Cape Peninsula University of Technology

THE EXPLORATION OF REMANUFACTURING AND UPCYCLING IN THE CAPE TOWN FASHION MANUFACTURING INDUSTRY

by

NTHABELENG MONYAKI

Thesis submitted in fulfilment of the requirements for the degree

Master of Technology: Design

in the Faculty of Informatics and Design

at the Cape Peninsula University of Technology

Supervisor: Ms Ryna Cilliers

Cape Town
December 2022

Declaration

I, Nthabeleng Caroline Monyaki, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signature:  **Date:** 20/02/2023

Acknowledgements

I wish to thank:

- God Almighty, who held my hand through this journey and kept me sane and focused.
- My parents, Mr Tsidiso Monyaki and Ms Nocawe Maureen Monyaki who kept encouraging me to push through.
- Last but not least, my main supervisor, Ms Ryna Cilliers, who derserves all the credit for her efforts, her time and absolute resilience during my period of studies.
- I would like thank every other contributor to this thesis.

Dedication

I would like to dedicate this thesis to my late grandmother, Leticia Nomakhaya Tshika, who left me early this year while I was anticipating to celebrate this milestone with her. Rest in peace mother and best friend.

Abstract

Statistics show that the average person wears a only garment seven times before throwing it away (Eco Friendly Habits, 2021). Due to global concerns regarding the fashion industry being the cause of depletion of natural resources, discussions of sustainable fashion have been emerging since the 1900s. The topic of this study is the exploration of remanufacturing and upcycling in the Cape Town fashion manufacturing industry.

The research has been conducted in response to the research gap in these sustainable practices within the local (Cape Town) apparel manufacturers. Hence, the aim of this study was to explore current practice and existing perception towards recycling practices, with a focus on remanufacturing and upcycling in the Cape Town manufacturing industry. The multiple-case study included owners from two small niche market businesses, one marketing consultant for major local clothing retailers, two local independent designers, and a team leader in the product development department of a significant local outdoor wear retailer. The study adopted the Circular Economy (CE) framework and further developed a data analysis framework (Hugo et al., 2021). The newly-developed conceptual framework aims to establish barriers and drivers (factors) that may have an influence on the adoption of sustainable manufacturing practices. The Theory of Constraints was adopted to identify one significant barrier and further adapted to identify the major driver to the adoption of sustainable manufacturing practices.

Considering the barriers to the adoption of circular practices, the results show a significant gap in education regarding sustainable manufacturing practices such as remanufacturing and upcycling in South Africa. Funding emerged as the main driver of sustainable practices. An important finding on a broader perspective of the circular fashion system in terms of developing and developed countries reveals that the significance of circularity in the Global South and the North is centred on different priorities. In fact, circular fashion in the Global South is founded on social benefts rather than the environment. However, the most crucial results show that the move towards a circular fashion in South Africa, Cape Town, will require all aspects of sustainable development that consider the people, the planet as well as profit.

Keywords: Fast fashion, remanufacturing, upcycling, manufacturer, sustainability, sustainable manufacturing practices, sustainable fashion, recycling, reuse, circular economy, linear manufacturing system, consumption, consumerism, environment.

Table of Contents

List of Figures

List of Tables

Clarification of terms

Term	Clarification
Consumption	The act of using up goods, by means of utilisation, decay, or by destruction (Anon., 2021).
Channel choice	Citizens' and companies' choice of channels through which they interact with government and move users towards the most affordable channels (Madsen & Kræmmergaard, 2015).
Circular economy	Such business models entail two groups: one that houses reuse and prolong lifecycle by refurbishment, and one that converts worn out products into new units (Stahel, 2016:435).
Liberalisation	Exposes local businesses in emerging economies to international competition and global ventures to head to an improved distribution of resources, which may lead to manufacturing developments (Topalova & Khandelwal, 2011:995; Topalova, 2011:995).
Linear manufacturing system	The existing economic standing is focused on a linear economy where factories produce goods that customers use and discard. This manufacturing model causes raw material loss such as energy wastage and disruption of environmental systems (Michelinia et al., 2017:2).
Manufacturer	One who produces goods through machinery on a large or industrial magnitude (Collins, 2021).
Post-consumer textile waste	Post-consumer textile waste comprises of any type of garment or home products thrown away due to being old worn out (Eryuruk, 2012:24).
Recycling	Recycling is utilised to grow sustainability of fashion manufacturing. It is a strategy of gathering and sorting materials that would be discarded as rubbish and making it into new items (Cimattia et al., 2017:397).
Remanufacturing	The process of a worn-out item is taken apart entirely. Salvaged parts are restored, and the product is put together from used parts to create a product similar to and possibly of higher quality than the original item (Dissanayake & Sihna, 2010:5).
Reuse	As described by EU WFD (European Union Waste Framework Directive), it is the process in which units that are not used may be reused for the same intention for which they were made (Castellani et al., 2015:373).
Sustainability	"Conserving an ecological balance by avoiding depletion of natural resources" (Vadicherla et al., 2017:1).
Sustainable manufacturing	The making of goods through economically-sound systems that reduce negative environmental effects while protecting energy and natural resources (United States Environmental Protection Agency, 2020).
Upcycling	A strategy relevant to fashion manufacturing, where worn-out materials are used to design and create products of higher value, keeping their lifecycle longer (Han et al., 2017:72).

Term	Clarification
Waste hierarchy	The “waste hierarchy” comprises of five interventions: “prevention, preparing for reuse, recycling, other recovery (e.g. energy recovery) and disposal” (Pires & Martinho, 2019:298).

Abbreviations

Abbreviation	Full word/term
AfCFTA	Africa Continental Free Trade Area
CE	Circular Economy
CTCPIP	Clothing and Textile Competitiveness Production Incentive Programme
CTFL	Clothing, Textiles, Footwear & Leather
CTFLGP	Clothing, Textiles, Footwear & Leather Growth Programme
DTIC	Department of Trade, Industry and Competition
GDP	Gross Domestic Product
OEM	Original Equipment Manufacturer
PCTW	Post-Consumer Textile Waste
R-CTFL	Retail-Clothing, Textiles, Footwear & Leather
UK	United Kingdom
US EPA	United States Environmental Protection Agency
WTO	World Trade Organisation

Chapter 1: Introduction

1.1 Introduction

The fashion industry is known to be the second biggest polluter in the world (Niinimäki et al., 2020) as well as a major contributor to the depletion of the world's natural resources (Jestratijevic & Rudd, 2018:220). Therefore, this study is grounded upon such global concerns, regarding unsustainability issues in the fashion industry. As a result of these prevalent unsustainable practices that have long existed in the industry, the idea of sustainable fashion has been viewed as unattainable. Previous research has labelled the concept of sustainability in fashion as an oxymoron (Black, 2011; Benzidia, 2018), as its processes and existing systems clash with the goals of sustainability. Furthermore, many (Hur & Cassidy, 2019; Jestratijevic & Rudd, 2018:220) have similarly identified the complexities in raw material sourcing and garment manufacturing processes making it very challenging to achieve what can be called sustainably-produced fashion.

The research aims to explore current practices and existing perceptions of sustainable manufacturing with a focus on remanufacturing and upcycling in Cape Town clothing manufacturing. The study used an exploratory case study approach to structure the research alongside data collection methods such as semi-structured interviews to gain insight into the under-researched phenomenon. The Literature review provided background information and validation into the existing gap of knowledge regarding the existence of these sustainable manufacturing practices in South Africa (SA). Six cases were selected from the Cape Town fashion manufacturing population to understand their behaviours, views and real-life experiences regarding the adoption of sustainable manufacturing practices. Some are owners of small niche-market businesses and some occupy positions in major local retail houses. A further focus of the study was to establish the barriers and drivers to the adoption sustainable manufacturing practices.

In general, the analysis revealed the following findings: i) the perception of a significant barrier to the adoption of sustainable manufacturing practices as a lack of education; ii) the high cost of sustainability was identified as the reason behind the reluctance of many manufacturers towards the adoption of sustainable manufacturing practices; iii) lack of access to government support was another key issue across the cases; and iv) uncertainties and concerns regarding the scale at which sustainability would thrive locally.

This chapter introduces the topic and unpacks these issues by exploring the underlying factors that have led to current state of the South African fashion industry. The theoretical framework

guides the entire study's direction. The delineation of the research, the significance of the research and the thesis outline are presented last.

1.2 Statement of the research problem

In recent years, the South African government launched initiatives and programs to support the regeneration of the clothing and textiles industry, explicitly dedicated to its ability to compete globally with cheap imports. Even so, the industry remains strained (Iordanescu & Cuc, 2015:157). Various studies (Fletcher & Williams, 2013; Niniimaki, 2018; Subramanian et al., 2016; The Ellen McArthur Foundation, 2017) have uncovered alternative systems and strategies to mitigate the environmental consequences resulting from the unsustainable practices of fast fashion imports. The need for a fashion industry that is sustainable from both an economic and environmental perspective has been acknowledged by local organisations like the South African Fashion Council. The council calls for a fashion industry where "…fashion is repaired, reused, recycled and upcycled" (Cape Town Fashion Council, 2020b).

