acquire different identities and functions (Geissdoerfer et al. 2018), as was found in the participants' product chains. The three participants that were found to be connected to practices of Repurpose all had an innovative or novel use of a product that was repurposed. This is evident in the following quotations:

*"We were shredding them into fibre and it's going into those pavers."* (Participant B)

*"The sole...can be melted down into blocks for ECT – early childhood development."* (Participant B)

*"I don't specifically use clothing for clothing end use. I use a lot of table clothes. I'm currently working on stuff with doilies and lace doilies. So something that's got a sort of household, very different function."* (Participant E)

*“We upcycle waste material into our products and so we sort of reimagining what a billboard used to be and be giving it a new life as now it's a bag...our lining...it used to be an indoor advertising banner...which is a polytope material, and now it lines all of our bags.” (Participant H).*

The examples of products created through repurposed raw materials in the literature review also had the same attribute of an innovative use through cross-industry use. It can, therefore, be asserted that Repurpose requires the innovative or novel use of the raw materials that make up clothing and apparel. This factor has implications for likely high research and development costs due to the development of new products. The innovation factor could also require an interdisciplinary skillset or mean collaborating with different and/or partnering industries. Many of the discussed practices of Repurpose, stated in the literature review, and found occurring or connected to the participants' product chains, in some way collaborate or connect (network) to an industry outside of the clothing and textile industry. Therefore, collaboration can be asserted as a likely component of Repurpose. There could be an implication of financial difficulties due to the newness of a product that does not have a proven track record (Ekins et al. 2020), while there is also concern over consumer adoption of a new product, with potential sourcing challenges. Due to the said likely industry partnerships and innovation, BMs that centre on Repurpose may not be the easiest to establish within South Africa. There is, however, much-needed innovation to tackle the issue of waste. It was surprising to find the variety of applications of material considered waste connected to or part of participant product chains within this study. This begs the question of what other innovative applications of materials are occurring within other South African product-based industries.

### 5.2.3 Strategies for Useful Application of Materials

The final R strategy in the 9R Framework, is that of Recycle. **Recycle** is based on converting materials from existing products to create different products. The production of recycled apparel is a time and money-intensive process that has numerous processing stages, including waste opening, re-spinning, re-knitting and re-dyeing (Haq & Alam 2023). Ideally, apparel items become a source for recycling when reuse is not possible, and the product is considered to be at the end of its usefulness (Geyer et al. 2007). Due to the high-energy processes required for recycling, it is the last option in the 9R Framework, however, it has its place in actioning CE principals as it reduces the need for virgin materials and natural resource consumption (Todeschini et al. 2017). The participant businesses (B, D, and H) found to practise recycling did not explicitly recycle within their product chains, but had a partner that enabled this practice as part of the participants' product chain. In South Africa, current recycling practice allows

for the collection, sorting, and recycling of pre-consumer industrial textile waste. This waste is collected from the manufacturing supply chain and typically results in better quality recycled fibres in comparison to fibres derived from post-consumer waste (Muthu 2016). In South Africa, there is little focus on recycling post-consumer textile waste because of the complexity of the required network and additional processing required, but this is also impacted by the commonly used mixed fibre material types and irregular volumes of waste (Green Cape 2023). Separation of fibres is critical in mixed fibre recycling due to the varied processing and performance parameters required by the fibre types used in blended fibre material. Currently, the industry is facing the challenge of how to recycle blended fibre materials on a world-wide scale (Muthu 2016).

Sandvik and Stubbs (2019) assert that a material stream of used garments and textiles would assist in establishing textile recycling. While there is currently textile recycling of pre-consumer industrial textiles in South Africa, post-consumer textile waste is inherent with processing (sorting and disassembling) challenges (Green Cape 2023). A material stream of post-consumer waste for the South African clothing and textile industry presents opportunities for informal collection of textile products, like urban waste miners. In a study of textile recycling in India, used clothing and household textiles were collected through informal means that made recycling easier for the consumer (Abraham 2011). This is like the now formalised urban waste miners that recycle plastics, cans, and glass from consumer waste in South Africa. Hence, the suggestion for this established network to expand their collected material types and include textiles as this could contribute to the said required stream of used garments. Another important factor to consider with the processing of post-consumer textile waste is the required sorting and disassembly of garments. Sorting is currently still a labour-intensive manual process and requires a specialised skill set to differentiate fibres, inhibited by incorrect labelling, while disassembly requires low-skilled labour with the requirement of machinery, and the consideration of the resultant unusable waste to consider. The matter of disassembly is asserted by Participant B in the following quotation: *“We going to our special needs schools in the area, they’re all going to be trained on how to do cutting on those machines and...we’d have 20 human beings [that] never would have a job before would have employment”*. In this vein, both the sorting and disassembly present opportunities for job creation for the South African clothing and textile industry. Participant B spoke of the sorting process for processing post-consumer waste that occurs within the BM’s product chain, *“that scanner I was tell[ing] you [about], is the second level of sorting...there’s no machine that will separate it, it’s not possible, there is millions of types of clothes, and different densities of fibre. So...it’s manual.”* Participant D described the sorting process of the pre-consumer textile waste procured from clothing manufacturers: *“The team*

*then separates and sorts what's recyclable and what's not recyclable and then what is recyclable is then removed onsite.*" These findings are in line with the still predominantly manual (human) requirement for accurate textile sorting.

South African BMs that want to form part of a recycling network will have to consider the source and quality of their feedstock (in the case of collection and procuring) and the quantities required for feasibility. The matter of quantity is asserted by Sandvik and Stubbs (2019), who state that significant volumes of collected textiles are needed for textile recycling to be feasible, which can be relatable to the South African clothing and textile industry. Participant B spoke of significant quantities of clothing feedstock for processing, and had a business partner that was an established large enterprise as part of their product chain, as described in the quote that follows, *"anything to 6 to 8 tonnes maybe even 15 tonnes in a busy month"*. In addition, textile recycling requires stakeholders in the supply chain and the current lack of a recycling market inhibits access to the required materials for sufficient supply. Therefore, for textile recycling to expand in the South African clothing and textile industry, a recovery stream of clothing that is destined for landfill or incineration needs to be established (Sandvik & Stubbs 2019). This recovery stream would manage waste streams but requires large and small companies to collaborate on logistics, access to materials, and reaching the required quantities. Waste for textile recycling could be collected from sources outside of the textile and apparel industry, as well as through collection points within a supply chain. Reprocessing of collected waste is critical in determining whether the waste material will contribute to the already established closed-loop recycling system in South Africa, or potentially a closed-loop system (Muthu 2016). Textile recycling is, however, hindered by the issue of low-grade feedstock due to the prominence of low quality fast fashion, globally and for South Africa.

Sandvik and Stubbs (2019) discuss that digital tools can make textile sorting more efficient for recycling. These tools include material scanning, radio frequency identification, and a digital passport. The authors also discuss digital receipts that document chemicals and materials used to develop products. This would be actioned by the producer and create transparency for the recycler. These innovations would address the current challenges in sorting textiles, which is still a manual process with difficulty in identifying each fibre type (Sandvik & Stubbs 2019). However, the said interventions are required from the textile manufacturer and would need to be feasible for business buy-in. Textile recycling of post-consumer waste has implications of establishing a reverse supply chain and network of actors (O Reilly & Kumar 2015). There is also the issue of education for the actors (consumers, manufacturers, retailers),



who enable the collection and processing of the feedstock, as raised by many of the participants in this study and described in the quotes that follow:

*“You need to educate and make it easy.”* (Participant A)

*“Across the spectrum products in general should all be way more mindful of environmental impact and way more educational to consumers around what the impacts are for purchasing this item. I think there’s a big education and communication factor that needs to happen in all product spheres.”* (Participant E)

*“We educate manufacturers, retailers, designers, fashion school students, consumers, have masterclasses, events, keynote speakers, various different ways that we engage with each of those different stakeholders to, one accelerate the adoption of textile recycling and circular textile practices within South Africa.”* (Participant D)

From this, it can be deduced that education is a critical aspect of textile recycling becoming a feasible and impactful practice of a CE for the South African clothing and textile industry. A study by Morgan and Birtwistle (2009) stated that young female consumers are unaware of the need for clothing recycling towards establishing a more sustainable fashion industry. The authors’ position is that there should be more information shared on the environmental impact of clothing manufacturing. This is supported by Norris (2019), who positions (a decade later) cultural acceptance impacting the revaluation of recycled textile materials as fashionable in mainstream markets. Hawley (2006) also recognises this issue by stating that there is a need for increased awareness of acceptance of used fibre. The author goes on to state that there is a stigma of inferiority and cheapness associated with recycled fibre that should be remedied through consumer education of the environmental benefits of recycled textiles. O’Reilly and Kumar (2015) found that consumer challenges facing garment recycling in India were access to information about recycling channels, and finding the time to visit recycling centres. Sandvik and Stubbs (2019), therefore, stress the importance of ensuring that consumers understand the value of their used clothes.

While South Africa has established open-loop recycling, there are challenges of innovation, capital requirements, guaranteed large quantities of feedstock, and skilled labour to establish a closed-loop (fibre-to-fibre) textile recycling system (Green Cape 2023). Open-loop recycling means that materials are not recycled indefinitely, and these materials will eventually be excluded from the circulation of resources flow enabled by recycling, due to either the degradation of the raw materials or the use of the recycled materials for an unrecyclable product (Muthu 2016). The ultimate and most sustainable

outcome would be closed-loop recycling for the South African clothing and textile industry where the recycling of material is indefinite without degradation. However, this requires an additional stage for a recyclable product in the recycling process (Muthu 2016). Considering the discussed challenges, one must question if textile recycling is feasible for the South African clothing and textile industry. In support, Sandvik and Stubbs (2019) assert that there is simply an insufficient market for recycled materials, suggesting that textile recycling, while a difficult business opportunity to realise at scale, is extremely important in closing the loop for a circular economy to be realised to its fullest potential.

### 5.3 Enabling factors for a CE in South Africa

The section that follows will discuss found common enablers for a CE in South Africa. The topics for this section are gleaned from the data, as enablers for the South African clothing and textile, but are also proposed for product-centric businesses within the greater South African business landscape.

#### 5.3.1 Sustainable Born BMs

It has been commonly found that BMs that practise environmental sustainability are considered 'born-sustainable' businesses due to practices of sustainability being central to the business (Colucci & Vecchi, 2020; Monyaki 2022; Todeschini et al. 2017). These businesses embed sustainability approaches with a commitment to promoting social and environmental sustainability, which are central to the BMs vision (Colucci & Vecchi, 2020; Todeschini et al. 2017). In a study of four Italian fashion companies, Colucci and Vecchi, (2020) found that the sustainable-born businesses that were the focus of their study had found original solutions to value generation, allowing them to economically profit from their competitive positioning. Todeschini et al. (2017) assert that fashion start-ups could leverage a start-up's flexible state to design innovative BMs that have the intention to address social and environmental issues through innovative product or service creation. In this study, it was found that most (8/9) of the participants could be considered sustainable-born MSMEs due to environmentally sustainable practices being central to the BMs, but also that the businesses were conceived with the said sustainable practice as a primary focus. The only participant excluded from this group was Participant I, where the sustainable practices were found occurring in the initial part of the product chain, as adapted strategies to improve a historic and linear product chain. It is, therefore, asserted that new BMs will enable designing for environmental sustainability more easily than existing business. In the study of the fashion companies by Colucci and Vecchi (2020), it was found that the luxury brand Gucci approached sustainability with the goal to reduce its environmental impact through practices of integrated initiatives without altering their

'traditional' approach to business. This approach was also found in the case of Participant I, who had the challenge of retrofitting their established supply chain, often achieving limited practices towards environmental sustainability. Existing supply chains present complex challenges with regards to achieving sustainability. It can, therefore, be asserted that there is value in the agile nature of a fashion start-up to design innovative products and services that address issues of sustainability. Adigüzel and Donato (2021) motivate the position of luxury businesses to be designed and established as sustainable alternatives from the outset.

### 5.3.2 Reverse Supply Chain

A closed-loop supply chain effectively manages the recovery of products through processes that capture the value of products used by consumers. A closed-loop supply chain is inclusive of conventional supply chain activities, with additional reverse supply chain actions (Wikner & Tang 2008). The last decade has seen an emerging interest in reverse supply chain logistics and closed supply chain management due to strict environmental laws and regulations, shorter product life cycles, increased recycling, and profitable opportunities to capture the value of end-of-life products. A closed-loop supply chain emphasises production acquisition and market development to build on established reverse logistic activities (O Reilly & Kumar 2015). While there are established recycling 'pockets' in South Africa (Von Blottnitz et al. 2021), there is no such flow for garment recycling (as in the case of global recycling networks) (O Reilly & Kumar 2015). Garments present a challenging case for consideration of reverse supply chain logistics as garments are not replaced, as in the case of other consumptive goods, but kept for further use (O Reilly & Kumar 2015). In a garment recovery process, products can be disassembled into different components for reprocessing. Reprocessing could mean restoring the product's functionality or upgrading the product to an equal or improved quality (Wikner & Tang 2008). Hvaas and Pederson (2019) position that establishing reverse supply chain logistics requires new competencies and specialised skills that the typical clothing or textile business does not possess. Therefore, the traditional infrastructure, internal capabilities, and partnerships of the current clothing and textile industry are insufficient for establishing a required product take-back system with the accompanying reverse logistics (Hvaas and Pederson, 2019). Ekström and Salomonson (2014) motivate that many different actors in society are required to take responsibility for the increasing volume of consumer clothing and textiles. This means a multitude of competencies to address consumption, production, material, technology, and logistics, and collaboration to address the issue (Ekström & Salomonson 2014). Moreover, there is also the issue of value appropriation of clothing and textiles, which needs to be addressed (Ekström & Salomonson

2014). O Reilly and Kumar (2015) recommend that sustainable supply chain design should not solely be informed by considering past best practice but should consider innovative solutions that have not yet been established. In addition, the authors recommend that the informal and formal sectors be considered in building more sustainable solutions, which could be an avenue for job creation for South Africa. However, the design of closed-loop garment and textile supply chains should stimulate greater awareness of the value of clothing and textiles, possible recycling options, sound practices, and should address the said difficulties as experienced in a similar developing economy (O Reilly & Kumar 2015).

The section that follows will develop a potential supply chain and network for a reverse supply chain for the South African clothing and textile industry. The discussion will draw on aspects of existing reverse supply chains from developing economies. Two studies dealing with clothing and apparel reverse supply chain in India are used for the justification of this discussion. The reverse supply chain of the said case has been adapted and considers South Africa's challenges and capabilities, and asserts opportunities that speak to the said challenges facing the economy and sector.