On the other hand, the current studies have investigated the vast second-hand clothing market in Africa but further use of these existing clothing which are highly consumed and discarded shortly after use, has not been fully exploited. This lack of available knowledge gap regarding sustainable manufacturing practices points to further studies in this field.

While existing literature (Han et al., 2017:70; USITC, 2013) states that in the global North, the adoption of reuse and repurposing practices have been a rapidly growing trend as a means of being sustainable, the Global South is challenged with more pressing issues such as massive unemployment, food shortages, and education (Blissick et al., 2017:266), and sustainability may be viewed in a different light. Furthermore, available research (Khurana & Tadesse, 2019:4; Schröder et al., 2019) has presented evidence of sustainability in different perceptions, centred on the different priorities of the Global North and Global South. Therefore, to understand perceptions and behaviours as well as barriers and drivers in this specific context, the study focuses on the under-researched current practices of sustainable clothing manufacturing in the Global South.

While existing literature (Han et al., 2017:70; USITC, 2013) states that in the global North, the adoption of reuse and repurposing practices have been a rapidly growing trend as a means of being sustainable, the Global South is challenged with more pressing issues such as massive unemployment, food shortages, and education (Blissick et al., 2017:266), and sustainability may be viewed in a different light. Furthermore, available research (Khurana & Tadesse, 2019:4; Schröder et al., 2019) has presented evidence of sustainability in different perceptions, centred on the different priorities of the Global North and Global South. Understanding sustainable fashion production techniques in the Global South needs much

more research. Studies have looked into the enormous market for used clothes in Africa (Brooks & Simon, 2012:1273; Brooks, 2015:290; Khurana & Tadesse, 2019:4), but there are few opportunities to reuse the clothing that is currently being heavily consumed and thrown soon after usage (St. John James and Kent 2019:4). Furthermore, only a few researchers have focused on upcycling and remanufacturing processes in Africa (Shaw, 2013; Ericsson & Brooks, 2014; St. John James & Kent, 2019:7). These studies have not, however, specifically addressed the drivers and obstacles in this region. According to Guldmann's study from 2016, while textile collection programs are available in wealthy nations, no similar programs exist in poor nations. Therefore, in order to understand perceptions and behaviours as well as barriers and drivers in this specific context, the study focuses on the under-researched current practices of sustainable clothing manufacturing in the Global South.

1.3 Background of the research problem

After liberalisation in the 1990s trade between South Africa and international markets was permitted. South Africa had to now compete with international production. This led to major deterioration in production output as it competed openly with cheap imported products from China, known for low labour costs and having the latest technologies. The result was factory shutdowns and inevitable unemployment (Edwards et al., 2013:447, 456).

By 2009, China had become a major exporter of manufactured products into South Africa and has been thriving in this regard (Dhurup, 2014:168; Umezurike et al., 2017:124). Unemployment numbers continued to drop tremendously in the apparel industry, resulting in a 46% shrinkage of labourers between 2003 and 2013 between 2003 and 2013 (Morris & Barnes, 2014:2).

In 2009 the Clothing and Textile Competitiveness Improvement Programme (CTCIP) was initiated to resuscitate the domestic clothing manufacturing sector as well as stimulate employment (Department of Trade, Industry and Competitiveness: Republic of South Africa, 2020). Furthermore, a government developmental institution labelled, the Clothing, Textiles, Footwear and Leather Government Plan (CTFLGP) and the implementation of the Retail-Clothing, Textiles, Footwear & Leather (R-CTFL) ‘Masterplan’ were established as means to stimulate local employment as well as eliminate illegal trade and imports (CTCP, 2020). There could not have been a better time for the government’s involvement in supporting clothing manufacturing firms, especially since South African factories that performed poorly in 2018 include those involved in the production of textiles and clothing (Boucher, 2019). Furthermore, the Clothing and Textile industry is a major contributor to South Africa’s economy (Dhurup, 2014:169). More recently, the R-CTFL Masterplan was founded and officiated in November 2019. This was put in place as a major backer of the economy and overall job creation.

According to the DTI's findings in 2020, 85 billion clothing products have been allocated to local production such as Pepkor and TFG (Department of environment, 2020).

These interventions to improve SA's clothing industry did not seem enough. In 2015 there was a further decline of close to 80,000 jobs. This displayed a 70% of total decrease of available jobs due to production reductions resulting from increased imports (Edwards et al., 2013:447, 456). As if this was not enough, the South African Textiles and Clothing sector also experienced its fourth successive year of production decline, decreasing by less than 3% in 2018. This means that with all efforts of the government, the industry remains vulnerable to cheap imports, and top retailers such as H&M and Zara have been at the forefront of this fast fashion (Business Partners (ZA), 2014). For local manufacturers, striving for commercial competitiveness had led them into perpetuating the same perpetuating the same linear production models that negatively impact the environment (Cuc et al., 2015:157). These linear production models have given birth to fast fashion that is centred on speed, unfair trade and low labour costs, perpetuating the eagerness for the newest products daily, which, which ultimately means discarded garments (Signé et al., 2018:3). This compulsive consumption has been reflected in the yearly growth in clothing sales from 2010 to 2015 in developing countries in Africa among the middle class (Iordanescu & Cuc, 2015:157; Signé et al., 2018:3). The after-effects of this economic liberalisation in SA are currently evident in the former clothing factories widespread around Cape Town's Salt River neighbourhood, which have been transformed into international call centres or are just sitting empty (Lowitt, 2007:36; Hoskins, 2015).

Fast fashion is said to be accountable for global environmental issues (Yuyingliu, 2017), as studies conducted in 2017 predicted an increase of 811% between 1960 and 2015 in textile waste (United States Environmental Protection Agency, 2020). In South Africa, a study by Jordeva et al. (2018:13) displays only 7,6% of mass-production clothing manufacturers sold their discarded waste, while many (62,1%) disposed of it into landfills. Although the argument for environmental policies such recycling, resource conservation and reuse seem fairly promising, studies (Department of environment, 2020:11; Nahman, 2021) have revealed that talks of moving from linear manufacturing patterns to closed-loop model systems are still feeble. This attachment to linear production models is because, the Clothing and textiles sector in South Africa mainly considers the nation's social issues, like high poverty levels, high unemployment, and wealth inequality which are seen to be more pressing issues than ecological depletion and contamination (Blissick et al., 2017:93-94). Further studies (Blissick et al., 2017:93-94; May, 2019) suggest that while the circular economy fashion is a growing trend in the Global North, it is still foreign in the Global South nations such as South Africa.

The Ellen McArthur Foundation has advocated for the development and implementation of the concept of Circular economy internationally. The Ellen MacArthur Foundation has been the advocate for the CE concept globally and has contested against linear business models, spreading its influence in industries, including the clothing and textiles industry. According to this foundation, should the apparel industry continue in this current manner of consumption and landfilling, its contribution to global pollution will significantly rise by 2050 (The Ellen McArthur Foundation, 2017:17). The linear manufacturing model brings excessive resource depletion and therefore, the call for an alternative economic model is inevitable (Michelini et al., 2017:2). This call has been taken up by the Cape Town Fashion Council initiative in its fashion revolution campaign, which was founded following the Rana Plaza tragedy in 2013. One of their main aims is to eliminate the throw-away culture and move towards zero-waste processes and a fashion industry that "… never unnecessarily destroys or discards but mindfully redesigns and recuperates in a circular way..." (Cape Town Fashion Council, 2020b).

Existing studies (Michelini et al., 2017:2, 5; Niinimäki et al., 2013:15) suggest that contrary to the linear model, the circular economy pays attention to the end-use of products and might address the issues caused by the linear production model through recovery and regeneration of materials. An interest in sustainable design and manufacturing models has been implemented through practices such as remanufacturing and upcycling in the global North (Hugo et al., 2021) however, much remains to be explored regarding the understanding of these sustainable manufacturing practices and current practices Global South nations such as South Africa.

1.4 Research questions

The research was directed by the following primary research question (PRQ) and research sub-questions (RSQs):

PRQ: What are the dynamics that influence the adoption of sustainable manufacturing practices, such as remanufacturing and upcycling in selected apparel manufacturing companies in Cape Town?

RSQ 1: What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry?

RSQ 2: What are the factors influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry?

RSQ 3: How are the identified factors related across the cases?

1.5 Objectives of the research

Given the inadequacies in existing literature on sustainable manufacturing alternatives within a local context, which may contribute towards an understanding of the drivers and barriers towards the implementation of sustainable strategies, this research aimed to explore current practice and existing perception towards sustainable manufacturing with a focus on remanufacturing and upcycling in the Cape Town fashion manufacturing area.