The reverse supply chain for the South African clothing and textile industry would begin with sourcing partners. These could be users (consumers) who have donated unwanted clothing and apparel, clothing and apparel manufacturers, and retail businesses within the sector. This could also potentially extend to businesses that deal with soft home furnishings that have similar properties to those of textiles used within the clothing and apparel industry. Sourcing requires a logistical network of collection points spanning consumers, manufacturers, and retail businesses. Following sourcing, sorting could separate high resale value garments that are in good enough condition as is for resale, high resale value items requiring minor alterations, garments that require significant remanufacturing, and low-value garments destined for recycling (Abraham 2011; O Reilly & Kumar 2015). Sorting is dependent on the experience of those doing the sorting, which means implications of labour education and skills development (Abraham 2011). Products deemed suitable for resale without intervention can be cleaned, packaged, and sold to retail partners. Those products requiring repair and remanufacturing could be improved by semi-skilled labour in informal workshop settings like those of Participant G. This aspect of the supply chain also presents entrepreneurial opportunities for small and medium enterprises that specialise in value addition services for clothing and apparel. Repaired and remanufactured goods would be sold onto businesses for resale, or sold directly to the consumer, in both informal and formal settings. Goods of higher value would be sold through formal business settings like those of Participants A and C, while the lower value goods can be sold through informal settings like those of Participants F and G. O Reilly

and Kumar (2015) state challenges to reverse supply chains of the said nature during the sourcing phase. On the one hand there is the requirement of customer motivation to sell/or participate in donating and on the other, product collection processes and logistics. The authors go on to state that more attention should be given to environmentally sustainable practices by the consumer, which requires industry and government regulations. Product collection and logistics can be impeded by poor coordination, value appropriation, and poor involvement of the informal and formal sectors. The authors assert that the design of the closed-loop supply chain should seek to address the said limitations of the product sourcing process, and respond to consumer motivational factors while considering local conditions. Ekström and Salomonson (2014) suggest increasing consumer knowledge about reuse and recycling, and making collection locations and apparatus more accessible, which could speak to the said issues. To conclude, O Reilly and Kumar (2015) suggest that the creation of formalised structures and processes with the incorporation of sophisticated technologies and recovery options make for attractive business opportunities, which are contingent on a formalised, developed, and regulated supply chain. The said factors should be considered for potential reverse supply chains for product-centric businesses, while also being relevant for the South African clothing and textile industry.

### 5.3.3 Government

Monyaki (2022) states that circular fashion is still a niche idea for the developing economy of South Africa. Plagued with issues of poverty, unemployment, and continuous power and water supply interruptions, the matter of a more sustainable fashion industry is less urgent for South Africa, as seen by the government. However, the government has a significant role to play in establishing a more sustainable clothing and textile industry. Through the implementation of policies, clothing and apparel consumers can be guided towards changing their consumption behaviour to be more sustainable. In addition, governmental initiatives should work towards incentives and technological subsidies with easier access to funding for businesses (Olayemi 2022). Durrani (2018) asserts that a bottom-up approach can be employed for sustainable interventions targeting users. These initiatives can be developed in collaboration with South African businesses to inform directives for a more sustainable clothing and textile industry. Lastly, the South African government should act to generate awareness among consumers and businesses of the benefits of a circular model for the clothing and textile and other industries. These efforts would aid consumer adoption of more sustainable consumptive behaviour.

#### 5.3.4 Education

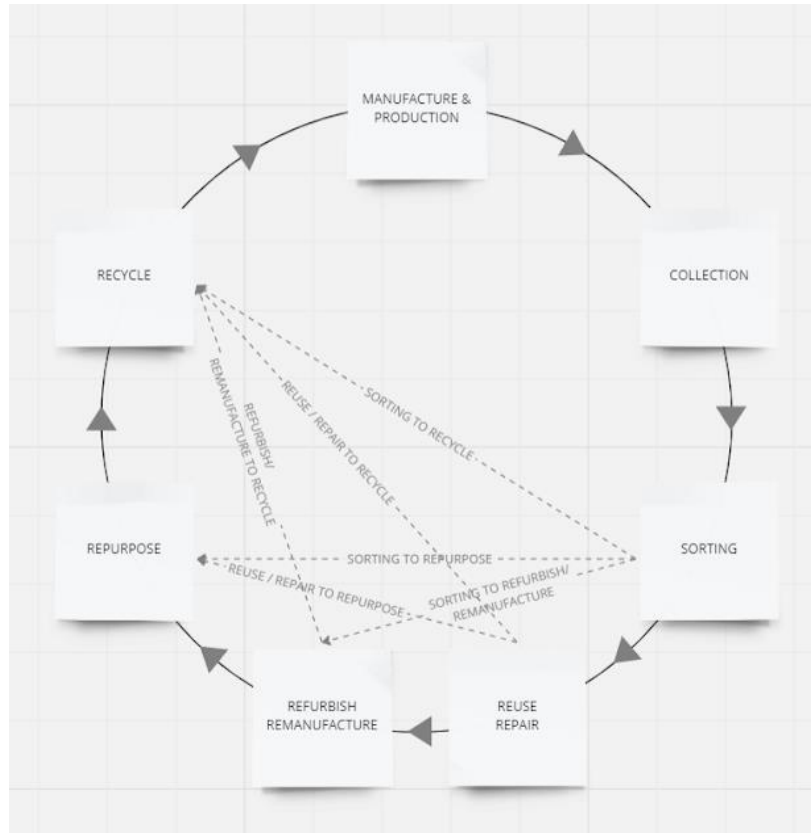
In the previous chapter, limitations concerning the level of consumer education and their limited knowledge of sustainability was a recurring finding raised by many of the participants in different ways. Business owners stated their perception of limited customer education while it was recognised that consumer education is a requirement for the transition to a more circular clothing and textile industry. This is in line with the finding by Todeschini et al. (2017) that consumer education is considered a key aspect and major influence towards more sustainable clothing and textile practices. South African consumers should be educated about the social and environmental consequences of their consumptive behaviour, and this could assist in potentially changing their consumption habits. In addition, consumer education could help to transition consumers to support different BMs that are innovative in comparison to the traditional clothing BMs. Morgan and Birtwistle (2009) found that consumers were more open to changing their clothing consumption and disposal behaviours if they were more aware of the social and environmental consequences, meaning that there is potential for the same change of habit should South African consumers be educated in this way. In addition, the authors assert that consumer education about high volumes of clothing ownership motivated donation of clothing by these consumers, which could also be likened to the South African consumer. Morgan and Birtwistle (2009) did note that donation was enabled by convenience, which can be supported by the said enablers and mechanisms of a functional reverse supply chain. Like Participant I, Hvass et al. (2019) asserted the importance of the retail setting to guide consumers, whereby store employees play a critical role in communicating sustainable messages to better guide the consumer.

While the South African higher education system for fashion design transitions to the ever-increasing demand for more sustainable awareness and skills, there is already an expectation of employees positioned in the workforce to implement sustainability in the design and product development phase of production. However, there is currently a knowledge and skills gap among designers (Claxton & Kent 2020). Designers are recognised for their key role in the decisions concerning product design and development (Claxton & Kent 2020) and thus this discussion will state interventions and considerations to better equip designers to act in accordance with increasing the environmental sustainability of clothing and textile products for the South African market. A fashion/clothing/apparel designers' journey typically begins in tertiary education, raising the importance of educational programmes to facilitate learning for sustainable design outcomes. Much of fashion design education is based on traditional foundations of design, textile knowledge, pattern design, and garment construction. As

educational institutions transition to incorporate sustainability there seems to be a similar approach to retrofitting an existing supply chain with sustainable mechanisms and practices where traditional educational approaches are supplemented with the addition of sustainability in textiles, pattern design, and construction. This is realised as environmental considerations for more sustainable textiles, design techniques for upcycling and reuse, and strategies to eliminate waste in pattern design and manufacturing (garment production), while missing the fundamental and central notion of circular flow of resources that is central to a more sustainable environmental model that the fashion industry forms part of.

As the South African fashion education system grapples with coming to terms with the required transition to prepare learners for the ever-shifting requirements of the modern designer, there should be a focus on implementing strategies that are relevant for the South African and African context. This notion is centred on the understanding that design for sustainability will be different for Africa and South Africa, in comparison to countries in the global north, to respond to the pertinent issues facing South Africa and Africa. To meet the growing needs of skills for sustainable design, higher educational institutions can facilitate learning to support design skills that are central to a CE for the clothing and textile industry. These are designing for a circular supply chain that includes renewable, recyclable, and biodegradable materials; designing for recovery and recycling where materials and components are considered for further uses, meaning that design for disassembly, reuse, mono-fibres, and textile longevity is considered; and product life extension resulting in products to enable repair, upcycling (remanufacturing, repurposing) and reuse (Lacy & Rutqvist 2015). Therefore, a designer's engagement with appropriate education and learning can enhance the designer's potential to influence and contribute to the requirements of the clothing and textile industry (Claxton & Kent 2020).

This chapter discussed considerations for BMs that form part of a CE for South Africa, with a focus on BMs for the clothing and textile industry. The proposed framework for these BMs is, therefore, presented in Figure 5.1 below.



*Figure 48 Business models for Circular Economy in South Africa*

The suggested BMs have been proposed in a circular flow of resources as this is fundamental to CE and ideal for the effective use of resources for the South African economy. BMs for manufacture and production can refuse materials made from blended fibre, refuse the use of fabrics that are difficult to recycle, refuse materials that don't have environmentally sustainable attributes, use materials with recycled fibres and fabrics, and use textile waste as raw material. Manufacturers and producers should also produce quality products for reuse and to enable value-beneficiation. Product sharing would be enabled by reuse and rental BMs. BMs that collect products can do so through take-back systems, connected or separate to retailers, donations, and recycling collection points. Sorting BMs should be closely connected to collection BMs, as collectors provide the feedstock for sorters. Sorting BMs sort feedstock according to a value hierarchy for products that can be reused and repaired; refurbished and remanufactured; repurposed; and recycled. Reuse and Repair BMs could have a beneficial relationship due to products needing minor repairs for value reinstatement to enable reuse. Remanufacture and Refurbish BMs can produce high-quality niche goods using products unsuitable for reuse or repair. These BMs can provide reworking or redesigning services, or be part of BMs that centre on product life extension activities. BMs that practise Repurpose would likely hinge on product innovation, cross-



industry collaboration and potentially interdisciplinary skills. BMs that Recycle could capitalise on pre-consumer industrial waste with the addition of post-consumer waste. However, this has implications for sorting and disassembly in the case of textile products.

## 5.4 Conclusion

Based on the discussed BMs and enablers for a CE, it is evident that the enabler of collaborating industries is paramount for the circulation of resources, required for a CE. The network of producers and users present opportunities for interdisciplinary innovation to tackle the issue of waste and maintain the highest possible resource value. As found occurring in the participant BMs, the repurposing of textile waste procured from the retail industry and use of apparel waste as a resource for brick production is representative of the said collaborative enablers. The collaborative effort is asserted in the quote that follows:

*"In terms of business model changes, collaboration across the supply chain with partners across industries presented the best opportunity to support the circular economy [in South Africa]" Hassim (2021).*

# Chapter 6 Conclusion

## 6.1 Introduction

The aim of this study was to investigate the environmentally sustainable practices of South African clothing and textile BMs through the 9R Framework. This study also investigated the motivation of the MSMEs for practising the sustainability initiatives, the challenges faced by these businesses, and considered opportunities and attributes of future clothing and textile BMs, as well as partner industries that can also apply the findings to their own CE BMs. This study also proposed a framework for BMs to enable a circular flow of resources for a CE. The conclusions discussed in this chapter are ordered by the objectives of this study, to meet the study's aim, namely:

- Objective 1: To investigate the environmentally sustainable strategies of clothing and textile business models.
- Objective 2: To explore why circular strategies feature in the clothing and textile MSMEs.
- Objective 3: To investigate the challenges of clothing and textile business models, and circular opportunities for future clothing and textile businesses.

The objectives are to be investigated, in order to propose a CE's BM that addresses the 9R Framework for improved production and consumption in the clothing and textile industry in South Africa.

### 6.1.1 Environmentally Sustainable Strategies of Clothing and Textile Business Models

The first objective investigated the environmentally sustainable strategies of clothing and textile BMs, with the majority of found environmentally sustainable practices categorised into the group for extending the life of products and their parts. These interventions targeted extended use of an existing product while there were some practices that formed part of the design and conceptualisation phase of the product or services production (strategies for useful application of materials). It was also frequently found that more than one R practice was occurring or connected to each participant's product chain, but this could also be due to the subjective nature of categorising practices according to the framework practices.

Practices of **Refuse** were found to be refusing virgin material, and thereby using existing textile considered waste as the clothing and apparel products' primary resource, or refusing the use of unnecessary product trims. **Rethink** is described as products that are used intensively or in different

ways and refers to product sharing. All the participant businesses who dealt with the sale of second-hand clothing products were thus enabling product sharing (Participants A, B, C, and F). Through more intensive use of existing textile products, Participants E and H were found to practice Rethink. Participants B, E, and G **Reduced** the quantity of raw materials used for production through the reuse or repurposing of existing textile products. Participant I had interventions in the product development phase to reduce the number of samples required for this process. The most commonly found practice of **Reuse**, found in six (6) of the nine (9) participants' BMs, mostly occurred as the sale of second-hand clothing items, but also featured in participants' product chains where products produced by the business, or processed by the business, were reused. Reuse was often found connected to practices of **Repair**, as part of a participant BM or connected through a partner who actioned the repair. Participants who repaired did so exclusively to apparel products (not textiles) with the intention of adding value to the product. **Refurbish** was the least common practice found occurring. It featured only as part of Participant G's product chain, as a service where clothing was restored through efforts of colour restoration, alteration, or upcycling. All these interventions were actioned as services targeted at consumers. Practices of **Remanufacture** were found occurring in Participants E, G, and H's product chain while Participant I's product chain was connected to practices of Remanufacture. As found in Participants E, G and H's product chain, textile waste from the clothing or textile industry, and from the retail industry, was used to create remanufactured apparel products, all for sale directly to consumers. **Repurpose** was found to occur within Participants E and H's product chains and connected to Participant B's product chain through an external partner. Both Participants E and H used textile not intended for clothing and apparel as a primary resource, procured from a different industry in the case of Participant H. The methods used to repurpose in all cases required a novel application and method of the material, and it can, therefore, be asserted that product innovation was present in all cases of Repurpose. Practices of **Recycling** were not found occurring within the participants' product chains but connected via recycling partners.

Most of the product chains were found to be linear, except for Participant G and H's. These participants had opportunities for products to be returned to the business for value-adding interventions, enabling circularity of resources. These cases were always initiated and acted by the consumer. It should also be stated that eight (8) of the nine (9) participant BMs can be considered born sustainable businesses due to environmentally sustainable practices being central or critical to the BMs and product chains. Only Participant I was not considered this due to the product chain that had sustainability interventions added on to an existing production process. This resulted in a limited impact of sustainability due to the

complicated nature of retrofitting an established product chain. The consumer was a primary enabler of practices to extend the lifespan of products and their parts. The consumer was key in either donating, purchasing, or requesting a value-adding intervention for apparel products. In the case of sustainable initiatives for smarter product use and manufacture, the designer/maker/producer/manufacture drove and actioned the sustainable intervention.

#### 6.1.2 Why Circular Strategies Feature in the Clothing and Textile MSMEs

The second objective aimed to investigate why circular strategies feature in clothing and textile MSMEs, with the participants asserting similar beneficial factors of the circular practices as those stated as motivational factors for including the circular practices within the BMs. The link can, therefore, be made that the perceived benefit of the sustainable practices is closely tied to the motivation to implement and practise the environmentally sustainable practices. Seven (7) of the nine (9) participants cited a personal motivating factor for wanting to include the sustainable practices within the businesses they founded, owned, or represented, highlighting a link between businesses that practise in accordance with environmental sustainability and personal motivation by the owners or critical staff involved in the business. This demonstrates the importance of owners or employees to drive the adoption and practices of environmentally sustainable practices within MSMEs.