This research study endeavoured to achieve three objectives:

- To ascertain current practice of sustainable manufacturing in the fashion industry locally.
- To determine the perceived barriers and drivers to the incorporation/adoption of sustainable practices from a manufacturing perspective.
- To understand the dynamics between factors that might influence the adoption of sustainable manufacturing practices.

1.6 Theoretical framework of the study

The study was guided by the Circular Economy (CE) model to understand the focus of the study. CE endeavours to maximise a product's life cycle, from its origin to manufacturing and consumption to disposal (Mishra et al., 2020).

The framework was developed by combining two studies by de Jesus and Medonca (2018) and Hugo et al. (2021). designed specifically towards establishing barriers and drivers that might influence the adoption of sustainable manufacturing practices in fashion. Through the newly-developed framework, a qualitative content analysis approach was used to transform the huge amount of data into themes and subsequent results.

Furthermore, the study adopted The Theory of Constraints (TOC), developed by an Israeli Physicist, Dr. Eliyahu Moshe Goldratt. TOC aims for continuous improvement thorugh identifying a significant limiting element (i.e., constraint) that restricts an organisation's accomplishments and systematically eliminates that restriction until it becomes a non-factor (Orouji, 2016:45). In this study, the bottlenecks or constraints to adopting remanufacturing and upcycling practices were explored to enhance the existing system for uptake of sustainable manufacturing by the South African fashion industry. The Current Reality Tree (CRT) tool was employed to establish the unfavourable effects (UE) of the existing production system.

It is important to note that the study concentrated on factors that drive and inhibit sustainable manufacturing. TOC was developed to impose limitations or obstacles but not drivers, (Puche et al., 2016:14). To identify the accelerators for the adoption of sustainable manufacturing

practices in Cape Town, the Current Reality Tree (CRT) tool/model was adapted to the drivers—from the immediate drivers through to the intermediate drivers, and finally the lead driver; this was done methodically.

1.7 Delineation of the research

Firstly, it was not part of the study's scope to investigate beyond Cape Town, which was the initial proposed research site due to its rich history as a clothing manufacturing area. Secondly, the scope of the study focused on remanufacturing and upcycling as opposed to recycling, which many may associate with the study. Thirdly, the analysis of the study was limited to the identification of Circular economy (CE) barriers and drivers to the adoption of circular economy practices in fashion, specifically for fashion manufacturers. Lastly, the outcome of the research was reported from the researcher's understanding of behaviours and attitudes of manufacturers towards remanufacturing and upcycling phenomena within the Cape Town manufacturing population. As the research was explorative, comprising six cases, the result may not be generalisable to the entire clothing manufacturing population. The sample was selected based on pre-set criteria of participants with firm background in the fashion manufacturing industry. Therefore, purposive sampling was applied. The study involved six participants. Due to the small size of the sample, the interpretation of the research findings might not be representative of the entire clothing manufacturing population's perceptions. Given the lack of existing research on the remanufacturing and upcycling phenomena in the South African fashion industry, the research was centred on available literature about the topic and the results might not fully confirm the outcome. Because of the lack of extensive experience in primary data collection, the construct of the interview script might leave room for improvement. The findings from the study of the South African fashion industry might not be generalised to other industries or other African developing nations.

1.8 Significance of the research

This study contributes to the current body of knowledge in terms of barriers and drivers of incorporating sustainable alternatives within a local context as well as innovative and profitable possibilities in the fashion industry that promise sustainable futures to manufacturers. The study provides deeper insights into barriers affecting the acceleration of sustainable manufacturing in Cape Town among clothing manufacturers. Through the identified drivers of sustainable manufacturing, the study provides possible solutions that could be applied within the local clothing production to offer the necessary support to develop a sustainable pipeline. Furthermore, the study may greatly assist in addressing the missing education regarding the implementation of sustainable strategies and provide local fashion companies with the necessary avenues or collaborations towards circularity. In the long term, this research is

intended to be of benefit to: i) policymakers and practice in terms of government; ii) further research; and iii) further development work.

1.9 Thesis outline

Chapter 1 introduces the context of the study. It briefly addresses topics of sustainable fashion production, which is the main emphasis of the study, and discusses difficulties associated with the fashion industry in terms of consumption and fast fashion. The value of this type of research has been contested as well as the research's objectives and questions. Discussions have also taken place on the study's ethical issues, limitations, and significance.

Through the lenses of remanufacturing and upcycling, **Chapter 2** delves deeper into over-consumption issues often encouraged by fast fashion. In addition, this section specifically emphasises the issues raised by the growing amount of second-hand clothing in developing nations, particularly in West Africa. Therefore, the literature review further concentrates on the current situation of the circular fashion system in South Africa and larger Africa. The chapter also covers an alternative model as a conceptual framework and the theoretical framework for developing possible solutions to issues that influence the adoption of sustainable manufacturing.

Chapter 3 defines the methodology and presents the theoretical framework of the research. The broader research design is discussed, data collection and analysis techniques are explained, and the qualitative case study research approach is justifiied. The methodological limitations are discussed, followed by elaborating on the trustworthiness of the data.

Chapter 4 presents the findings derived from the qualitative case study data, gathered through semi-structured interviews with the fashion manufacturing population sample. The objectives and research questions are centred on fulfilling the aim of the study, which is to explore current practice and existing perceptions of sustainable manufacturing with the focus on remanufacturing and upcycling. The analysis of the collected primary data took place through the coding of the interview transcripts. Through a newly-developed conceptual framework, themes and patterns were identified to form emerging meaningful categories and sub-categories, presented in the form of tables and diagrams.

Chapter 5 provides interpretations to the findings through supporting theory derived from the literature review, as directed by the constructs of this study. The outcomes are categorised under each research question and objectives, to address the results of the research objectives in particular. The limitations, implications and recommendations are discussed. The chapter concludes with possibilities for further research.

Chapter 2: Literature Review

2.1 Introduction

Textile waste management is a major sustainability challenge for any nation (Sihna et al., 2016:v). This study views sustainability in fashion design as a matter of urgency and aims to ascertain current practices and applications of sustainability in fashion and fashion production to identify key barriers and drivers. The study explores remanufacturing and upcycling practices in the Cape Town Fashion manufacturing industry. This review aims to explore the dynamics that influence the adoption of practices of sustainable manufacturing.

The selected cases for this study include three small, independent businesses that remanufacture and upcycle second-hand garments. One SME manufactures school wear and supplies for a babywear retailer. One of the cases is a marketing consultant to local retailers, and the other is a team leader for a major outdoor wear retailer in Cape Town, South Africa. Therefore, it is important to situate this topic within the wider context of sustainable fashion in developing nations and Africa in particular.

This literature review therefore focuses on situating the state of the current circular fashion system in wider Africa and South Africa. Therefore, this review draws inspiration from Pammi Sinha, Subramanian Senthilkannan Muthu, and Geetha Dissanayake's book, *Environmental footprints and eco-design of products and processes: Remanufactured fashion,* published in 2016. The book explores the mitigation of over-consumption and fast fashion through the lens of remanufacturing and upcycling is of particular relevance. Sihna pays special attention to the problems caused by the increasing volumes of second-hand and discarded garments in developing countries, especially in West Africa.

Additionally, the influences and procedures for the fashion system are considered. This study is informed by sustainable development and design models and frameworks such as the three pillars of sustainable development, the circular economy, the circular fashion system, and the end-of-life phase. Within the end-of-life phase, the focus is on remanufacturing and upcycling and what might drive or impede its adoption as the study is centred on the two specific forms of sustainable manufacturing practices. It is crucial to emphasise the significance of the three key points of the study namely: remanufacturing and upcycling, circularity, as well as design for sustainability. All the above-mentioned innovations are solutions to environmental problems, addressing resource depletion issues, which speaks to longer use of products, reuse and saving energy (Arnette et al., 2014:375; Niniimaki, 2018:17). The study adopts the Circular system model as a conceptual framework and Goldratt's Theory of Constraints theoretical framework as a solution tool to address these barriers and present the drivers.

However, it is of the essence to first define sustainability to form an understanding of it as the core of the literature. To do this, the following section starts by defining sustainable development.

2.2 Sustainable design

2.2.1 Origins of the term 'sustainability'

With increased concern for the environment, sustainable development has been defined differently. One of the earliest definitions of sustainability is "meeting the needs of the present without compromising the ability of future generations to meet their needs" (WCED, 1987:8). Even though there isn't a single definition of sustainability, this common definition is focused on the context of knowledge of the "three pillars" of sustainability (Purvis et al., 2019). The roots of the 'three-pillar' paradigm (figure 2.1) have been widely connected to the Brundtland Report, Agenda 21, and the 2002 World Summit on Sustainable Development (Moldan et al., 2012). The three pillars refer to the necessity for the interdependence of economic (profit), social (people), and environmental (planet) partnerships (Connell & Kozar, 2017:2) to stimulate the progress of changes in the current space, ensuring rapid growth in this sector's economy and also favouring not just society but the environment. The sustainable development goals (Soini & Dessein, 2016:1) have added more pillars to the original paradigm. According to Soini and Dessein (2016:1), "culture" and "politics" were also broadly discussed and debated across scientific disciplines and policy fields to add more pillars to the original paradigm. Evidence in the literature suggests the complexities attached to the notion of sustainable development due to many policymakers' definitions and narratives. However, sustainable development should be an alternative intended to address the unsustainability issues of today to eliminate the existing misunderstandings.