It was found that there was the desire to educate consumers about more sustainable consumption behaviours and the environmental pollution caused by the clothing and textile industry. Many of the participants expressed a benefit of their businesses was the creation of employment for South Africans, which included a disadvantaged community of people. Almost all the participants motivated an environmental benefit from the business practices with the benefit leading back to a reduction of textile waste within the environment. Moreover, most businesses identified with an environmental and people benefit as motivation for the circular practices, with profit being less of a benefitting factor. While profit is a motivational factor, it did not hold the same importance as benefiting people and the planet, suggesting a hierarchy of motivational factors for the participants.

### 6.1.3 Challenges of Clothing and Textile Business Models and Circular Opportunities for Future Clothing and Textile Businesses

The final objective resulted in participants describing challenges, which were limitations in fibre recycling practices and infrastructure to support textile recycling. Limitations included low-quality textile products with mislabelled garments. Another point raised was that textile and clothing sorting is still done by hand, requiring skilled people, as opposed to mechanical sorting. There is also the low value of textile products destined for fibre processing, which impacts the profitability of this resource. Participants also stated that there is a lack of credibility among suppliers and a lack of network suppliers and partners (collaborators) that have environmentally sustainable attributes for products and/or services, resulting in limitations of sustainability within the participants' product chains. There are also high costs for new types of BMs and higher costs for products or services with environmentally sustainable attributes, resulting in products with sustainable attributes being priced higher to be feasible. Participant B also raised the limitation of financial support for businesses by financial institutions due to the BM being different from others in the way that the business centred on practices of environmental sustainability, veering from the traditional BM. Challenges posed by the consumer included the lack of knowledge and awareness of sustainability and sustainable consumption habits. There are also the issues of consumer adoption of novel apparel products that are produced through Repurpose and Remanufacture. The participant who worked for a bigger nation-wide retailer of clothing and apparel discussed organisational issues relating to transitioning to increased environmentally sustainable practices. In other BMs, participants cited challenges of designing environmentally sustainable products that were profitable, and this was coupled with the lack of network and supply chain to make production feasible.

Opportunities for the clothing and textile industry, and the BMs that occur within the industry, included removing synthetic fibres from clothing, and for synthetic fibres to be phased out of uses that require wash and care on the part of the consumer, to be repurposed and used for other products that don't carry the wash and care requirements. There was also the suggestion for recycled fibre and to phase out synthetic fibre use. Opportunities exist for manufacturing for bigger clothing and apparel retail BMs to collaborate in procurement of more sustainable textiles and supplies to benefit smaller brands within the bigger retail business, while there was a suggestion of better practice to deal with counterfeit goods through remanufacturing techniques. Opportunities for retail were considering consumer education and growing the acceptance and practice of reuse of clothing and apparel by consumers. Opportunities for

post-consumer use were for a take-back system to enable reuse of consumer purchased goods and improved textile sorting practices to benefit textile recycling processes. Participant I suggested that there should be initiatives by retailers for returned goods to be repaired or some sort of value-addition practice so that the returned product is elevated to a level that enables reuse. In this vein, there is also the opportunity for initiatives to extend the value and use of existing textiles, which could take the shape of any of the Rs to extend the use of the products.

In the way of gains for future clothing and textile BMs, participants asserted that textile manufacturing should be less harmful (to planet and people) with specific mention of less impactful fibres with a prioritisation of natural fibres. There was also the call for better clothing products that would enable product longevity, and in turn would benefit practices to extend the life of apparel products and their parts. The clothing and textile industry has gains to make in growing and developing practices of Reusing, Refurbishing, Remanufacturing, Repurposing, and Recycling. The participants stated that transparency of business operations and manufacturing was an attribute for future clothing and textile BMs, along with tracking ownership. The frequently arising matter of consumer education was yet again mentioned as part of future businesses within the clothing and textile industry.

Figure 6.1 shows the framework that suggests BMs for a CE in South Africa. BMs for manufacture and production can refuse materials that are difficult to recycle and don't have environmentally sustainable attributes, use materials made with recycled materials, and use waste as raw material. Manufacturers and producers should produce quality products for reuse and further value beneficiation. BMs that collect products can do so through take-back systems, donations, and recycling collection points. Sorting BMs sort feedstock according to a value hierarchy for Reuse and Repair, Refurbish and Remanufacture, Repurpose, and Recycle. Reuse BMs provide feedstock for Repair BMs with circulation resources between these BMs until the product value can only be maintained through efforts of Refurbish and Remanufacture. Refurbish and Remanufacture BMs precede BMs that Repurpose. If the repurposed product is recyclable after its processing and potentially new identity, the raw materials can be recycled. Recycled raw materials are then incorporated into new raw materials, which are used in production.

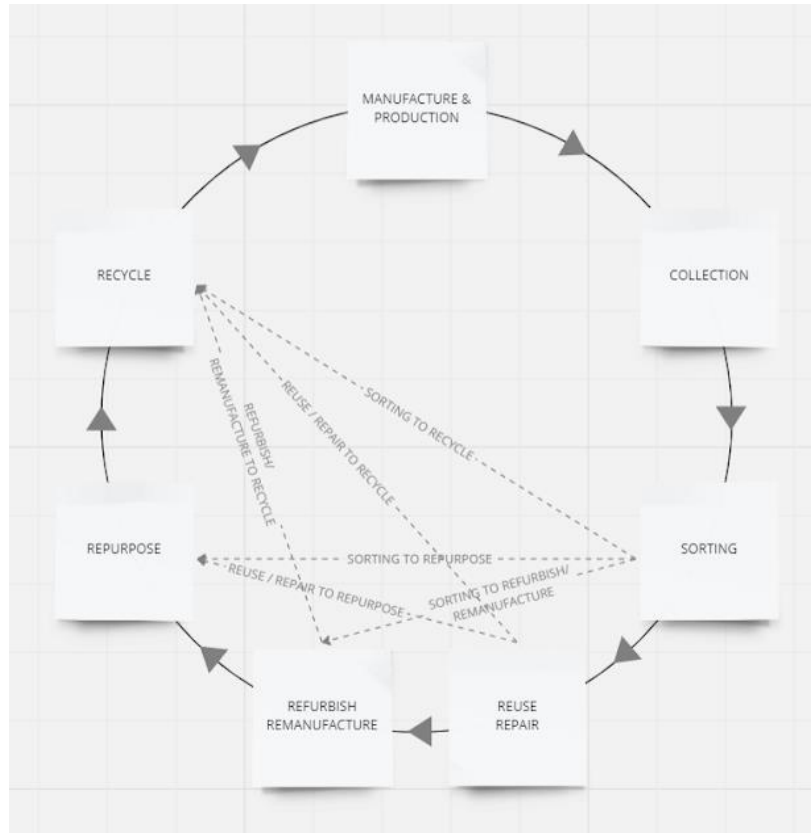


Figure 49 Business models for Circular Economy in South Africa

## 6.2 Theoretical Contribution

The findings will add to the current understanding of how CE practices are being applied and implemented in the South African clothing and textile industry, which contributes to understanding Africa's progression to a more sustainable development model, and what actions are being taken by businesses within the clothing and textile industry. The theoretical contribution also provides insight into the motivation for the sustainable practices, which is key to understanding how to potentially influence businesses to more sustainable practice, and the drivers for implementing sustainability. These aspects are under researched in the given context and, therefore, contribute to literature on this topic. The proposed framework of this study contributes to the theoretical understanding of what kinds of BMs would enable CE, and bolsters existing frameworks that show supply cycles and networks for CE, specific for the clothing and textile industry but also for other industries. There are frameworks that also refer to the R-Strategies, as the framework developed in this study does, therefore, contributing to the assertion of the R practices as legitimate for environmental sustainability, and their place in a CE. The application of the Potting et al. (2017) framework to guide the investigation of the environmentally

sustainable practices contributes to understanding of how this framework guides progression to CE, as the framework is positioned to do, and how the framework is applied within the clothing and textile context. Through this application, the strengths and shortfalls of the framework can be stated and justified, along with common occurrences of findings of the framework where it has been applied for similar investigations of product chains.

### 6.3 Practical Contribution

The practical contribution of this study is that it provides a guideline for businesses wanting to transition to or improve the sustainability of their BMs, as the outcomes provide a guideline for a circular flow of resources. The findings are specific to clothing and textile businesses but also relate to other businesses in different industries with a product/service. The framework provides an ideal of BM types that enable the prioritisation of resource value and can be adopted by practitioners. The practical contribution extends to understanding how the R practices are being actioned within the developing economy context, while understanding the limitations of an industry that is still anchored to the traditional linear economic model with limited sustainability.

### 6.4 Limitations

This study used purposive sampling, which can have limitations in producing data reflecting the true status of environmentally sustainable practices occurring within the said industry. However, the study's particular focus was to investigate what practices were occurring and how so, and not to ascertain if interventions for sustainability were occurring or not. A random sampling strategy would provide a clearer picture on what sustainable interventions are being applied and how. As the study was qualitative in nature, the results are not generalisable to the bigger population of clothing and textile MSMEs. There is the possibility that participants' responses were biased due to their limited understanding of the 9R Framework, but the researcher was selective and consistent in assigning the strategies from the 9R Framework, which deviated where necessary, to how participants stated the BMs' interventions relative to the practices. A limitation to state for the motivational factors that influence the adoption, implementation, and practices of the sustainable practices themselves, is that almost all participants noted their commitment to environmental sustainability as part of their professional endeavours, and often in their personal lives. This is not a generalisable finding for similar people within clothing and textile businesses, but does highlight the importance of the value of



sustainable consumption awareness by the people working within these types of businesses, and potentially, other businesses.

## 6.5 Recommendations

Future studies can apply the 9R Framework in other South African industries to expand the use of the said framework and determine how environmental sustainability adoption is progressing in other industries in the developing economy context. There is also the recommendation to do research using the three categories of the said framework, or to select specific R practices and investigate how the strategy is being applied, in and outside of the clothing and textile industry. The matter of motivation for practising the environmentally sustainable practices can also be expanded to study a more general sample. It would be interesting to see if personal motivation is also present where any environmentally sustainable business practice is actioned. Further research can develop frameworks for specific circular resource flows that add to the BM framework proposed in this study to better conceptualise how a CE could ideally be practised within the South African clothing and textile industry. The Potting et al. (2017) framework is positioned as a precursor to measuring sustainable innovation in product chains and, therefore, there is the recommendation to measure the circularity of sustainable intervention for the South African clothing and textile industry. This mirrors the global trend of measuring circularity of businesses and industries. However, there should be more research to provide a multidimensional understanding of the sustainable practices occurring within the said context prior to research of this nature.

*“We need to use fewer virgin materials, less plastic and no harmful chemicals. We need to ensure that we use, reuse, and recycle resources more effectively. And dispose safely of what is left over.” Andersen (2023)*

The 9R Framework applied in this study is not exclusive to BMs, but can also be applied to the consumer for a much needed guideline on sustainable behaviour. The figure that follows provides actions for consumers according to the 9R Framework.

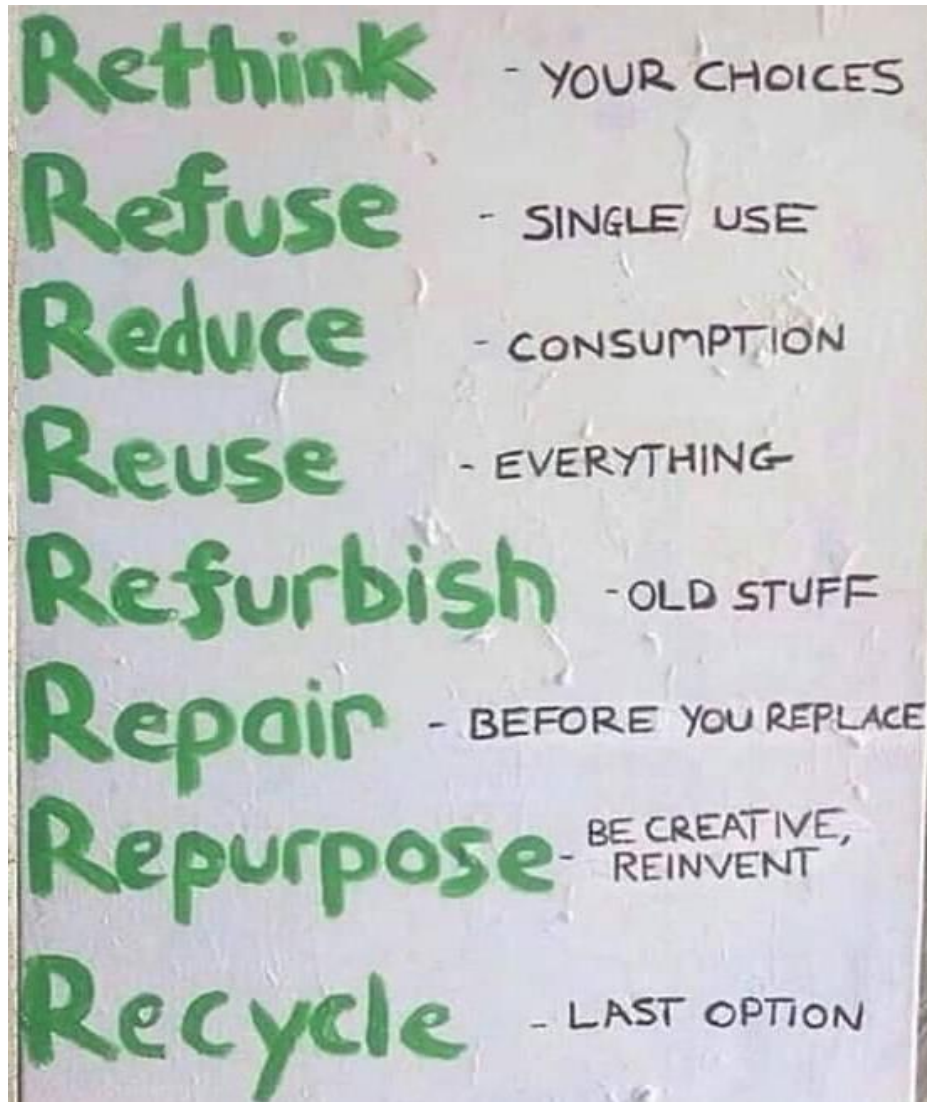


Figure 50 9R Framework for consumer consumption (Khan, 2023)

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## Annexure A

Table 10 Participant demographics

	<b>Business Description</b>	<b>Product or service description</b>	<b>Business to business or Business to consumer</b>	<b>Business age</b>	<b>Number of employees &amp; MSME categorisation</b>
Participant A	<i>"we do pre-loved, so second-hand luxury and premium branded clothing, accessories, shoes for men, women and children."</i>	<i>"we do pre-loved, so second-hand luxury and premium branded clothing, accessories, shoes for men, women and children. Um, and then, alongside that the service aspect of it is that we do, um, so if someone wanted to sell, we take it on consignment, so we obviously offer the service of helping someone sell their pre-loved on a consignment bases and then the product that we sell is to the client of pre-loved luxury"</i>	<i>"B2C"</i>	<i>"we've been trading and operating for just over a year and a half"</i>	<i>"I've got a, um, full-time photographer and then I've got an operations assistant...and then there's myself – that does everything else."</i>
Participant B	<i>"we are a used clothing recycling company"</i>	<i>"we are a used clothing recycling company so, our services, ah, have evolved from there. So, one is in it's current"</i>	<i>" B2B because we expecting our customers to sell out but we now, because we are doing weighted"</i>	<i>"July it was 11 years"</i>	<i>"the actual people, contract staff is 30"</i>

		<p><i>form which is re-used...um, upcycling into various products from weighted products for peop- children with disabilities to consumer products like bags and other things. And then our other products is the actual bales which then becomes fibre..."</i></p> <p><i>"and we create those businesses"</i></p> <p><i>"larger churches here in Centurion are recycling [name of business being interviewed]."</i></p>	<p><i>products and we have got occupational therapists and therapists, we would probably be required to do some B2C"</i></p> <p><i>"we are guided by the European Union waste hierarchy which is why we would work with the [lists 2 international clothing brands] because that's what they expect recycling from all six categories. And the partnerships of certain categories because they don't expect you to incinerate but they know you have a partner"</i></p>		
Participant C	<p><i>"We sell only second-hand women's, men's and kids clothing, shoes and accessories"</i></p>	<p><i>"we launched only with women's, but we grew into kids and well as men's."</i></p> <p><i>"we wanted to bridge the gap between the very high end, sort of luxury label only brick and mortar that sell second hand luxury things"</i></p>	<p><i>"B2C."</i></p>	<p><i>"launched in November 2019."</i></p>	<p><i>"Four. Three partners [lists names of partners] and then we have [name of employee] here with us in [name of main local city] in studio"</i></p>

		<i>"we've got a studio here in [South African main city] and [South African main city]"</i>			
Participant D	<p><i>"textile waste management service"</i></p> <p><i>"waste disposal service"</i></p> <p><i>"sale of the textile waste"</i></p>	<p><i>"textile waste management service.... We place our team onsite at the manufacturing site where all of the offcuts come from... The team then separates and sorts what's recyclable and what's not recyclable and then what is recyclable is then removed onsite... where it's further prepared for recycling... then we keep the textile waste for recycling"</i></p> <p><i>"a waste disposal service... so that would be collection... or drop off and then we charge them a small fee for additional sorting and quality assurance"</i></p> <p><i>"We then sell the textile waste to other companies that use the"</i></p>	<i>"on the side of the textile waste, I would also say they 95% B2B and then on the side of the sale of product, product being a fabric, I would say there it's, maybe 60/40. 60 being B2C and 40 being B2B. So on the fabric side we sell a lot more to individual designers than what we do to companies."</i>	<i>"we have been in operation for four years, but on a commercial scale from March 2020"</i>	Unconfirmed by participant



		<p><i>textile waste as an input.”</i></p> <p><i>“So we have 100% recycled fabric that is made from textile waste and plastic waste.”</i></p> <p><i>“we also have corporate gifting that we also sell to other companies. So tote bags made from recycled fabric is another product line that we do sell.”</i></p>			
Participant E	<i>“I offer services of freelance design but my predominant making practice is making apparel”</i>	<i>“So as an individual, I think of myself as a textile artist, designer and just an all-round designer, creative. So I offer services of freelance design but my predominant making practice is making apparel”</i>	<i>“Business To Consumer”</i>	<i>“it’s been actively running since 2021”</i>	<i>“I don’t really have access to much resource here. So I am making, patterning, sifting and sorting doing it all myself.”</i>
Participant F	<i>“a second-hand school uniform for the [name of private South African school] to render sales services where we are the referral company and get commission.”</i>	<i>“a second-hand school uniform for the [name of private South African school] to render sales services where we are the referral company and get commission.”</i>	<i>“with regard to the parents that comes to buy”</i>	<p><i>“it was birthed in 2019 however I’ve got other businesses that I ran before the one that I’m talking about now”</i></p> <p><i>“after Covid we realised that South</i></p>	Unconfirmed by participant but participant alluded to being the only person working in the business when discussing the businesses product chain

		<i>"it's parents that maybe their children have grown and they want us to sell their uniform to us, so we give them 50% of what that bring when we sell for them."</i>		<i>Africa, actually the whole world is financially distressed."</i>	
Participant G	<i>"We offer services like clothing alterations, clothing repairs, clothing upcycling and clothing refurbishing. Those are the primary services we offer."</i>	<i>"We offer services like clothing alterations, clothing repairs, clothing upcycling and clothing refurbishing. Those are the primary services we offer."  "Our main focus is to provide services"</i>	<i>"We are offering both. It's mostly business to consumer but when it comes to business to business transaction, it's when a company or organisation that offers us a gig to facilitate a workshop or speak on behalf of sustainable fashion"</i>	<i>"We've been operating from last year July"</i>	Unconfirmed by participant but participant alluded to being one of two person working in the business during the interview
Participant H	<i>"bags and accessories and apparel. Essentially, that's kind of our retail business."  ""we've got a B to B offering with our conscious gifting side of the business. So where we offer a, I mean industry wide known as corporate gifting, we call it conscious gifting, and where we sell direct to businesses in bulk"</i>	<i>"bags and accessories and apparel. Essentially, that's kind of our retail business. So it's bags and accessories are our primary goods"</i>	<i>"we've got a B to B offering with our conscious gifting side of the business. So where we offer a, I mean industry wide known as corporate gifting, we call it conscious gifting, and where we sell direct to businesses in bulk where it's for staff welfare for employee gifting, client gifting. Um, so that's sort of the B2B side. And then I'll direct to consumer side"</i>	<i>"It started in the beginning of 2015, so eight years"</i>	<i>"52/53 people"</i>

			<i>is everything that's sold through our physical retail stores and online. We're primarily a retail brand, so we sell everything like direct to customer"</i>		
Participant I	<i>"we fall under [name of businesses bigger organisational group] and within [name of businesses bigger organisational group], I think they are six brands. Our brand, the brand that I work for is [name of smaller brand within the bigger organisational group]"</i>	<i>"we sell menswear clothing and then also ladieswear clothes and we sell, umm, accessories."</i>	<i>"business to consumer"</i>	<i>"I think it's almost eight years. So like 7 1/2 years"</i>	<i>"40 or 50 staff members"</i>

Table 11 Environmentally sustainable practices

SMARTER PRODUCT USE & MANUFACTURE			EXTEND THE LIFESPAN OF PRODUCTS AND THEIR PARTS					USEFUL APPLICATION OF MATERIALS
REFUSE - R0	RETHINK - R1	REDUCE - R2	REUSE - R3	REPAIR - R4	REFURBISH - R5	REMANUFACTURE - R6	REPURPOSE - R7	RECYCLE - R8
PA: "we only use recycled, repurposed packaging and try sort of reuse it as much as possible"	PA: Product sharing	PB: "With reduce, we're making all the way to paving blocks and tiles". "We were shredding them into fibre and it's going into those pavers."	PA: "we do pre-loved, so second-hand luxury and premium branded clothing, accessories, shoes for men, women and children"	PA: "we do offer the service of either cleaning it for clients, at a fee, or sourcing/out-sourcing it to specialist leather care company or mending"	PG: "We mostly provide recycling when a client brings in an old jean [pair of denim jeans] and they want us to turn that jean into something new."	PE: "I take thrifted items or old items of my own and I'll reuse them in a new way."	PB: "With reduce, we're making all the way to paving blocks and tiles" "We were shredding them into fibre and it's going into those pavers."	PB: "In our down cycling business we have also diversified a lot because of our partners." "with fibre, you've heard, we do that"
PE: "I've tried to limit as far as possible,	PB: Product sharing	PE: "I reduce waste is through	PB: "14 large NGOs that repair and	PC: "items that come in will need to be	PG: "Mostly the refurbish side is colour	PE: "I don't specifically use clothing for	PE: "I do repurpose a lot of things so I	PD: "We then sell the textile waste to other

<i>tried to limit my use of polyamide polyester fabrics within manufacturing ."</i>		<i>collecting waste from factories, and utilising them in new designs that I create."</i>	<i>reuse" "40 – 50% of our business is reuse. We have 108 micro businesses that reuse them properly."</i>	<i>fixed, um, that might have holes in, um, that need to be cleaned, um, that need to be, ya, mended."</i>	<i>restoration because that's the major issue when it comes to clothing."</i>	<i>clothing end use. I use a lot of table clothes. I'm currently working on stuff with doilies and lace doilies. So something that's got a sort of household, very different function, and repurposing it in a completely different way."</i>	<i>can't always be sure that there's not polyester content within it"</i>	<i>companies that use the textile waste as an input."</i>
<i>PH: "all of our bags are made using waste material, which is essentially</i>	<i>PC: Product Sharing</i>	<i>PG: "we are basically reducing fast fashion, we are basically reducing</i>	<i>PC: "We sell only second-hand women's, men's and kids clothing, shoes</i>	<i>PG: "It also happens when it comes to repairing because we</i>	<i>PG: "Most of our business is repair. From the top, it's repair; its alterations and</i>	<i>PG: "We usually take something from our offcuts...Maybe offcuts from</i>	<i>PH: "we have a partnership with one of SAs largest retailers where we actually</i>	<i>PH: "we use a regenerated nylon material"</i>

<p><i>what we would call our raw material”</i></p>		<p><i>clothes ending up in landfill”</i></p>	<p><i>and accessories”</i></p>	<p><i>can repair a portion on a garment and then it comes back needing repair on a different portion of the same garment.”</i></p>	<p><i>then it’s refurbishing and then it’s upcycling.”</i></p>	<p><i>cutting length off jeans or pants...we just put them inside a bin, as something we can use later on.”</i>  <i>“From remanufacturing, we go as far as using the process where we use offcuts to make something new...from the garments that we’re altering, we need to cut something, we need to reduce a garment. So</i></p>	<p><i>getand tons of their waste materials shipped to us every month, which allows us to sort of scale and the manufacturing side and but allowing us to upcycle forever and ever essentially. Um, and then the outside of our bags, we use the canvas which is upcycled as B grade or its end of roll.”</i></p>	
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						those offcuts we actually use them to make something new.”		
	PE: “I recreate new textiles from factory scraps that I get from designers and other factories in South Africa. So it’s a rethinking what a new virgin material, or resource could look like”	PI: “in terms of the product itself, we are trying to not use, you know those little bags that you put that extra button into” “in some cases, we’ve also just stopped giving away that extra button because it’s not always necessary”	PD: “With the sale of the textile waste we do have individuals, designers, who come and source, offcut fabric.”	PH: “the repair and sort of everlasting of our bag. We have an Evergreen guarantee, so if there’s ever an issue with the bag, ah, we will repair it.”		PH: “If we can’t repair it, we will replace it and then if it is replaced and the bag comes back to us, we’ll either strip it and use components onto a different bag, um, or go through like a sort of a larger repair”		PH: “whatever we don’t use or offcuts, whatever happens in our manufacturing process, we then recycle that through a partner of ours”

	PF: Product Sharing		PF: "a second-hand school uniform"			PI: "at the end of the season, the designer will end up having like a huge file like this with all the prints that she signed off and am, prints, buttons, trims everything... I'll donate it to [name of local university]..they literally cut it up and then make stuff from it, they use it to design."		
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Table 12 Product chain

Participant A	Consignment service	Product process	Consignment service	Cost of sales
	<i>“alongside that the service aspect of it is that we do, um, so if someone wanted to sell, we take it on consignment, so we obviously offer the service of helping someone sell their pre-loved on a consignment bases and then the product that we sell is to the client of pre-loved luxury”</i>	<i>“every single item on our page has to be individually photographed”</i>	<i>“we take a 35% commission for our services”</i>	<i>“we pay for the courier, we pay for the packaging, we’ve got all the time-consuming things of dealing with the clients, marketing, we professionally photograph”</i>
Participant B	Sourcing and tracking	Sorting and assets	Guidelines and BM (Business Model)	Employment and enterprise development
	<i>“in the high level process, it’s sourcing, processing, then it’ll be selling or donating”</i>  <i>“larger churches here in Centurion are recycling [name of business being interviewed].”</i>  <i>“Because your selling something, or donating something. Um, so inside them. We source from retail, we source from staff</i>	<i>“A-grade clothes is R70 per kg, your B-grade is R50 per kg and it gets less and less and less as its reuse is less”</i>  <i>“the sourcing into 28 different categories and then, um, noting that number 28 is ‘can’t be used in 27 of the other categories’, they are sources further into 12 different categories that we can downcycle into fibre.”</i>  <i>“need logistical assets because you need vehicles,</i>	<i>“we are guided by the European Union waste hierarchy which is why we would work with the [lists 2 international clothing brands] because that’s what they expect recycling from all six categories. And the partnerships of certain categories because they don’t expect you to incinerate but they know you have a partner”</i>	<i>“so if we’re not empowering people, I don’t think people would be sourcing it, we wouldn’t be getting the clothes”</i>  <i>“we’d have 20 human beings never was, would have a job before would have employment, ah, because of the way we designed it”</i>  <i>“because we’re an empowerment company and we were, have a very clear</i>

	<p><i>volunteerism programmes, we source from school programmes, we source from non-profits because a church, for example, will ask the congregation to bring clothes and guess how much of those clothes can actually be used? Probably 40% or less.”</i></p> <p><i>“we track right down to every single kilogram”</i></p> <p><i>“that 6 kg’s is put on the scale, they sort it into the different categories”</i></p> <p><i>“daily capturing”</i></p> <p><i>“tracking every kilogram”</i></p> <p><i>“weight is a very important thing to us, besides counting, which is easy, that’s the easy part, weighing is important because we take. So if a person, a mother from a school recycles, lets say [lists the name of an affluent private school from a well-known South African city], we can tell the mother exactly where her 6 kilograms went: upcycling, re-use, upcycling, downcycling.”</i></p>	<p><i>you need sourcing, you need um, so our biggest cost is human costs, salaries. Second biggest is logistics, ah, third biggest is space.”</i></p> <p><i>“we need fixed assets like everybody else. We need equipment that can be able to do the work. Um, most of it is designed here because if you import this equipment it costs you millions”</i></p>	<p><i>“From a business model perspective, if you only wanted to pick one of this, then you need others to do everything else.”</i></p> <p><i>“In our down cycling business we have also diversified a lot because of our partners.”</i></p> <p><i>“a weighted product could be up to R1000, however, it’s only less than 5% of the 100% you’ve recycled. So that means that this is quite expensive.”</i></p>	<p><i>focus on mothers of children with disability ...No body wants to look after their children, and ah, they can’t get work for that reason, right. So, touched a lot of peoples hearts. Organisations like [list’s well-known international fashion brands] want to be part of that. They also want to be part of inclusion, they just don’t, so they, they get involved in our social enterprise and noting we have a business buddy.”</i></p>
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Participant C	Sourcing and studio	Assets and sales processes	Sales processes	Operations
	<p><i>“have a very big, well big studio in [prominent city in South Africa] and a studio in [prominent city in South Africa] as well.”</i></p> <p><i>“we’ve got a studio here in [South African main city] and [South African main city]”</i></p> <p><i>“quality is of the utmost concern. Everything, our entire collection is highly curated”</i></p> <p><i>“anything that we don’t sell that they don’t necessarily want back to go to their own charities, um, we pass onto the [a local non-profit organisation that reuses clothing]”</i></p> <p><i>“we’re donating items to [local non-profit organisation that reuses clothing]”</i></p>	<p><i>“our No. 1 asset, which is our clothing”</i></p> <p><i>“our platform, our website is so important, and then obviously our studio”</i></p> <p><i>“I don’t fix things but we do the photography in-house. We have outsourced photography and we will continue to do so.”</i></p> <p><i>“women that have sold clothes to us, we pay them back with a credit which is approximately 40% of the resale value, and then they can shop again at [name of business].”</i></p>	<p><i>“every single piece that we load is tagged, you know, with all these different kind of filters”</i></p> <p><i>“downside of our business model is that every single item is once-off. So, if we buy that beautiful white top you’re wearing, we have to quality check it, photograph it, quality check it, load it to the website, price it, store it, pick it, pack it and ship it, and then it’s gone. It’s not like we can load that product once, or 60 times, or 600 times. So, our business is very labour intensive and obviously that requires people, it requires actual humans.”</i></p>	<p><i>“outsourcing in terms of our marketing, our social media is outsourced, our Google – all our marketing, media is outsourced”</i></p> <p><i>“the parcel arrives like the next day, or maybe two days later, we allow returns, um, I think we were definitely one of the first second-hand companies to allow people to return”</i></p>
Participant D	Sourcing and product chain	Business sales	Sourcing and assurance	Partners
	<p><i>“a waste disposal service...we go and collect from the client, or they come and drop off and then we</i></p>	<p><i>“on the side of the textile waste, I would also say they 95% B2B and then on the side of the sale of product,</i></p>	<p><i>“textile waste management service. Um, and that service is an onsite sorting service. Um, the onsite sorting</i></p>	<p><i>“So, um, I’ve got two clients in, ah, one is in [name’s main city] and one is in [name’s another main city] and, they,</i></p>