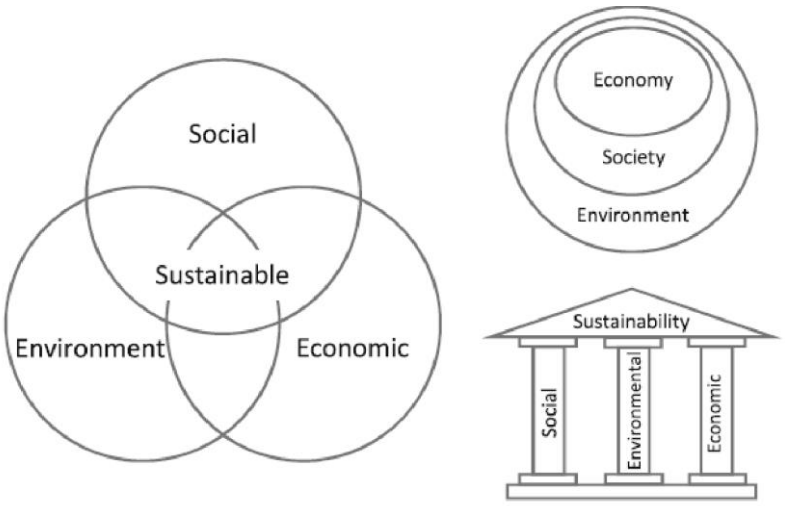


Figure 2.1: Left, a typical representation of sustainability as three intersecting circles. Right, alternative depictions: literal 'pillars' and a concentric circles approach (Rocha et al., 2019)

Jestratijevic and Rudd (2018:220) raised concerns about misunderstandings surrounding sustainability and sustainable development that various industry players have created. For example, environmentally friendly clothing was labelled as “pure”, “natural (green)”, and “recycled” in 1990s fashion publications, regardless of the manufacturing practices and the provenance of the materials, according to Fletcher (2013). In the late 2000s, Block and Paredis (2019:2) discovered that sustainability has been misunderstood as being about ‘ecological concerns’. Additionally, the researchers have further challenged the Brundtland Report’s definition of sustainability by reaffirming how “meeting needs” do not only involve a clean environment but also food, shelter, teaching, etc. (Block & Paredis, 2019). Despite the truth in these popular beliefs, this is only part of it, stated the authors. In industries, in particular, sustainability discussions often tend to be centred on the environmental aspect. The authors argue that the real issue is focused on how we can expand societies that deliver a superior quality of life in an equally environmentally beneficial manner globally. Thus, with the abundance of definitions, available literature on sustainability suggests that sustainability is not a one-dimensional development but considers the environment as well as economic and social development. Sustainable development goals also illustrate the importance of ensuring the well-being of society as well (WCED, 1987:8).

Further goals of sustainable development is to ensure that all humans are treated with dignity, both socially and economically, through common respect between all parties necessary in the manufacturing procedures (Silva Solino et al., 2020:166). There is less doubt that the three sustainability pillars, namely, economic significance, environmental price and social gain, are vital in the triumph of the sustainable and ethical fashion industry (Tsang-Ming et al., 2019:730). These views illustrate that design can and should be a key component of social shifts towards sustainability, acting as a real catalyst for and driver of innovation (Ceschin & Gaziulusoy, 2020:i). Design by itself has to introduce change that can contribute to the quality of everyday life. When sustainability is implemented in design, it awakens us to the influence the product may have throughout its entire lifespan. This would allow sustainable techniques to be used by designers and producers at all levels of product development and manufacturing (Acaroglu, 2020). The next section explores the concept of sustainability in design.

2.2.2 Defining sustainability in design

Sustainable design aims to produce goods and services that minimise negative effects on the environment, society, and the economy from the beginning to the end of the design process (Kumar, 2017:9; GSA, 2020). Adopting a sustainable design perspective essentially guides decisions at every level of the design process that will decrease adverse effects on the ecosystem and human well-being without compromising the future (GSA, 2020). This section

aims to obtain insight into the meaning of “sustainable design” and its origins, and to understand its application and relevance in today’s world.

Environmental worries first emerged in Alexander von Humboldt’s scientific investigations in botanical geography from the late 18th to early 19th century (Wulf, 2015). Humboldt was said to be the first to voice these anxieties in a design and engineering context. The earliest studies associating design with sustainability emerged in the 1970s and have received widespread recognition in academia and expert literature. Design was inspired by Rachel Carson’s 1962 book, *Silent Spring*, and James Lovelock and Lynn Margulis’ 1974 Gaia theory to investigate a proper balance between social standards and the environment (Keitsch, 2012:1). Design was greatly associated with engineering during this period and gained recognition as a marketing instrument (Swann, 2002).

Papanek’s (1984, 1995) design idea/philosophy was predicated on the understanding that design must bridge the gap between human requirements, culture, and nature. Papanek (1985:4) has been involved with various fundamentals of sustainability and practice since the mid-twentieth century. Victor Papanek’s book Design for the Real World: Human Ecology and Social Change is regarded as the key work that introduced ecological concepts into the realm of designers (Papanek, 1985).

From the 1980s onwards, there was more attention on contextualised design in the form of user participation and stakeholder involvement (Keitsch, 2012:180). Knight (2009) later defined the transition from eco-design to sustainable design/design for sustainability as one of “broadening of scope in more social-driven approaches” with the existing Brundtland definition (World Commission on Environment and Development, 1987) and early concerns regarding global resource depletion (Rocha et al., 2019:1430).

After the first definition of sustainability (WCED, 1987) in the 1980s, design was acknowledged as an area of major importance for sustainable manufacturing and consumption approaches. Later, a life cycle visualisation of products was recognised, and it was realised that damaging effects might appear from all the levels of the product life cycle, from the mining of materials to the discarding stage. This suggests that in the 1990s, products, in particular, were the main focus of the route of sustainable development because of evidence that demonstrated harmful effects on the ecosystem and society were associated with production and consumption methods stated (Ceschin & Gaziulusoy, 2016; McAloone & Pigosso, 2017).

In the late 1900s, eco-design (Brezet 1997; Brezet & Van Hemel 1997; UNEP 2006) began as an industrial strategy focused on lessening the environmental effects of each level in the product lifespan (Bhamra & Lofthouse 2007). During this era, design surfaced as a profession.

Thus its user strategies were highly based on the sustainable viewpoint that designers had the power to solve public challenges since the public was uninformed (Jackson, 2012). Similarly, Bhamra and Hernandez (2021) found that eco-design has been one of the industry's most commonly applied approaches and concepts, particularly design for sustainability. Eco-design is the main instrument in the foundation of approaches that allows for the Circular Economy (Acaroglu, 2020).

Following eco-design, 2012 saw the emergence of new concepts such as the circular economy (CE) (Ellen MacArthur Foundation, 2012) as potential answers to the linear system that is damaging to the environment (Hernandez, 2019). CE is an approach that gathered numerous concepts linked to design for sustainability and combines them systematically. Some of these previous concepts are the cradle to cradle (Braungart & McDonough, 2002), eco-efficiency (Bhamra & Lofthouse, 2007) as well as eco-design (Brezet & Van Hemel, 1997). It is to highlight this significance and the contribution of eco-design to this study as it encourages the full lifespan of a product within a circular economy context, where resources and energy are saved. All the concepts mentioned above were developed with the initial aim of achieving a sustainable lifestyle and satisfying the needs of society, measuring up to the first definition of sustainability (WCED, 1987).

The first decade of the 2000s was distinguished by the designers' increasing interest in socio-cultural sustainability, user innovation, and life value, evident in Manzini's (2003) philosophy that the shift towards sustainability will impact all dimensions of the socio-technical system in which humans live. Due to its complexity, humans will learn to cohabit sustainably, and this move towards sustainability will not be a linear evolution. Due to this design evolution for sustainability in the 2000s, the design field gave rise to innovative ideas and developed into what is seen today (Bhamra & Hernandez, 2021:3). Service and social design are two areas where the design discipline has pushed its boundaries.