	<p>charge them a small fee for additional sorting and quality assurance and then, in those two ways, is how we get our textile waste in the business. Once the textile waste is in, either we got it through an onsite sorting, either we got it through an onsite client or we got it through a waste disposal client, it's then sorted according to fabric types, it's then prepared for recycling, we then bale it, um and then a third revenue stream kicks in which is the sale of the textile waste. We then sell the textile waste to other companies that use the textile waste as an input."</p>	<p>product being a fabric, I would say there it's, maybe 60/40. 60 being B2C and 40 being B2B. So on the fabric side we sell a lot more to individual designers that what we do to companies"</p> <p>"current only channel of sale is my online store and in-person sales."</p>	<p>service involves [names business] being placed at a large-scale manufactures site...where all of the offcuts come from...The team then separates and sorts what's recyclable and what's not recyclable and then what is recyclable is then removed onsite...and it goes to [name of business] where it's, um, further prepared for recycling, um, and ya, then we keep the textile waste for recycling"</p> <p>"we have a very strict policy of not taking things that we can't recycle because we don't want to be the ones that will then have to divert it to landfill"</p> <p>" "I know it's not going to landfill, you've given me a certificate that shows me that." "</p>	<p>the clients that we sell to, produce fibre from the textile waste. The fibre is then, they sell it on to other companies, like automotive companies, construction companies, blanket companies, dog-beds, the toy industry and so that is essentially the end destination of our textile waste."</p>
Participant E	Sourcing	Sourcing and sorting	Product development	Sales
	<p>"vintage stores and thrift stores"</p> <p>"beautiful second-hand shops"</p>	<p>"sourcing the offcuts from factory room cut floors, from designers, from manufacturers and utilising all their seconds, and all their</p>	<p>"Sifting and sorting and then like ironing pieces out and then there's a big process of colour coordinating which I'm currently in now. So I'm separating all my colours</p>	<p>"And once the garment is made up and is online, there's a social media engagement that I have to be quite involved with, which I really don't like, but it's a</p>

	<p><i>“they’re very inexpensive and I just collect things that really appeal to me.”</i></p> <p><i>“I think what initially started this was that I’ve never really thrown any of my scraps away since studying design, which was about 15 years ago, so I’ve maintained all these beautiful pieces of fabric that I’ve really loved and with every house that I’ve moved I’ve always moved with this big pile of fabric that I’ve kept.”</i></p> <p><i>“There’s a collaboration, reaching out personal connection that needs to happen first with vendors, I guess. So a lot of the factories I reach out to, and start building connections with them and start saying, you know, “do you need someone to dispose of your waste for you?”</i></p>	<p><i>scraps.”</i></p> <p><i>“I collect that. I sometimes have it couriered to me if I’m in [names 2 main South African cities]. Or if I’m in the town, then I’ll collect it myself.”</i></p> <p><i>“once I receive those raw materials there’s a sifting and sorting process that happens internally with me in my studio. And that’s literally just sifting and sorting through what’s usable, what’s not usable and then it’s like pilling”</i></p>	<p><i>from lights to darks, fabric texture. So I create this entire bank of usable, my partner like to refer to it as my ‘paint’, so I organise my ‘paints’ in my studio. And that’s kind of my library that I work from. So I’m constantly adding to this bank of ‘paint’ or resource that I paint from. Then, my actual manufacturing process - I am currently making everything myself. I’m in a small town in the [names South African province] so I don’t really have access to much resource here. So I am making, patterning, sifting and sorting doing it all myself. And then, ya, constructing textile from that. So from those pieces, I would layout my designs, work out what I really want to do with them, cut and prep and then sew up meter, probably, two meter pieces of fabric and then I cut my patterns out of that.”</i></p>	<p><i>bit part of what one has to do as an entrepreneur. So I’m shooting the product, marketing it. I’ve got an online store which I maintain as well. And then there’s also copy that goes along with it which is a: “what inspired this? - where did it come from? - what does it mean to me specifically as a designer and maker?”. So the storytelling process behind how and where it’s, what it’s end us is is just as important to me as the actual garment itself.”</i></p>
	Sourcing	Product	Business process	Business process

Participant F	<p><i>“they want us to sell their uniform to us, so we give them 50% of what that bring when we sell for them.”</i></p> <p><i>“If it was donated then it’s revenue that goes to our shop, but if it was donated, remember I’ve got a record of received and sold goods so whenever the client sells whatever the client gave to use to sell we record it down and then we pay them and send them a POP”</i></p>	<p><i>“even if I get it and it’s clean, for hygiene, I need to go and wash it myself and steam it myself”</i></p> <p><i>“Repairing is not part of what I do. So obviously when the parent brings stock I need to assess it”</i></p>	<p><i>“there’s a record that we have.”</i></p> <p><i>“with regard to the parents that comes to buy, we do inform them that this is second-hand and this is what has been given to us. So whatever we have given the consent to the parents that sold to us”</i></p>	<p><i>“Number one, we do have a policy and a procedure that we give the parent that brings the stock. So we do sign a contract with them that this is what they’re going to be paid. They cannot bring the stock and get the money immediately so we need to sell it for them.”</i></p> <p><i>“never had returns”</i></p>
Participant G	<p>Service</p> <p><i>“Our main focus is to provide services”</i></p> <p><i>“We offer services like clothing alterations, clothing repairs, clothing upcycling and clothing refurbishing. Those are the primary services we offer.”</i></p> <p><i>“Most of our business is repair. From the top, it’s repair; its alterations and then it’s refurbishing and then it’s upcycling.”</i></p>	<p>Service</p> <p><i>“We provide services where we prolong the lifespan of clothes that are already existing in the world.”</i></p> <p><i>“we are aiming to upcycle, repair, refurbish and then alter. Because when it comes to alterations, its something that, we know the client that definitely still loves this garment”</i></p> <p><i>“It also happens when it comes to repairing because we can repair a portion on a garment and then it comes back needing repair on a</i></p>	<p>Business process</p> <p><i>“You just go through the procedure of the design and then with regards to the other different clients maybe someone brings in a garment but they do not know what they want, however they want us to recycle the garment. And then we can have a consultation and discuss the type of options that can go in with regards to recycling the garment and then we can take it from there.”</i></p> <p><i>“They can bring in a jean for colour restoration and then</i></p>	<p>Business process</p> <p><i>“We usually take something from our offcuts because we have like, a bin that’s filled with offcuts. Maybe offcuts from cutting length off jeans or pants, maybe we were supposed to take in the sides of the garment so those offcuts we do not throw away, we just put them inside a bin, as something we can use later on. So we usually refrain from asking a client to bring in a second garment because it’s going to use only a small portion and then there’s going to be waste from that garment.”</i></p>

		<i>different portion of the same garment.”</i>	<i>we restore the colour. After we restore the colour we’re going to tell the clients how to take care of the jean from now on. Some of them do take our advice and some of them don’t. Those are mostly the ones who come back, maybe after a year, maybe after six months or so depending on the amount of washes the garment goes through or what type of washing”</i>	
Participant H	Material sourcing	Material sourcing	Product development	Product development
	<i>“we have a partnership with one of SAs largest retailers where we actually get and tons of their waste materials shipped to us every month, which allows us to sort of scale and the manufacturing side and but allowing us to upcycle forever and ever essentially. Um, and then the outside of our bags, we use the canvas which is upcycled as B grade or its end of roll. Or in our, which is a new material we’ve introduced, which is a regenerated nylon, not a recycled nylon”</i>  <i>“we implemented that last</i>	<i>“the procuring of waste is always kind of like a little bit of a challenge, especially in COVID when a lot of the suppliers of our waste material, just stopped functioning...So we had to look at a different avenue and that’s when we sort of approaching shops and being like you know you guys hang banners on your wall all the time and you take them down. So just give them to us”</i>  <i>“our suppliers are generally just our, you know, whoever’s the manufacture</i>	<i>“our lining and it used to be an indoor advertising banner, um, which is a polytope material, and now it lines all of our bags.”</i>  <i>“our bags. I mean it’s 90% made from waste material, the 10% is the small trims that we just can’t, we can’t upcycle that, you can’t get a recycle version just yet.”</i>  <i>“So you know, for us the last thing is landfill, which we don’t ever actually do because you know we have a partner where by whatever off cuts, maybe small</i>	<i>“ the repair and sort of everlasting of our bag. We have an Evergreen guarantee, so if there’s ever an issue with the bag, ah, we will repair it. If we can’t repair it, we will replace it and then if it is replaced and the bag comes back to us, we’ll either strip it and use components onto a different bag, um, or go through like a sort of a larger repair, and then we’ll have it as part of our sort of reduced what we call our sort of sample repair stock”</i>  <i>“So we’ll replace it and just,</i>

	<p><i>year and that's made from discarded fishing nets, industrial plastic waste all combined into yarn and the awesome thing about that is that the difference of that sort of not being recycled compared to regenerated, you can regenerate that over and over again."</i></p>	<p><i>of the canvas, they'll have the waste material that we have, that we get from them and which would be the B grade stuff that we were to assume. Ah sort of consume to get from them. Um, our yacht sale supplier, for example, we get all their seconds, which they call it, so it's not fit for its primary purpose and so we didn't take it on and use it."</i></p> <p><i>"t's a particular type of waste material, which is a poly-twill waste and it's the, if you look, if you go into any store and you see, those in store advertising banners."</i></p>	<p><i>amounts in our cutting room for example, we use on smaller products. And if it's too tiny or whatever, different shape, we recycle it with a partner of ours and they take our materials, which they are able to recycle, and then they recycle and dispose of it responsibly."</i></p> <p><i>"we've scaled our production by using outsourced suppliers"</i></p> <p><i>"like all of our bags use most of all the trims. So it's like if you don't make that one, you use them on that one. So yeah, they're kind of all feed into each other really."</i></p>	<p><i>you know, and honour our lifetime guarantee and give them another option for a bag, um, and then what we'll do is we'll take that other bag and we'll sort of use the components of the bag where we can. You know, if there's a buckle on there, we'll strip the buckle, use it onto another bag, and depending on how bad it is, we'll do the best you can to repair it"</i></p> <p><i>"Yeah, so if there's ever any issues with our products, we repair them and if they can't be repaired, we replaced them...in house"</i></p>
Participant I	Sustainability practices	Sustainability practices	Product development	Product development
	<p><i>"currently we are on a sustainability implementation journey within the company. It just started and we haven't really gone that deep into it yet as like a as a group like [name of businesses bigger organisational group], but [name of smaller brand within the bigger</i></p>	<p><i>"before we going to bulk production umm, then we still have to tell them like okay, don't use this little bag because, I mean if you have like 10,000 units you have 10,000 of these little bags"</i></p> <p><i>"in terms of the product itself, we are trying to not use, you know those little</i></p>	<p><i>"the first sample, obviously the send after you've briefed the supplier and usually that's going to be in a sub fabric. So we try to make, sorry, as many changes, updates like anything that we need to do on there, we try to do on there, so that we don't have to ask for another one in the sub fabric"</i></p>	<p><i>"Okay, so the ones that gets made for us usually when your overseas suppliers send you samples, then they have to make a cut, they have to mutilate the sample because then we don't pay duties on it...So what it means is that you won't, you're not going to resell the garment...So what we often do is we'll</i></p>



	<p><i>organisational group] has already started implementing some of these things like two years ago."</i></p> <p><i>"this is a huge business drive now for us to go into 3D. So what that will mean for us is that we will do all our, you know, like your CADs"</i></p> <p><i>"we're moving into 3D now. Umm, you do your CAD, but it's very much it's 3-dimensional, and it's like you can fit everything virtually."</i></p>	<p><i>bags that you put that extra button into."</i></p> <p><i>"in some cases, we've also just stopped giving away that extra button because it's not always necessary"</i></p>	<p><i>"we'll get a pre-production sample which they then send in the actual fabric. So like the fabric that you want with your print on it, your actual zip, your actual button, whatever it is with like your tags and price sticker, everything. And sometimes what can happen...so you'll get the PP [pre-production] sample and...need to actually change this and change that and update that, and then you'll need another sample. So what you're trying to do now is to like, really try and intentionally do all of that on the first sample and then get the second one, and then just sign it off and then get a bulk sample which is from your bulk order."</i></p>	<p><i>have like an internal sample sale and then we sell it for like next to nothing for literally what maybe would have charged us for the sample."</i></p> <p><i>"if there is a sample that hasn't been, I mean there's been mutilated so much that you cannot sell it, then that gets donated to charities. We do not destroy anything. We do not burn anything. We do not landfill anything"</i></p>
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Table 13 Barriers of clothing and textile MSMEs