Today, sustainable design has been applied to models such as the design for sustainability. It has been an increasingly thriving field of interest in research that has increased tremendously over the past 30 years (Bhamra & Hernandez, 2021:1). The first concerns about resource depletion led to the development of design for sustainability, and Buckminster Fuller's ideas and work can be linked to how production affects the environment (Fuller, 1969). Fuller coined the idea of 'Spaceship Earth', paying close attention to the boundaries of our planet. Pioneers such as Papanek and Fuller's considerations of the environment in design processes steered progress towards the concept of (DfS) Design for Sustainability (Ceschin & Gaziulusoy, 2016:2). Design for sustainability (DfS) is a "holistic design approach" to processes outcomes that emphasise human welfare (including that of future generations) and resource efficiency

as a solution to environmental problems (Kumar, 2017; Ceschin & Gaziulusoy, 2016:2; Manzini, 2020; Sapuan, 2021). In essence, DfS is argued to be an approach that could potentially address the challenges in sustainability when applied in industry, everyday life, and economies. Design for sustainability in this study has been centred on issues such as disassembly, recycling, reducing waste, and saving energy (Arnette et al., 2014:375). Secondly, DfS is an advancement of this existing response for innovation to sustainability issues of the four design models of the Circular Economy framework. In the next section, we understand the history and the relevance of Design for a circular economy that has been recently embraced as a significant part of sustainable fashion.

CE has been recently implemented as a solutions approach in various fields, such as carpentry—circularity has been implemented into an influential part of the economy in a Fab lab upholstery event/project where furniture was rebuilt. Teaching "*The Great Recovery"* has been used as an intuitive tool of change for students in schools and teachers in the classroom with less experience required (The Great Recovery, 2012-2016:13).

2.2.3 Sustainability in fashion design

The idea of sustainability in the fashion business is not new (Henninger et al., 2016:400). Jung and Jin (2014:510) trace the idea of sustainability in fashion to the 1960s when consumers gained interest in the effects of garment production on the eco-system and challenged the industry to change its ways. Recent studies reveal that eco-fashions were already prevalent in the 1990s (Karaosman, 2016:7; Henninger et al., 2016). The concept of sustainability in fashion developed over the past four decades and stressed partnerships between government and social groups (Carey & Cervellon, 2014; Connell & Kozar, 2017:2). The terms "sustainable fashion" and "eco-fashion", "green fashion" and "ethical fashion" have been used interchangeably (Black 2011; Carey & Cervellon, 2014; Khandual & Pradhan, 2019:37). Sustainable fashion is often seen as a slow fashion movement that aims to alter the current fashion system in the processes of clothes manufacture and consumption while taking the environment and the welfare of future generations into consideration (Dissanayake & Sihna, 2016:19; Wei & Jung, 2017:1570; Petrow & Leemann, 2018:18). Henninger et al. (2016:401) agree that the slow fashion movement, which is frequently considered the antithesis of rapid fashion, includes sustainable fashion. At the same time, Woodside and Fine (2019:120) dispute this assertion by pointing out that it is an alternative to fast fashion, which is associated with mass production and garbage disposal. As a result, the phrase used to describe "sustainable fashion" lacks consensus and the complexity of what can be labelled as sustainably-produced apparel (Aakko & Koskennurmi-Sivonen, 2013:20; Niniimaki, 2015:1).

Several studies (Clark, 2008; Black, 2011; Hur & Cassidy, 2019:5) have found that the concept of fashion clashes with the idea of sustainability. Black (2011) as well as Bentahar and Benzidia (2018) view the concept of fashion as rather paradoxical and sustainable and as an oxymoron (Clark, 2008; Black, 2011). These perceptions stem from fashion being pre-occupied with the newest and latest styles, which opposes the long-term viewpoint of sustainability (Walker, 2006; Bentahar & Benzidia, 2018; Choi et al., 2019).

There is the lack of understanding terminology surrounding the term “sustainable fashion” and the complexity of what can be labelled as sustainably-produced apparel. (Aakko & Koskennurmi-Sivonen, 2013:20; Niniimaki, 2015:1). Determining what constitutes a sustainable material is difficult due to resource sourcing and manufacturing practices (McDonough & Braungart, 2002). Henninger et al. (2016:410) share an example of this, stating that classifying one as a “sustainable fashion” producer when choosing leather as a raw material can be negatively perceived by animal rights groups as unsustainable.

Clark (2008) and Aakko and Koskennurmi-Sivonen (2013) argue that the concept of sustainability is far too complex due to its many facets.to normalise sustainable fashion practices. Since many natural raw materials may seem ‘organic’, they could be polluted during material extraction and within the current textile production method. Jestratijevic and Rudd (2018:220) conclude that because of the complexity of the textile supply chain with relation to the creation of material goods, sustainability in fashion is too challenging to achieve. Hur and Cassidy (2019) further state that consumers and merchants frequently find it difficult to make sustainable decisions because of the complexity of the textile and apparel production processes.

Due to its garment production and marketing techniques, the fashion industry has come under fire for allegedly taking little responsibility for addressing sustainability-related issues, such as excessive resource usage (BSR, 2012:1; Nordic Fashion Association, 2016; Henninger et al., 2017:2; Thorisdottir & Johannsdottir, 2019:2). From this, it can be deduced that distrust in the idea of sustainable fashion presents itself as a barrier to implementing sustainable manufacturing practices.

In addition to the distrust in sustainable fashion, Armstrong et al. (2016) and Connell et al. (2016:418) have presented numerous possible barriers to committing to sustainable fashion. They argue that barriers present itself on a cultural, social, and individual levels. On a cultural level, issues involve tempting fashion marketing strategies that promote the need to manufacture new and fresh clothing according to demand (Hur & Cassidy, 2019:5-6). At a social level, pointed out that consumers are heavily influenced by their peers, especially the youth, who encounter emotions of insufficiencies and unhappiness through continuous

comparison with peers or age groups. Individual barriers include a yearning for fresh or perceived-as-new merchandise, services, and encounters (Armstrong et al., 2016). Connell et al. (2016:418) have also identified difficulties for individual customers to fully remove hedonistic desires such as impulsive spending.

Despite these challenges, there has been visible progression towards change in the fashion industry's habits. In 2014, Hu found that sustainable design mattered to the fashion industry after all. This change was due to the obvious previous environmental damages, such as pollution emitted at all garment production stages (Hu, 2014:54). Sowray (2015), Dissanayake and Sihna (2015), and Henninger et al. (2016:84) all claim that this change is reflective of the beginning of an industry that is more mindful of sustainability processes. Thorisdottir and Johannsdottir (2019:2) further report that the vivid change in recent years in this sector has been driven by pressures from consumers' concern for sustainability in fashion practices. An example of this change is evident in initiatives such as H&M's 'Close the Loop' collection, made from recycled garments, promoting a sustainable fashion business strategy (Bentahar and Benzidia, 2018). Although the growing social inequalities in developing countries and environmental issues in developed nations weaken the possibility of the fashion industry becoming fully sustainable, Jestratijevic and Rudd (2018:220) have declared that these recent movements towards sustainability could support change and secure gradual improvements towards sustainability. In further promotion of sustainable fashion, Fletcher (2013) previously decreed that sustainable fashion aims to develop well-being for businesses and all stakeholders affected by manufacturing, reuse, and the discarding of garments. Henninger et al. (2016:410) also emphasise long-term relationships among fashion experts and owners for transparency as a drivers towards sustainable fashion production.

In summary, one cannot overlook the negative reputation that has been long attached to the fashion industry. The literature identifies the idea of sustainability in fashion as impossible due to its complexities and high possibilities of unsustainable practices within the various stages of production and supply. Despite this, the small changes reflected in the literature suggest the many possibilities of a circular fashion industry. Geissdoerfer et al. (2017) point out that the circular economy is often focused on closed-loop systems, although the fashion industry frequently strives for "sustainable ideals" rather than these principles. This identifies misunderstandings around the circular economy, as it is often viewed as a basic approach to ordinary waste management, which obstructs the integration of circular systems in the fashion industry.

The single study that stands out in the review is Henninger et al. (2016), *What is sustainable fashion?* This study established an academic definition of sustainable fashion by examining

the term from the viewpoint of stakeholders, e.g., consumers. This is of utmost interest as it forms a linkage with the rest of the studies that have labelled sustainable fashion upon these perceptions and misinformation as an “oxymoron” based on the difficulties that come with achieving what truly can be called sustainable fashion. This study truly resonates with this research as it rules out some drivers and barriers to adopting sustainable practices. It is no wonder education has surfaced as a barrier to implementing sustainable fashion throughout the literature. The authors have additionally stressed the partnerships between stakeholders as a driver.