Participant A	<p><i>"our delightful economy of the cost of fuel going up and the load shedding"</i></p>	<p><i>"...little power, expensive fuel, I mean the cost of delivery."</i></p>	<p><i>"constant challenge and juggling how to make it financially viable and keep the cashflow and also incorporate all of these expenses and unfortunately, it is just a costly thing"</i></p>	<p><i>"fuel prices, lack of electricity"</i></p>
Participant B	<p><i>"I don't think that our financial institutes are mature enough to deal with these types of businesses yet because they don't understand. I mean we create more micro businesses than large corporate programmes. Yes, but um, so I think access to, um, growth funding for social impact is the biggest risk, right now."</i></p> <p><i>"It's lowest cost, least resources, highest profitability. That equation doesn't work in this world right. So as long as the virgin product is cheaper and easier to get even through it might be more pollutant using a lot more water, and all of those things. Um, as long as those business models are kept strong, it's going to be a very big challenge. So, the entire</i></p>	<p><i>"From a business model perspective, if you only wanted to pick one of this, then you need others to do everything else."</i></p> <p><i>"if you downcycle, reduce, the maximum we get is R2.80...and the average we get is R1.50 per kg. So think about it, R70 per kg, R1.50 per kg. You see this, you see the complexity of the model. And if only forty. You have to have between 40 and 50% that are sitting here [makes reference to the first R on his list: Re-use] for you to sustain 9 categories [referring to the remaining R's]."</i></p>	<p><i>"the challenges are to get them to a higher level of repurposing or reproducing is getting down to actual make-up of the, the item"</i></p>	<p><i>"lack of quality people in the work we do because noting that I don't think most people grow up and said: 'I'm going to be an environmental engineer, Mom'. It's only now they probably say that, but we didn't say that five years ago...So there's a lack of, of maybe skills that is required and it's a new age business. Um, ya so, that's the other thing. So, I think lack of skills."</i></p>

	<p><i>value cycle needs to change.”</i></p> <p><i>“access to low-cost capital”</i></p>			
Participant C	<p><i>“So [name of business partner] are both in out mid-forties and that’s wonderful because we’ve really capitalised on women in our, sort of, age group, like 35 to 55, who are thinking sustainably. But, we, the youth, so like, sort of 16-25, um, they are really the market that are thinking sustainably now...I think the environment and being conscious is much more engrained in that generation than in our generation...So, it’s how do we capture and convert the youth to also shop on [name of business] and that is a challenge for us.”</i></p>	<p><i>“things are so expensive” when they are manufactured locally because we’re paying people a decent salary to produce that garment”</i></p>	<p><i>“local producers at [name of small locally made clothing business] or [name of small locally made clothing business] or [name of small locally made clothing business], these are all brands in [main South African city] that are all very ethical and try and be as sustainable or environmentally conscious as they can be but their price point is quite high, because of that”</i></p>	<p><i>“biggest challenge but it’s an exciting challenge is to educate people that it’s nothing to be ashamed of”</i></p>
Participant D	<p><i>“when we started, we realised that you can’t just come here and put a textile recycling plant and then think people are going to start recycling their textiles. People don’t know, this is a very new concept within the value chain. So we started a non-profit that educates everyone within the eco-system of the different partnerships. So we educate manufacturers, retailers, designers, fashion school students, consumers, have masterclasses, events, keynote speakers, various different ways that we engage with each of those different stakeholders to, one accelerate the adoption of textile recycling and circular textile practices within South Africa, but two, to genuinely educate people so that people know.”</i></p>			
Participant G	<p><i>“we are facing a lot of problems as South Africans. There’s too many clothes coming in and there’s no</i></p>	<p><i>“There’s second-hand clothing coming in from Europe, and in large quantities; there’s counterfeit clothing coming from different countries, China, Bangladesh you name them, Turkey; and then there’s clothes that are coming in directly, those that goes to the malls and retails. All those clothes are not South African produced which means they end up here and</i></p>		

	<p><i>accountability for those clothes. And there's not so many people who are willing to fix the problem, or to find a way to stop that from happening"</i></p>	<p><i>they are bought by South Africans but there's no way whereby the people who brought those clothes here fund or create a functional system whereby they make sure they see everything through"</i></p>
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Table 14 Challenges of environmentally sustainable practices

<p>Manage ment and decision</p>	<p>PC: "a price point, what people are willing to pay, I think that is becoming more challenging to get that right"</p>		<p>PI: "it is really spreading because from [name of smaller brand within bigger organisation] now it's going to like [name's sister brands within bigger organisation] but those brands, sister brands, are so huge. They are so huge that when you start to implement a process, it takes like years to implement like three years. So I'm hoping that somehow they will be a faster way to action that" "the message had to come from me, go to the top and then come from the top down..."</p>		
<p>Labour</p>	<p>PB: "lack of quality people in the work we do because noting that I don't think most people grow up and said: 'I'm going to be an environmental engineer, Mom'. It's only now they probably say that, but we didn't say that five years ago...So there's a lack of, of maybe skills that is required and it's a new age business. Um, ya so, that's the other thing. So, I think lack of skills."</p>				
<p>Design challeng es</p>	<p>PA: "one of the challenges especially for small businesses in South Africa is we don't have a lot of the resources of sustainable packaging, sustainable shipping options. There's just, it hasn't grown big enough yet. So, we're quite limited in what we can do."</p>	<p>PB: "if you downcycle, reduce, the maximum we get is R2.80...and the average we get is R1.50 per kg. So think about it, R70 per kg, R1.50 per kg. You see this, you see the complexity of the model. And if only forty. You have to have between 40 and 50% that are sitting here [makes</p>	<p>PD: "we had to really think about how to get the textile waste in the door. So, we first started by just collecting, allowing people to do drop off for free, us collecting for free. You can imagine why we were running at a loss because then we had to send it all the way to KZN for free for everyone. And</p>	<p>PE: "I think price is like a bigger factor for most people. The bottom line is if it is economically viable to purchase something and we choose with the amount of money that we have available to spend. Soya, I think that is a big factor for most quote, unquote consumers"</p>	<p>PF: "The problem is that, with the [name of private South African school] it's branded, the uniform, so I can't give it to any charity. The only thing I need to take it back to the school and they need to identify children that are in need for the uniforms."</p>

		<p>reference to the first R on his list: Re-use] for you to sustain 9 categories [referring to the remaining R's]."</p> <p>"we had to subsidise all of those for many years so that is can get to the point where it makes it's own money."</p> <p>"So, this is the sad reality. It's, you'd have to have a very high reuse component to subsidise what you just saw..."</p> <p>"f you want to repurpose into something specific, like a weighted product, then</p>	<p>then we realised that people, that there was a problem to solve with a lot of our customers that they were willing to pay for. Um, people want, one, a waste disposal service but they also want to make sure that it doesn't go to landfill. Um, they also want to make sure that it's regular."</p> <p>"In our industry, you know, like kind of the recycling space, um, a lot of people tend to just purchase the input, manufacture and then have a</p>		
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		<p><i>you only need denim and you'd need a lot of crushed glass. So you need other organisations to supply you that. The beauty of our business model is that because we do sourcing, processing and reuse, upcycling and downcycling"</i></p>	<p><i>product to sell but with us, we're in a little bit of a tricky situation where most of the textile waste that is generated in the country or the Western Cape, but the only recycler is in KZN [Kwa-Zulu Natal, another South African province] so for us to purchase the input material and then have the cost to send it all the way to the recycling in KZN is really, really expensive."</i></p>		
<p><i>Materials</i></p>	<p><i>PB: "the challenges are to get them to a higher level of repurposing or reproducing is getting</i></p>	<p><i>PB: "it's all about sorting. If people haven't got the patients</i></p>	<p><i>PE: "another thing I struggled with in South Africa is access</i></p>	<p><i>PG: "There's a relation between plastic and polyester"</i></p>	<p><i>"we are facing a lot of problems as South Africans. There's too many clothes coming in and there's no accountability for those clothes. And there's not so many</i></p>

	<i>down to actual make-up of the, the item."</i>	<i>of the time to sort, they not, they going to greenwash. They not going to do this responsibly."</i>	<i>to really good raw materials"</i>	<i>people who are willing to fix the problem, or to find a way to stop that from happening"</i>		
<i>Rules and regulations</i>	<i>PB: "The only reason we have a PTY and non-profit is because South Africa doesn't have a social enterprise...If we had a choice, we would not have a PTY, we would not have a non-profit, we would have a social enterprise"</i>	<i>PB: "It's lowest cost, least resources, highest profitability. That equation doesn't work in this world right. So as long as the virgin product is cheaper and easier to get even though it might be more pollutant using a lot more water, and all of those things"</i>	<i>PI: "because that's like one of our biggest fears where we say that something is like recycled and then it's not"  "But all this time I had to rely on, you know, the suppliers of the bags that to trust that they're saying that it's recycled."  "Supply transparency. Knowing, uhm, what your factory in India, like, what are their working hours, who are they employing? How old are the people? Is it child labour, is not child labor? Umm, what are the conditions and where, where are they sourcing the fabric from the textiles from umm and having it traced."  "you still don't have visibility. I think that's very important. You must, it needs to be tracked, it needs to, you need to actually see and know that, okay, you're saying it's recycled, it has actually been recycled. Or it is actually recycled polyester? It's not a virgin fibre, whatever."</i>			
<i>Knowledge and awareness</i>	<i>PA: "People don't do it because: One, they don't know how to, they don't know where to,</i>	<i>PB: "I think that the big brands are starting to eliminate the</i>	<i>PC: "We have a huge job especially in South Africa</i>	<i>PD: "when we started, we realised that you can't just</i>	<i>PG: "not a lot of people are not familiar with upcycling"</i>	<i>PI: "the biggest challenge is the customer and being able to actually execute it. You know that's why I think they haven't done it. You know, gotten rid of the plastic bags</i>



	<p><i>and it takes time and most people are very 'time-poor' so if you can start making, um, easy and effortless"</i></p>	<p><i>polyester and nylon and things from production but it's going to take a long time. Because, ah, consumers want cheap."</i></p> <p><i>"So that we can build it up to a point that we can scale it but if you walked into a bank and told them you wanted those assets, they'd laugh at you because no-one understands these business models, so ah, because social entrepreneurship doesn't really exist as funding"</i></p>	<p><i>where the perception of second-hand is still, not quite where it should be, um. Second-hand is still potentially perceived here, not so much overseas, especially in Europe, but still perceived, you know, a bit gross, a bit musty, you know, Grannies old wardrobe. You've got to sift through thousands of items to find, you know, one gem. Whereas, you know, we take the thrift out of thrifting, um and, ya, our job to educate shoppers of the benefits of</i></p>	<p><i>come here and put a textile recycling plant and then think people are going to start recycling their textiles. People don't know, this is a very new concept within the value chain. So we started a non-profit that educates everyone within the eco-system of the different partnerships. So we educate manufacturers, retailers, designers, fashion school students, consumers, have masterclasses, events, keynote speakers, various different ways that we</i></p>	<p><i>"most of our clients, or most of general consumers who buy clothes, they really don't know how to take good care of clothes."</i></p>	<p><i>because you know, because of the whole transportation thing"</i></p> <p><i>"people that come from a less fortunate background that still need a plastic bag because it take a taxi, something needs to change there because South Africa is, the majority is, of South Africa are poor and if you are not affecting those communities then the problem doesn't go away. So I feel like from us it needs to spread out into like your[names sister brands within the organisations bigger group] because they're still selling plastic bags."</i></p>
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			shopping second-hand.”	engage with each of those different stakeholders to, one accelerate the adoption of textile recycling and circular textile practices within South Africa, but two, to genuinely educate people so that people know.”		
Integration and collaboration	PB: “Coming back to actual yarn because my dream ultimately which can never happen until we change production but once production...changes to a point that you can, the first point of, of fibre would actually be recycled fibre. That would be the ultimate goal so that you’d then have a total closed loop...So, the entire value cycle needs to	PC: “something we’re going to look at this year, to off-set the carbon footprint, rather than neutralise the carbon footprint because it’s not possible at the moment.”	PE: “Retail and access to selling platforms to be selling garments on. Places to resale could be a barrier at the moment because the product is quite niche and quite expensive as well so that can be a bit of a barrier at the moment”	PG: “we are currently facing challenges of accessing the market. When I say the market, accessing the people who actually buy clothes.”  “not a lot of people are not familiar with upcycling”	PI: “they’re also like using like a recycled polyester which a lot of retailers are doing. But I do feel like we can do so much more.”	

	change.”					
Cost	<p>PA: “a lot of companies, I think, um, don’t often go as big and as bold will all of these initiatives because on paper it is a bit more of a costly thing and it reduces the bottom line.”</p> <p>“constant challenge and juggling how to make it financially viable and keep the cashflow and also incorporate all of these expenses and unfortunately, it is just a costly thing”</p> <p>“our delightful economy of the cost of fuel going up and the load shedding”</p> <p>“constant challenge and juggling how to make it financially viable and keep the cashflow and also incorporate all of</p>	<p>PB: “access to low-cost capital”</p> <p>“So that we can build it up to a point that we can scale it but if you walked into a bank and told them you wanted those assets, they’d laugh at you because no-one understands these business models, so ah, because social entrepreneurshi p doesn’t really exist as funding.”</p>	<p>PC: “it’s financial at the end of the day. I think that is our biggest barrier, or our biggest challenge and struggle”</p> <p>“every two to three months, you’ve got to pay this hefty VAT bill which can be crippling. Um, so finances is a real struggle, and cashflow. Again, our business model, which I don’t want to change, is we take the risk and we buy our clothing up front, and the reason we’ve chosen to do</p>	<p>PE: “because the product is quite niche and quite expensive as well so that can be a bit of a barrier at the moment”</p> <p>“Funding for most small businesses is always going to be a barrier because I’ve currently invested all my own capital into starting something up.”</p> <p>“I think price is like a bigger factor for most people. The bottom line is if it is economically viable to</p>	<p>PH: “sometimes going sustainable is slightly more expensive to whatever you’re buying and you purchasing and it depends on if you can pass that cost onto your customer or not. And if you can’t, then that’s gonna be a problem”</p>	<p>PI: “switching from plastic bags to paper bags. I mean, there’s a cost involved and that it’s way more expensive to have a plastic bag. So you sort of have to work that into your cost”</p>

	<p><i>these expenses and unfortunately, it is just a costly thing”</i></p> <p><i>“when we first started I was accepting slightly, um, lower end brands, I wasn’t quite taking high street but I was accepting lower priced, ah, premium brands, ah, but as we started to grow a little bit I realised, um, financially it was not feasible for us to take items that would be reselling for anything less than about R500 – R1000 so we had to implement a minimum commission charge otherwise we weren’t just, we were not covering our expenses.”</i></p> <p><i>“every single item on our page has to be individually photographed”</i></p> <p><i>“one of the challenges especially for small</i></p>		<p><i>that is because consignment is such a pain”</i></p> <p><i>“downside of our business model is that every single item is once-off. So...we have to quality check it, photograph it, quality check it, load it to the website, price it, store it, pick it, pack it and ship it, and then it’s gone. It’s not like we can load that product once, or 60 times, or 600 times. So, our business is very labour intensive and obviously that requires people, it requires actual humans. Like it’s not, it’s very</i></p>	<p><i>purchase something and we choose with the amount of money that we have available to spend. Soya, I think that is a big factor for most quote, unquote consumers.”</i></p>		
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	<p><i>businesses in South Africa is we don't have a lot of the resources of sustainable packaging, sustainable shipping options. There's just, it hasn't grown big enough yet. So, we're quite limited in what we can do. Which means you've got to get very creative..."</i></p>		<p><i>difficult to scale our business without more people, and obviously more people requires more funding, and more money, and ya. It's a constant battle to be honest, in terms of loading product onto site and making sure we're reaching our sales targets and being able to cover all our expenses as a young, growing business. Um, so, labour is an asset, we have, but we need more of, and money. Um, ya, money to invest more in marketing, money to invest</i></p>			
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			<p><i>more in our tech, um, money to invest more in our stock, and our studio.”</i></p> <p><i>“South African couriers are very far behind in terms of plastic, their use of single-use plastic. Ah, we have looked at alternatives, there was one alternative, it was very expensive”</i></p>			
<p><i>Technical infrastructure</i></p>	<p><i>PB: “Coming back to actual yarn because my dream ultimately which can never happen until we change production but once production, let’s say 20 years from now, production um, changes to a point that you can, the first point of, of fibre would actually be recycled fibre. That would be the ultimate goal so that you’d then have a total closed loop”</i></p> <p><i>“Well, they need to produce better. They need to first grow better, produce better. Ah, noting there’s very, much more different opportunities, you don’t have to use polyester, you don’t have to use plastic. Ah, there are alternate fibres like hemp and pineapples and everything else”</i></p> <p><i>“We also going to, the long, long, long term is we’re going to start pulling out plastic polyester because the biggest polluter of our oceans and our water streams is not plastic bottles, it’s micro-fibres, it’s washing your clothes. So our long-term goal is to start pulling the plastic items out, like polyester, and moving them into other types of products that, that is not part of the clothing industry so nobody has to wash them. They can use them for other things. Ah, so that will be a long-term goal, that’s a challenge...”</i></p>					