However, a similar and recent study is *“Perceptions and attitudes towards sustainable fashion: Challenges and opportunities for implementing sustainability in fashion”* by Hur and Cassidy (2019). The study’s objectives were to determine stakeholders’ perspectives and opinions about sustainable fashion and the difficulties in implementing sustainable design principles. The study design is similar to this as it is subject to the participant’s responses to draw conclusions. Secondly, the study also highlights the lack of awareness regarding sustainable fashion’s impact on the practices as an internal barrier. Thirdly, the External factors inclusive of consumers behaviours (stakeholders) towards sustainable fashion, sourcing complexities, and pandemics have implemented sustainable practices in fashion unappetising to commit to, reveals the literature. In a similar and recent study, *“Fashion designers’ attitude behaviour inconsistencies towards a sustainable business model: A neutralisation theory perspective”* by Muposhi, Nyagadza and Mafini in 2021. The study examined the role of techniques influencing South African designers’ negative attitudes towards sustainable fashion. Once again, the focus was on local designers’ behaviours. The literature presents a pattern showing the existence of many definitions of sustainable fashion. Upon these numerous definitions, there was/is an emergence of misunderstandings, confusion, and consequent misinterpretations of the term. This reflects a gap in the existing research regarding the education on sustainable fashion amongst the key stakeholders. Woodside and Fine (2019:124) support this notion by stating that research on sustainable fashion is at its prime stages.

The next section focuses on the possibilities of applying a circular fashion systems concept.

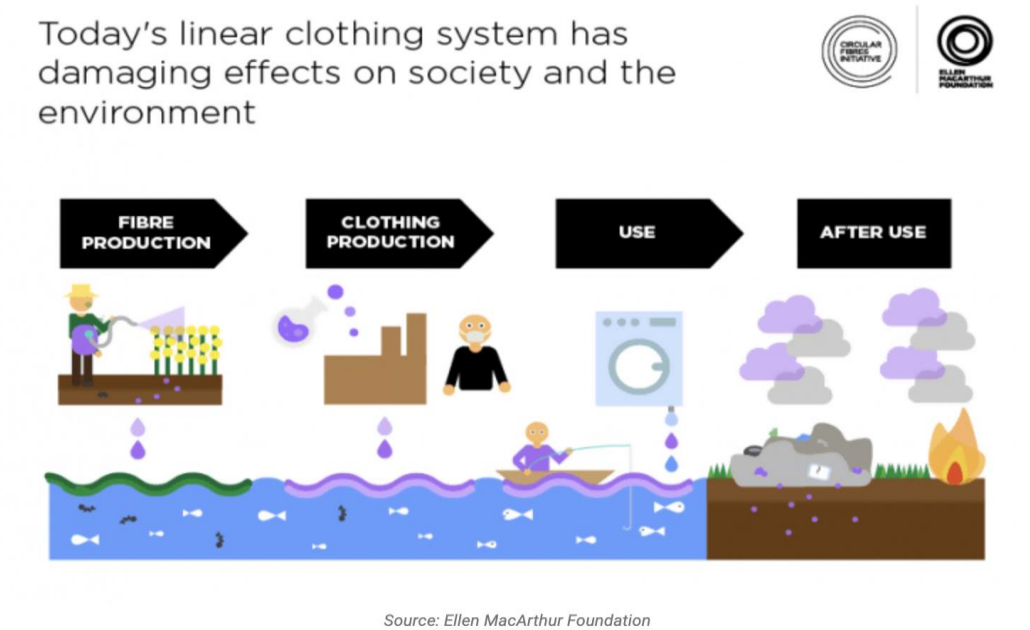
2.3 Circular fashion systems

Because the linear economy in manufacturing uses and discards products, the circular model keeps resources even longer to get the most value out of them while still being used. (Ellen McArthur Foundation, 2017). The aim of this section is to shift the focus to the positive benefits of adopting a circular fashion economy, eliminating waste from the system. It is important first to understand what circular economy in fashion is as an alternative to the traditional, linear

fashion economy. Insight into the various existing circular fashion models affords the study the opportunity to position itself within the existing body of knowledge. This section also explores the existence of Circular Fashion systems in Africa through the lens of the second-hand clothing market. In doing so, the study sheds light on the different narratives of circularity of the Global South and the Global North.

2.3.1 The circular economy and fashion

The circular economy was established as an alternative to the 'end-of-life' idea with restoration (meaning the rebuilding of material resources and energy). It moves towards the use of renewable energy, eradicating the utilisation of hazardous chemicals, which spoil the entire purpose of reuse, and intends removing waste using high-quality material design, products, strategies, as well as business models (The Ellen MacArthur Foundation, 2013:7; Michelinia et al., 2017:2). The traditional fashion system (in figure 2.2) is centred on a linear economy model, where resources are consumed to depletion (Ki et al., 2020). The application of a circular economy in fashion should cultivate a more ecological and closed-loop method where a longer life-cycle of clothing is the aim and keeping the worth of materials and products for much longer (Niniimaki, 2018:17). Niniimaki argues that for the fashion industry, a shift in the direction of a CE would involve adopting a system viewpoint of fashion, where all participants are included: "designers, producers, manufacturers, suppliers, and even consumers". The image below illustrates a linear economy model of the fashion industry.



Source: Ellen MacArthur Foundation

Figure 2.2: A linear fashion economy model (Ellen MacArthur Foundation, 2017)

This model relates to the study as it highlights the linear process of newly manufactured clothes from the early stages of resources to the end-use, the landfill. In this manner, the

researcher proposes an alternative to this model, emphasising the reuse of existing discarded garments through remanufacturing. While the linear model focuses on mass-producing new garments daily without consideration of resources, the remanufacturing process supports resource conservation by reducing the number of garments disposed of as waste, which may be incinerated or dumped at the landfill, contributing to environmental problems. Various existing frameworks assist in visualising the processes involved in a circular fashion system. These frameworks provide a conceptual understanding of how a circular fashion system might function and illustrate phases as well as the stakeholders involved. This section compares four existing frameworks and presents their differences and significance to this study.

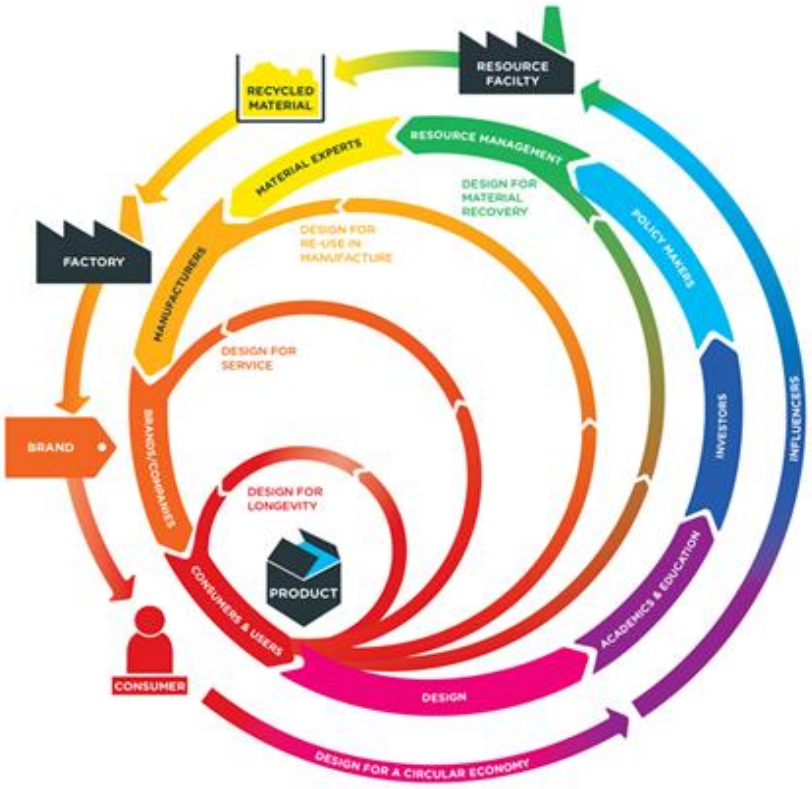


Figure 2.3: The Four Design Models for Circular Economy
(Source: RSA, The Great Recovery, 2016:34)

The diagram above presents the Four Design models for Circular Economy (DCE) (Figure 5), created by the Royal Society for the Arts, Manufactures and Commerce (RSA), as particularly well suited for use within the fashion industry. The RSA argues for four models or approaches to circular design: design for longevity, design for leasing or service, design for re-use in manufacture, and design for material recovery. The model is meant to assist designers and stakeholders in understanding who the key knowledge holders in the system are and demonstrate the routes a product may take to be created for circularity (RSA, The Great Recovery, 2013:14). The key elements of each model can be summarised as follows:

The innermost loop illustrates the *design for longevity*. This loop is highly inclusive of the consumer as a significant part of circularity. It involves designing and manufacturing durable products to meet the reuse requirements. *Design for longevity* avoids waste by producing well-made products with a longer life cycle.

The second inner loop is *design for service*, where sharing and renting are encouraged instead of brand-new purchases. Designing for service might be a critical element in a functioning circular economy. In this manner, resource material remains with the manufacturer or retailer because it is not for sale, and thus product value is still maintained.

The third outer layer presents the *design for re-use in manufacture*. Proper infrastructure is needed for disassembly, as it emphasises the necessity of deconstruction tools in manufacturing. The manufacturers must collaborate with the designer to form small business relationships towards a sustainable chain. The manufacturer receives detailed information regarding the prior use of the used item.

The fourth outer layer depicts the *design for material recovery.* This strategy involves the flow of products back into recovery after use. There must be proper information for material to flow easily during this process, and it needs a thorough check of material detail at every level.

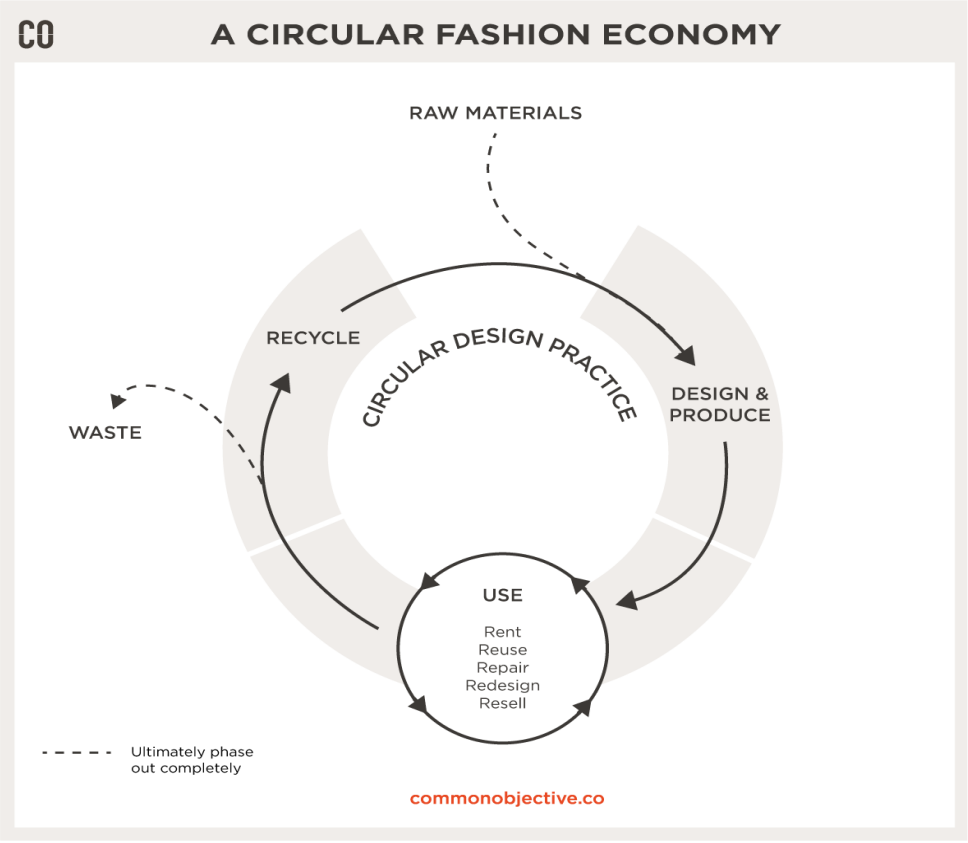


Figure 2.4: A circular fashion model as viewed by commonobjective.com (Lissamen, 2019)

A model by Common Objective, a business network for the fashion industry (Lissamen, 2019), illustrates a simplified version of circular design practice. It comprises three segments, namely: design, use and recycle. Raw material sourcing is featured prior to design and manufacture. This model pays significant attention to the end-use of the garment, as well as incorporating features of consumption. Interestingly, the end-use of the product is not placed as the final phase of the circular model, with the last segment presenting a closed-loop-system with the waste being put back into the system through recycling.

Figure 2.5: A circular fashion system inclusive of recycling from onlineclothingstudy.com (Sarkar, 2019)

The model is from an online resource for learning apparel manufacturing (Sarkar, 2019). It also emphasises a simplified closed-loop system. It divides the end-of-life phase into repair, remake, and reuse and ends with recycling at the discarding stage. This model includes the manufacturing stage and the beginning stage of sustainable products. It differs from the previous model as it illustrates the role of the retailer in distributing fashion products to the consumer. All these segments are representative of the stakeholders and key collaborations necessary for a shift to a fashion system that is circular. It is of interest to this study as it identifies the importance of the retailer's role in the path towards circular fashion before the product reaches the consumer.

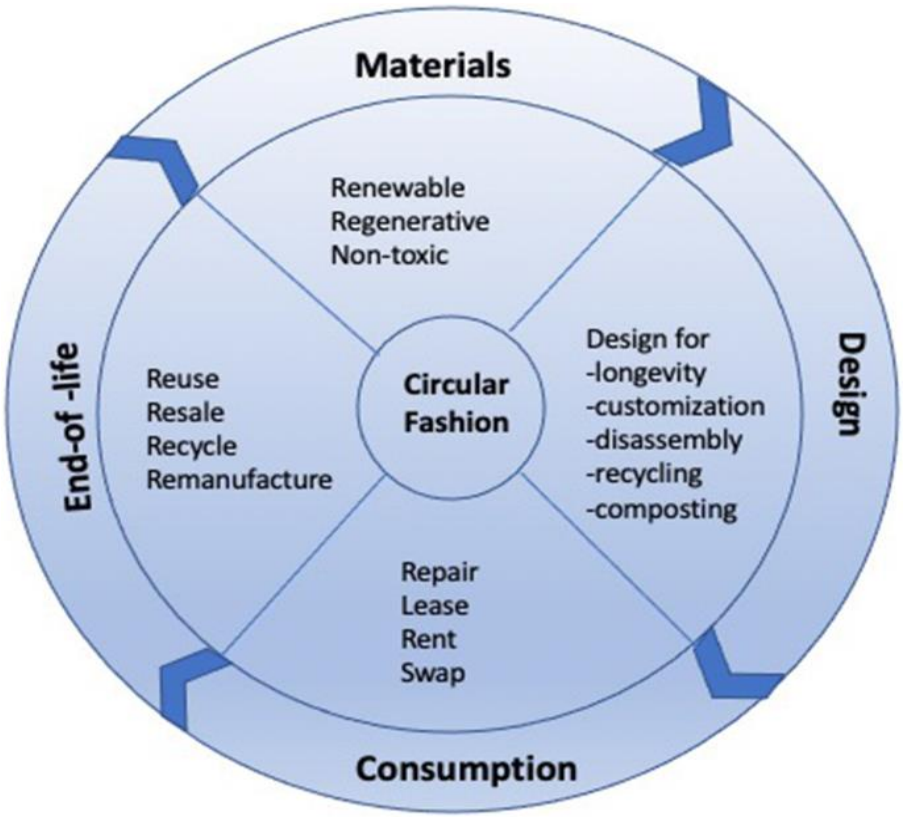


Figure 2.6: Developed from analysis of various contributions into a single circular fashion system by Dissanayake and Weerasinghe (2021:30)

This model is drawn from various contributions of previous studies, which is reflected in his 2021 study, "*Towards circular economy in fashion: Review of strategies, barriers, and enablers".* The model illustrates the lifecycle of a garment from sourcing raw material to end-of-life. In essence, it is a holistic approach to what would constitute circular fashion.

The first segment is *Materials*, specified to be renewable, regenerative, and non-toxic. It thus presents the importance of sustainably sourced materials in circularity.The Design segment lies in the fact that, during the design process, longer use of a garment is considered. It highlights that longevity, customisation, disassembly, recycling and composting might be considered during design. The Consumption segment considers the consumer use of the garment to constitute longer use of the garment products repair, lease, rent, or swap might be used as strategies.

The end-of-life, as the last segment, emphasises the various end uses of a garment as opposed to landfilling, also structured towards a prolonged use of a garment. This provokes possible design innovation strategies as to how this product can be reused into a new product. This includes reuse, resale, recycling, and remanufacturing. It differs from the previous model as it stipulates exactly how each of these segments can be addressed. This model is particularly useful for conceptualising the end-of-life segment related to the research study. It

is important to note that this model addresses the end-of-life cycles of interest to this study through the clear inclusion of reuse and remanufacture.

2.3.2 Circular fashion systems in Africa: The second-hand clothing market

Recent research illustrates that up to 80% of the population in Africa wears second-hand garments (BBC News, 2016; Moreno-Gavara & Jiménez-Zarco, 2019). This is more pronounced in nations like Ghana, Kenya, and Benin. According to studies (Hvass, 2015:13; Turunen & Leipämaa-Leskinen, 2015:60; Synzenbe, 2020), the trade of second-hand clothing in Africa may be underappreciated as a significant contributor to fashion sustainability because these items would otherwise wind up in rich countries' landfills. Although SHC is not directly relevant to the study, it provides clear evidence as to why remanufacturing and upcycling practices may be the appropriate circular strategies to implement within the context of Africa and other developing nations with large amounts of textile waste from second-hand clothing in the landfills. Therefore, this section explores the current understanding and intention of the CE in the Global South compared to the Global North and what role the second-hand market plays.