*“...very expensive opportunity because it needs a lot of knowledge and it needs a lot of sorting.”*

Table 15 Business practice changes for increased competitiveness

	Education and Communication	Organisational
Participant C	<p><i>"it's to educate about the challenges. You often hear "oh, things are so expensive" when they are manufactured locally because we're paying people a decent salary to produce that garment... I think it's like, they need to be unashamed about their price point, and educate consumers as to why that [South African fast-fashion retailer] is going to be so cheap."</i></p> <p><i>"educate about the challenges."</i></p> <p><i>"businesses need to educate"</i></p>	<p><i>"we need more local producers in South Africa"</i></p> <p><i>"there is a lot of opportunity in South Africa to continue to produce, you know you've seen it in the cosmetics, I think, industry. There's been a huge boom in locally produced, consciously produced cosmetics and creams and ladies goods, and things like that, and I think it should just continue and continue to grow"</i></p> <p><i>"to be more competitive and to get your band out there more, it's all about tapping into like-minded consumers and tapping into different markets."</i></p> <p><i>"the more we collaborate with players in the sustainable food industry and the sustainable beauty industry and the sustainable what-ever-it-is industry, um, the more we are tapping into people who are thinking along those lines and I think that is, certainly for [name of business] where our competitive edge will sit"</i></p>
Participant D		<p><i>"That is our whole vision as a company, is to localise the manufacturing of such products, but currently it's not."</i></p> <p><i>"the scope of what we can recycle is increasing through."</i></p> <p><i>part of the businesses strategy is actually to localize recycling in the Western Cape"</i></p> <p><i>"the business is now moving towards localizing the recycling process. And so that will obviously mean further growth in our product line so we'll not only be selling fabric, we'll be taking the textile waste that we collect and making it into fibre, so there'll be fibre retail part of our product line. And then we'll be using the fibre to make all sorts of products as I've mentioned. And so there'll be a range of other products that we'll retail in addition to the fabric that we're currently retailing"</i></p>



Participant E	<p><i>“and way more educational to consumers around what the impacts are for purchasing this item. I think there’s a big education and communication factor that needs to happen in all product spheres.”</i></p>	
Participant I	<p><i>“the fitting room in store would be great to have like a little digital thing there that tells you the items that you can put together, give you some like umm background on the item like, this is recycled, which made from recycled fibres or something like that because therein lies more education but then also maybe opening up your consumer to purchasing more recycled things and then just explaining why it’s good for the environment and everything. Umm, instead of only having it on the actual tag. But then I do feel that we can communicate that more that we are using recycled fibres to make up garments and that sort of the story behind it.”</i></p>	<p><i>“ I think transparency is important”</i></p> <p><i>“there is a communication problem, so that should have been communicated to the people in store so that they could educate the customer, not the customer educating you know, the store staff”</i></p> <p><i>“we’re moving into 3D now. Umm, you do your CAD, but it's very much it's 3-dimensional, and it's like you can fit everything virtually...So instead of getting a sample, you can see everything and you can literally go into your pre-production sample and then only give two samples. But the thing is that before we get to that stage, we can trust that the supply is gonna send us the proper thing, we have to actually, we have to fit a digitally, virtually and make samples until we get that fit right and until we can say okay, this is our Bible, this is what we're going with, and then we're going to bulk from there. So that's very much still a working progress. Umm, but there is a huge drive to reduce the amount of samples because that really uses up a lot of raw materials”</i></p> <p><i>“the better cotton initiative. So how this thing works is very obviously a retailer signs up to contribute towards like having like a contract that you sign with them and then they literally track for you and they will tell you on which suppliers are actually producing the cotton in an environmentally sustainable manner. Uhm, and that they’re reducing, they’re using like less resources or less water. Whatever it is that they're doing, and so you can trace it from the cotton field, the cotton plant up to the mill, you can see like, who transported it”</i></p>

Table 16 Opportunities of environmentally sustainable practices for fibre and textile manufacturing

Fibre & Textile Production	Manufacturing	Retail	Post Initial Use Opportunities
<p>PB: <i>"We also going to, the long, long, long term is we're going to start pulling out plastic polyester because the biggest polluter of our oceans and our water streams is not plastic bottles, it's micro-fibres, it's washing your clothes. So our long-term goal is to start pulling the plastic items out, like polyester, and moving them into other types of products that, that is not part of the clothing industry so nobody has to wash them. They can use them for other things. Ah, so that will be a long-term goal, that's a challenge...It's definitely an opportunity but it's a very expensive opportunity because it needs a lot of knowledge and it needs a lot of sorting"</i></p> <p><i>"Coming back to actual yarn because my dream ultimately which can never happen until we change production but once production, let's say 20 years from now, production um, changes to a point that you can, the first point of, of fibre would actually be recycled fibre. That would be the ultimate goal so that</i></p>	<p>PB: <i>"we've been also invited to handle counterfeit in the country because at the moment, they are incinerating it. Our country doesn't want to incinerate it, they want it to be, if we can repurpose it or remanufacture it or shred it, it would be better so we are going to do that."</i></p>	<p>PA: <i>"one of the challenges especially for small businesses in South Africa is we don't have a lot of the resources of sustainable packaging, sustainable shipping options. There's just, it hasn't grown big enough yet. So, we're quite limited in what we can do."</i></p>	<p>PA: <i>"tracking the ownership"</i></p>

<p><i>you'd then have a total closed loop...So, the entire value cycle needs to change."</i></p>			
		<p><i>PC: "opportunity is that second-hand is becoming more well known"</i></p> <p><i>"it's the biggest trend right now, globally, resale, the environment, the planet. You know, everything from businesses and governments and consumers, changing their behaviour."</i></p> <p><i>"it's an upward trend internationally and it will only follow here"</i></p> <p><i>"It's perhaps allowing us to develop a website which is a custom-build which would know that the last time that you were on, you searched for a white top and you, and you know, it's that size so the next time that you shop. So the next time something comes in you automatically get a</i></p>	<p><i>PB: "Um, so the business model sustainability is relative to your reuse. Noting though, when you get really good at repurposing and remanufacturing, that game will change."</i></p> <p><i>"when we're doing now our shedding and our fibre work we will sort into further categories based on the make-up of the item. So that we can get involved in that."</i></p> <p><i>"So we are going to assist them to do it because we know how, ah but it's the sorting, cutting that's the, nobody wants to do, everybody just wants the fibre but it doesn't, you have to sort first and if you not able to sort"</i></p> <p><i>"we've been also invited to handle counterfeit in the country because at the moment, they are incinerating it. Our country doesn't want to incinerate it, they want it to be, if we can repurpose it or remanufacture it or shred it, it would be better so we are going to do that."</i></p>

		<p>triggered email saying "hello, this has come in, we see it's in-line with what you buy". You know, we'd love to go a lot more customised"</p>	
	<p>PI: "I understand that because it's a value brand that they have to use cheaper fibres, which is polyester unfortunately. But they are using recycled polyester, but I feel like there can be a merge between two of the brands within bigger organisation. Currently they are operating in silos, but if they were to just like source it from the same plant, even or mill, sorry mill, and they could share the cost and it wouldn't be as expensive."</p> <p>"we actually need to have a textile recycle bin...especially in this business, that's something that we should actually have because we work with so many little pieces of fabrics and things. Or if</p>	<p>PF: "it's [name of private school] so I want to spread this to all the [name of private school] schools because that's where I can test if this is working or not. So whatever that we missed, we can fix it one this one. So I see it across the board in all the [name of private school] because uniform is expensive."</p> <p>"it can expand and actually in all the private schools."</p>	<p>PG: "that's currently still in the pipeline because we do not currently have the capacity for that, however we do do smaller projects for us outside of providing services for us in the workshop. Like doing a fitting room curtain of offcuts, doing a pillow to sit on our chair. But those are not the services we provide until we have the capacity and resources"</p>

	<p><i>you have like a little off cut"</i></p>		
		<p><i>PI: "something needs to change there and I feel like retail is such a huge influence over everyone"</i></p>	<p><i>PI: "something that we want to do now is to, you know, like H&amp;M takes garments in"</i></p> <p><i>"this is actually a sustainability discussion right now. This is an organisation that works with the likes of [names two South African retailers]. So basically what happens is they also take all the customer returns and then they send it to this organisation and then they literally repair and then they like have people in the community sell it, etc."</i></p>

Table 17 Sustainable attributes of future clothing and textile businesses

<p>Participant A</p>	<p><i>"it's something that I'm looking at doing, partnerships with other companies is, um, repairing and refurbishing items."</i></p> <p><i>"I think we need to start having options and availability to be able to recycle material, so people, in stead of donating the items, can be, the fabric can almost be recycled and can be reused"</i></p>	<p><i>"I want to be able to offer like a 'rebuy', like a 'buy back', so if someone, for example, say buys a Louis Vuitton handbag from us, it's obviously pre-loved already so we've entered into a circularity system already, but we're taking a pre-loved. If they buy it from us"</i></p>	<p><i>"tracking the full lifecycle is a very important aspect of circularity in any, in any business."</i></p>	<p><i>" transparent, knowing exactly where every aspect of the clothing and textiles come from. Where things are manufactured, where the fabrics are sourced, keeping things very transparent."</i></p>	<p><i>"So, then they can say to their clients: "okay, so you going to buy this beautiful linen shirt with us, ah, when you don't want that anymore, instead of just throwing it away, give it back to us, and we will give you a small credit to shop with us". And whether they donate on the clients behalf, or resell, so if it's of value it can come to us and then we will do the resale but the business is offering to their clients."</i></p>
<p>Participant B</p>	<p><i>"Well, they need to produce better. They need to first</i></p>	<p><i>"Coming back to actual yarn because my dream ultimately which can never happen until we change production but once production, let's say 20 years from now, production um, changes to a point that you can, the first point of, of fibre would actually be recycled fibre. That would be the ultimate goal so that you'd then have a total closed loop...So, the entire value</i></p>			

	<p><i>grow better, produce better. Ah, noting there's very, much more different opportunities, you don't have to use polyester, you don't have to use plastic. Ah, there are alternate fibres like hemp and pineapples and everything else"</i></p>	<p><i>cycle needs to change."</i></p>
Participant C	<p><i>"transparency"</i></p>	
Participant E	<p><i>"across the spectrum products in general should all be way more mindful of environmental impact"</i></p>	
Participant F	<p><i>"I think reselling...I think, online"</i></p>	
Participant G	<p><i>"if people are going to manufacture clothes they need to make sure that after five years of manufacturing these clothes we need to go back to those places and check if those products we brought into the country, did they leave a green footprint and if they did not, we need to find a way to create a green footprint with the people who live in that country so that we can have harmony with the partnership."</i></p>	
Participant H	<p><i>"we should be getting towards the second hand vintage market. Personally, there's so much out there"</i></p>	

## Annexure B



Ethical approval

### UNISA-CAES HEALTH RESEARCH ETHICS COMMITTEE

Date: 10/10/2022

Dear Ms Page

NHREC Registration # : REC-170616-051  
REC Reference # : 2022/CAES\_HREC/151  
Name : Ms S Page  
Student #: 18070183

**Decision: Ethics Approval from  
06/10/2022 to 30/09/2025**

**Researcher(s):** Ms S Page  
[18070183@mylife.ac.za](mailto:18070183@mylife.ac.za); 083-262-0058

**Supervisor (s):** Dr L Christie  
[chrisl@unisa.ac.za](mailto:chrisl@unisa.ac.za); 011-471-2811

**Working title of research:**

**Exploring business models of clothing and textile SMEs through the lens of a circular economy**

**Qualification:** M Consumer Science

Thank you for the application for research ethics clearance by the Unisa-CAES Health Research Ethics Committee for the above mentioned research. Ethics approval is granted for three years, **subject to submission of yearly progress reports. Failure to submit the progress report will lead to withdrawal of the ethics clearance until the report has been submitted.**

**The researcher is cautioned to adhere to the Unisa protocols for research during Covid-19.**

**Due date for progress report: 30 September 2023**

The progress report is available on the college ethics webpage:  
<https://www.unisa.ac.za/sites/corporate/default/Colleges/Agriculture-&-Environmental-Sciences/Research/Research-Ethics>

*Please note the points below for further action:*



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Telephone: +27 12 429 3111 Facsimile: +27 12 429 4150  
[www.unisa.ac.za](http://www.unisa.ac.za)





1. The researcher indicates that one interview will take approximately two hours – is this correct? If so, this is quite lengthy and the researcher should allow participants the necessary comfort breaks during the interview.
2. Should some of the participants need to obtain permission from the owners/directors of the business to participate, the committee advises that these be obtained in writing and that they are submitted to the committee for record purposes.

*The **low risk application** was **reviewed** by the UNISA-CAES Health Research Ethics Committee on 06 October 2022 in compliance with the Unisa Policy on Research Ethics and the Standard Operating Procedure on Research Ethics Risk Assessment.*

The proposed research may now commence with the provisions that:

1. The researcher will ensure that the research project adheres to the relevant guidelines set out in the Unisa Covid-19 position statement on research ethics attached.
2. The researcher(s) will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
3. Any adverse circumstance arising in the undertaking of the research project that is relevant to the ethicality of the study should be communicated in writing to the Committee.
4. The researcher(s) will conduct the study according to the methods and procedures set out in the approved application.
5. Any changes that can affect the study-related risks for the research participants, particularly in terms of assurances made with regards to the protection of participants' privacy and the confidentiality of the data, should be reported to the Committee in writing, accompanied by a progress report.
6. The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study. Adherence to the following South African legislation is important, if applicable: Protection of Personal Information Act, no 4 of 2013; Children's act no 38 of 2005 and the National Health Act, no 61 of 2003.
7. Only de-identified research data may be used for secondary research purposes in future on condition that the research objectives are similar to those of the original research. Secondary use of identifiable human research data require additional ethics clearance.

8. No field work activities may continue after the expiry date. Submission of a completed research ethics progress report will constitute an application for renewal of Ethics Research Committee approval.

*Note:*

*The reference number **2022/CAES\_HREC/151** should be clearly indicated on all forms of communication with the intended research participants, as well as with the Committee.*

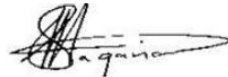
Yours sincerely,



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**Prof MA Antwi**  
**Chair of UNISA-CAES Health REC**

E-mail: [antwima@unisa.ac.za](mailto:antwima@unisa.ac.za)  
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**Prof SR Magano**  
**Executive Dean: CAES**

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Tel: (011) 471-3649

## Annexure C

### Consent form

#### **PARTICIPANT INFORMATION SHEET**

Ethics clearance reference number:

Research permission reference number:

16 July 2022

Title: Fashion Entrepreneurship: Through the lens of a Circular Economy

#### **Dear Prospective Participant**

My name is Samantha Page and I am doing research with Dr Lorna Christie, a senior lecturer in the Department of Life and Consumer Sciences towards a Master of Consumer Science degree at the University of South Africa. We are inviting you to participate in a study entitled Fashion Entrepreneurship: Through the lens of a Circular Economy.

#### **WHAT IS THE PURPOSE OF THE STUDY?**

I am conducting this research to find out what sustainable practices are occurring in fashion SME's (Small to Medium Enterprises) that are synonymous with a business operating within a circular economy. This study is expected to collect important information that could benefit South African fashion entrepreneurs and SME's. The benefits in participating in this study are to contribute to the knowledge regarding the sustainable practices occurring in South African SME's. The knowledge provided will detail the sustainable efforts of our local fashion (clothing & textile) industry and the important considerations connected to these practices.

#### **WHY AM I BEING INVITED TO PARTICIPATE?**

You are invited to participate as you'd be able to provide important information about your business, or the business that you work for sustainability practices regarding the business

model and product design. I obtained the information required to contact you through conducting a Google search of the business and companies contact details. South African entrepreneurs or knowledgeable business representatives in fashion (clothing & textile) orientated businesses are key in helping this study map the circular practices currently occurring in this sector of our local economy. This is a small study of 13 participants and your input would add value in determining what sustainable practices are occurring, operational factors of these practices and the motivation behind these practices.

### **WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY?**

The study involves collecting data through an interview whereby not more than 2 hours of your time will be required. The interview can be conducted in person (preferred) or through virtual means. In more detail, this study will investigate the sustainable practices that are occurring in the business and ask about the motivational factors in applying these practices. Your thoughts on future considerations for sustainable entrepreneurship in this sector and future projections will also be asked.

### **CAN I WITHDRAW FROM THIS STUDY EVEN AFTER HAVING AGREED TO PARTICIPATE?**

Participating in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

### **ARE THERE ANY NEGATIVE CONSEQUENCES FOR ME IF I PARTICIPATE IN THE RESEARCH PROJECT?**

There is only a potential for minor risk that would include a time risk as completing the interview may infringe on your time and a social risk as you may find some of the questions difficult to answer in light of their perceived social acceptability on the subject matter.

### **WILL THE INFORMATION THAT I CONVEY TO THE RESEARCHER AND MY IDENTITY BE KEPT CONFIDENTIAL?**

As the owner of the business, or representative of the business, your name will be asked, as well as the business' name. This information will be asked for the purpose of record keeping in the data collection phase but these details will not be mentioned in the written output of the study in any way. You have the right to insist that your name will not be recorded anywhere and that no one, apart from the researcher will know about your involvement in this research. You can insist that your answers will be given a code number. You will be referred to in this way (code number) in the data, any publications, or other research reporting methods such as conference proceedings.

Your answers may be reviewed by people responsible for making sure that research is done properly, including members of the Research Ethics Review Committee. Otherwise, records that identify you will be available only to people working on the study, unless you give permission for other people to see the records.

A report of this study may be submitted for publication but as an individual participant, your data will remain anonymous so any identifiable information will not be used within such a report.

### **HOW WILL THE RESEARCHER(S) PROTECT THE SECURITY OF DATA?**

Hard copies of your answers will be stored by the researcher for a period of five years in a locked cupboard for future research or academic purposes; electronic information will be stored on a password protected virtual cloud network. Future use of the stored data will be subject to further Research Ethics Review and approval if applicable. Hard copies of the data will be shredded and electronic data will be permanently deleted after the required research storing period has been reached.

### **WILL I RECEIVE PAYMENT OR ANY INCENTIVES FOR PARTICIPATING IN THIS STUDY?**

There is no payment for participating in this research study and the cost of meeting (transportation or internet) will be incurred by the participant.

### **HAS THE STUDY RECEIVED ETHICS APPROVAL**

This study has received written approval from the Health Research Ethics Committee of the College of Agriculture and Environmental Sciences, Unisa. A copy of the approval letter can be obtained from the researcher if you so wish.

### **HOW WILL I BE INFORMED OF THE FINDINGS/RESULTS OF THE RESEARCH?**

If you would like to be informed of the final research findings, please contact Samantha Page on 083 262 0058. The findings will be accessible from December 2023 - 2025. Should you require any further information or want to contact the researcher about any aspect of this study, please contact Samantha Page telephonically (083 262 0058) or via email ([forasphaltyoufckers717@gmail.com](mailto:forasphaltyoufckers717@gmail.com)).

Should you have concerns about the way in which the research has been conducted, you may contact Dr Lorna Christie using [christl@unisa.ac.za](mailto:christl@unisa.ac.za) or 011 471 2811. Contact the research ethics chairperson of the CAES Health Research Ethics Committee, Prof MA Antwi on 011-670-9391 or [antwima@unisa.ac.za](mailto:antwima@unisa.ac.za) if you have any ethical concerns.

Thank you for taking time to read this information sheet and for participating in this study.  
Thank you.

A handwritten signature in black ink, appearing to read 'S Page', with a stylized flourish above the 'S'.

Samantha Page

## CONSENT TO PARTICIPATE IN THIS STUDY

I, \_\_\_\_\_ (participant name), confirm that the person asking my consent to take part in this research has told me about the nature, procedure, potential benefits and anticipated inconvenience of participation.

I have read (or had explained to me) and understood the study as explained in the information sheet.

I have had sufficient opportunity to ask questions and am prepared to participate in the study.

I understand that my participation is voluntary and that I am free to withdraw at any time without penalty.

I am aware that the findings of this study will be processed into a research report, journal publications and/or conference proceedings, but that my participation will be kept confidential.

I agree to the recording of the interview.

I have received a signed copy of the informed consent agreement.

Participant Name & Surname..... (please print)

Participant Signature.....Date.....

Researcher's Name & Surname.....(please print)

Researcher's signature.....Date.....



## Annexure D

### Interview Guide

Interview #x

Business pseudonym:

Introductory remarks:

Good day,

Thank you for agreeing to participate in this interview. Please read through and sign the consent form before we begin.

There are a few things to keep in mind during this discussion,

1. Your participation is completely voluntary, and you can withdraw at any given time should you wish to, without explanation and or any penalties
2. Your participation will remain anonymous, and no personal information will be required from you.
3. Your responses will remain confidential, and will only be used for research purposes, not for any commercial endeavors.
4. There is no right or wrong answers, no right or wrong way of doing things either, we are only interested in your opinion, and how your business operates.

These are the studies objectives that speak to the questions and our discussion:

Research Objective 1: To investigate what circular strategies feature in clothing and textile SME business models.

Research Objective 2: To explore the reasons why the circular strategies feature in the clothing and textile SME business models.

Research Objective 3: To explore the challenges and opportunities of current and future circular strategies in clothing and textile business models.

Ok, now we can begin.

Tell me some of the basic information about your business:

- 1.1 How long has the business been in operation?
- 1.2 What are the businesses primary products and services offered?
- 1.3 Does the business offer B2B or B2C product offering, or both?
  - 1.4 Have the businesses products and services changed since the business began? In what ways and why?

Objective 1: To investigate what circular strategies feature in clothing and textile SME business models. (don't read to the participant)

- 2.1 Do you know what circular strategies in a business entails? If so, can you please elaborate?
- 2.2 Have you ever hear of the 9R framework? If so, can you please elaborate?

If the answer is 'no' to these questions. Then mention the following:

The 9 R Framework refer to the concepts of recycle, reduce, refurbish, refuse, remanufacture, repair, repurpose, rethink and reuse. I am sure that you have heard of these, and that you might even be familiar with some in your operations. Now that we have named them,

3.1 Which of the sustainable practices from the 9R framework occur in this business?

3.2 How do these concepts occur within your business model.

Prompts to ask should participant not freely chat about the question:

5.1 Describe the process of the practice? (Where does the process begin? What steps are involved? What is the final step of the process? What are the key activities to this process?)

5.2 What assets (human, intellectual, financial and physical) are required for this process?

5.3 How did the practice begin within the business?

5.4 Has the practice developed or changed since it first occurred in the business? If so, how has it changed? What were the motivational factors for the changes, if applicable?

5.5 If there are more than one practice occurring in the business, are they connected in some way or are they interdependent? How are the practices connected? What benefits are there to the connection? Is there a motivation for the connection?

5.6 Does the circular practice require collaboration of some sort or industry partner/s? Who are the collaborators/partners and how do they contribute to the practice occurring within this business? How do they benefit from the collaboration/partnership?

Objective 2: To explore the reasons why the circular strategies feature in the clothing and textile SME business models. (don't read to the participant)

4.1 What was the motivation for incorporating the practice within the business model?

You can talk about individual R's or you can discuss these functions as a whole.

4.2 What is the perceived benefit for your business?

4.3 Who else do these practices benefit?

Prompts to ask should participant not freely chat about the question:

Can you think of any financial, environmental or social benefits that such practices hold?

Objective 3: To explore the challenges and opportunities of current and future circular strategies in clothing and textile business models. (don't read to the participant)

5.1 What challenges and opportunities are there to the afore discussed sustainable practices for the business?

For your business, and other clothing and textile businesses.

5.2 What factors inhibit the business from increasing the sustainability of the business enterprise?

Then lastly,

6.1 What should future product and services of clothing and textile businesses be?

6.2 How should clothing and textile business models change and adapt to be more competitive?

Thank you for your participation.

## Annexure E

# South African Association of Family Ecology and Consumer Sciences Abstract and Acceptance Letter

## Abstract

The issue of the current unsustainable economic system has become the focal point of scientists, environmentalists, and global policy makers (Geissdoerfer et al. 2017) and there have been calls for a transition for a more sustainable economy in response to increasing concerns about resource overconsumption, environmental degradation, and social inequality (Adams et al. 2016). Like the bigger economic model the clothing and textiles industry is a major contributor in the decline of our natural world, from both a social and environmental standpoint (EMF 2017). While global resources are under pressure, the South African economic sectors and value chains are experiencing the same rapid diminishing of resources. A Circular Economy is proposed to enable increasing sustainable resource use (Godfrey 2021) and, for South Africa, is poised to provide opportunities for low-carbon, sustainable and resilient economic growth with a future-proof economic system to address South Africa's three prominent challenges of social and economic inequality, poverty, and unemployment (Nahman et al. 2021). As there have been calls for research into the implementation of or transition to circular economy (Govindan & Hasanagic 2018), monitoring existing endeavours is fundamental for advancing CE (Ghisellini et al. 2015). In response, this study used Potting et al. (2017) 9-R Framework to investigate environmentally sustainable practices of business's product or services product chain. Moreover, motivational factors to include the said practices were investigated, along with barriers that these business face and considerations for better clothing and textile businesses. This study employed an interpretivist paradigm in the investigation of the practices of South African clothing and textile MSMEs (Micro Small Medium Enterprises), following a qualitative research design with in-depth interviews of a sample of 9 MSMEs (Micro, Small, Medium Enterprises). Non-probability sampling was used to select the research population based on the sustainability practices featuring in their businesses product chains (Crossley & Rautenbach 2021; Ritchie et al. 2003). The strategies (practices) of the 9-R Framework were used as the selection criteria to investigate a diverse collection of businesses that had a range of clothing or textile products or services with environmentally sustainable attributes. Participants were interviewed and data analysis used an inductive approach. It was found there was always more than a singular R practice occurring within each business product chain, addressing

different levels of sustainability (R0-R8) (Potting et al. 2017). Practices that enabled smarter product use and manufacture were often found to link to practices that extended the lifespan of the clothing and textile products and their parts. The most commonly found practice of Reuse, was frequently enabled through product sharing and re-selling of a second-hand item. Repair was always found to be connected to practices of Reuse. Practices of Repurpose incorporated innovation as the application or use of the raw materials was unconventional. Most businesses had linear product chains with two of the participant businesses having circularity of resources within their product chains. The requirement of collaboration emerged in order for the sustainable practices to take place, collaboration from users, suppliers and stakeholders. Most of the representatives of the businesses cited motivational factors that had a sustainable development agenda for incorporating the environmentally sustainable practices. Therefore, this alluded to a strong personal motivation to action the sustainable as being a critical requirement for businesses that practice environmental sustainability. Sustainable initiatives of using upcycled textiles for production; materials with select fibre compositions; materials with environmentally sustainable attributes; garment repair and take-back's were found to be in common with Swedish fashion brands (Brydges 2021), and other clothing and textile businesses. By way of challenges impeding businesses of this nature, the lack of education around sustainability surfaced, while there are infrastructure limitations and lack of support from financial institutions. There was also a lack of environmentally sustainable supplies and services that formed part of key partnerships of the participants. Projections for clothing and textile business and their product/service offering dealt with themes of take-back systems, regenerative fibre and business models that centred around reuse and product sharing. The current project holds practical implications for businesses through showcasing what R principles can be incorporated at various of the design and implementation stages of a business model to promote circularity. Additionally, the project also contributes a theoretical component to literature that provides an insight into this under-researched area.

## Key words

Clothing and Textile; Fashion Industry; Sustainable Fashion; Sustainable Business Model; Sustainable Transition

# Acceptance Letter

SAAFECS 2024 abstract acceptance letter

Abstract no 24057



22 November 2023

Dear Dr Truter and Ms Page

Thank you for submitting an abstract for the 16<sup>th</sup> International SAAFECS Conference in conjunction with IFHE Africa to be held in Cape Town, 13 to 15 March 2024.

I am pleased to inform you that your abstract with the title: **Through the lens of a Circular Economy: An investigation of South African MSMEs product chains**, has been accepted for **oral presentation** at the conference.

Please check the correctness of the i) language, ii) references, and iii) author details in the abstract.

You must submit the **final abstract** by sending it to Prof Corrie du Preez: [dupreezc@unizulu.ac.za](mailto:dupreezc@unizulu.ac.za) by **31 January 2024**. When submitting the final abstract, please add the details of the presenter and other authors where indicated.

**Presenting authors must be registered for the conference** to be included in the conference program. Conference registration can be accessed through the [conference website](#).

**The deadline for registration and payment is 1 March 2024**. Should you not be able to make payment on or before then, please email [info@behella.co.za](mailto:info@behella.co.za).

For any conference enquiries you may contact Dr Cate Molotja at [saafecs.org@gmail.com](mailto:saafecs.org@gmail.com) or Dr Lorna Truter at [christl@unisa.ac.za](mailto:christl@unisa.ac.za).

We are looking forward to your presentation at the SAAFECS conference.

Prof Corrie du Preez  
SAAFECS EXCO interim vice president.



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