The consumption of SHC in the Global South has become increasingly high, as it is affordable to these developing nations compared to newly manufactured garments. SHC has been identified as a major contributor to livelihoods in Africa, as it creates jobs and self-employment opportunities (Khurana & Tadesse, 2019:4). Turunen and Leipämaa-Leskinen (2015:60) stated that owning and acquiring second-hand clothing is a sustainable choice. In 2020, Synzenbe further supported these theories, claiming that second-hand clothing should be defined as a sustainable option because these garments are instead reused. On the other hand, these imported goods overflowing into Africa from the Global North contribute to landfilling issues (Brooks & Simon, 2012:1266).

The concept of the CE in this context could firstly provide a vision of how waste and emissions might be reduced through less use of energy and resources. Secondly, the shift to a circular fashion system includes waste-related legislative recommendations with the long-term goals of lowering landfilling and increasing reuse. Thirdly, it would provide a model for completing product lifecycles from manufacturing to consumption through repair and remanufacturing while reusing raw materials to boost the economy (EC, 2015). The findings in the literature identify a pattern of the Global South as a 'landfill' or a dumping ground for the Global North, in the name of sustainability, through clothing donations. This suggests that there is evidence of sustainability in different perceptions centred on the different priorities of the Global North and Global South. The Global South has to tackle pressing issues such as food security issues, education, and fighting unemployment. This means that their priorities are the well-

being and the survival of humans, which aligns more with the social and economic pillars of sustainability and environmental concerns tend to be a non-factor in their priorities as it is viewed as unimportance compared to these immediate issues. While in the Global North, the increasing concern for the environment is evident in climate change talks and efforts to reduce waste, which speaks to the environment pillar of sustainability, which may not be a primary concern in the Global North. Thus, this poses questions on how innovative is this idea of circularity in the Global South.

As “new” and “innovative” as CE may be considered as a way to combat the linear economy and reduce waste in the Global North, studies on CE in developing countries reveal that this concept dates back and that circular practices are deeply ingrained in countries from the Global South (Reike et al., 2019:247). In indigenous communities in the Global South, circularity has been a centuries-old custom, and circular practices were incorporated into their management of natural resources, agriculture, and education, resulting in communities that live a sustainable lifestyle and are at peace with nature (Giampietro, 2019). It is also of interest how the progression of circularity has also had an impact on fashion. Moreso, the evidence of this circularity in Africa existed in ways that were not recognised in the fashion field.

In fashion, 1980 was the year that the second-hand trade accounted for 30-50% of all garments sold in Ghana, Kenya, Benin, Malawi, Tanzania, and Zaire (Brooks & Simon, 2012:1266). Studies have revealed that it was during this period (the early 1980s) of execution of economic liberalisation that clothing imports to Africa increased (Brooks & Simon, 2012:1265; Imo & Maiyo, 2012:32; Moreno-Gavara & Jiménez-Zarco, 2019:13). On its own, East Africa imports second-hand clothing and footwear worth about $150 million (R2,769,474,000), primarily from America and Europe (Banik, 2020). According to Oxfam, a British charity, more than 70% of garments donated globally are shipped to Africa (Kubania, 2015; Poerner, 2021).

A further study in the same year (2015) showed that over 40% of the post-consumer textiles gathered in France were shipped to African nations. This suggests that Africa has been a breeding ground for sustainable practice through reuse for decades. According to a USAID estimate in 2017, the sector supported 355,000 jobs and brought approximately $230 million (R4 246 858 000) for the government. The second-hand fashion industry has also supported the livelihoods of an additional 1.4 million in the East Africa Community bloc. There is thus a significant need and demand for used fashion products in the African continent in various ways. This suggests that the SHC market as a CE practice creates employment and livelihoods in the underprivileged Global South.

The market for second-hand clothing exists not only in impoverished African nations. Still, it is sold globally because of a vintage fashion trend in developing nations in the global North (Brooks, 2015:6). Since the mid-14th century in the global North, used clothes were never discarded but passed down from European superiors to local peasants (Brooks, 2015:75; Herjanto et al., 2016). Due to the deep economic depression at the time, women would repair clothes in their homes and dedicate hours darning worn-out clothes (Herjanto et al., 2016; Borusiak et al., 2020:3; Brooks, 2015:75). This repairing and conservation of discarded clothing remained until the 19th and 20th centuries when low-cost new garments emerged. Even if the customs of reusing and mending used clothing have been around for generations, access to quick fashion has made them less valuable (Rybowska, 2017) because they were seen as items for the underprivileged.

On the other hand, the literature has revealed that the purging of apparel waste in Africa has resulted in a few economic advantages as well as problems in local clothing industries (Imo & Maiyo, 2012:33; St. John James & Kent, 2019:4; Synzenbe, 2020). Despite these previously mentioned advantages of SHC, several researchers have questioned this based not only on the accumulation of textile waste dumped in Africa but also on the negative aftereffects of this trade on the local clothing and textile manufacturing industries, directly undermining African performance economies. For instance, in Kenya, the garment industry that previously employed 500,000 persons has only 20,000 workers presently (Brooks & Simon, 2012:1266). Synzenbe (2020) further disclosed that major factories could not compete with the cheaper prices offered by the SHC industry and were forced to close down.

Further evidence of this can be seen in Malawi and Ghana, where newly manufactured clothing has been viewed as much costlier than SHC, resulting in major production companies could no longer contend with very low-cost prices of the SHC sector (Brooks & Simon, 2012:1266; St. John James & Kent, 2019:4). This issue is so widespread that many African developing countries (like Tanzania and Uganda) have banned SHC imports, imposing licensing requirements and increasing tariff rates (Navaretti et al., 2000; CNBC, 2018). However, efforts of completely banning trade have fallen flat or not been supported by major customs controls due to economic liberalisation policies and agreements with the Global South nations (Brooks & Simon, 2012:1266; Kubania, 2015; Poerner, 2021).

Furthermore, there is evidence of the smuggling of second-hand clothing into African countries (Brooks & Simon, 2012:1266). For Africa, this suggests that until there are more rigid restrictions on these imports, the second-hand clothing trade will exist for some time to come. The literature draws a pattern of ignorance or less attention paid to consumption practices in Africa. This suggests the African SHC market traders are entangled in the overlooked global

trade networks, which connect waste generation and disposal of clothing in the Global North to the consumption of these garments in the Global South.

As illustrated, current literature on circular fashion practices in Africa mainly focuses on second-hand clothing, as it is a massive market. These studies have also identified SHC as a great contributor to employment and livelihoods in Africa. However, prominent studies such as Clothing poverty: The hidden world of Fast fashion and second-hand clothes by Brooks (2015) and St James and Kent (2019) have exposed the hidden and negative impact of SHC on local economies and African dignity. Furthermore, recent literature strongly suggests that poverty and inequality have exposed Africa as a landfill of the Global North, perpetuating consumption issues in developing countries. However, Schröder's (2019) study, *"The circular economy and the Global South:Sustainable lifestyles and green industrial development",* have greatly contributed to this part of the study as far as the Global South is concerned. He has managed to scrutinise current perceptions and directions of CE in the Global South and South, looking at their differences and conflicting narratives of circularity. In this manner, the literature also focused on existing perceptions or behaviours towards sustainable/circular fashion practices locally and globally. Drawing from this, the Global North CE is grounded upon global environmental issues such as reducing pollution from manufacturing plants' greenhouse gas emissions.

In contrast, the Global South addresses circularity in considering the impoverished and improving livelihoods while considering human and environmental safety. Other than Pammi Sihna and Dissanayake's studies on remanufacturing and upcycling, such as the book, "*Remanufactured fashion"* in 2016, existing studies (Gueye, 2021; Ellen MacArthur Foundation, 2020) regarding circularity have greatly focused on recycling, failing to explore further possibilities of discarded garments/SHC, which would be addressing the consumption issues and economic and social development at the same time in the Global South. These findings indicate the need for further research on how second-hand clothing can be exploited for other circular strategies, not just recycling.

Although SHC is widely approved for reuse and recycling as part of sustainability in fashion, there is no sufficient evidence acknowledging SHC in Africa as Circular fashion. Holistically, there is a lack of literature regarding incorporating various circular fashion practices in the Global South in the fashion industry. Hugo et al. (2021:13) add that there is minimal education regarding the application of CE in emerging economies such as SA and India since they have major unsustainable practices, majority of studies in circular fashion are centred on the Global North. Schröder (2019) and Hugo et al. (2021) suggest that circular fashion is seemingly unnecessary in the Global South nations.

While CE emphasises the possibilities of industrial employment in the “recovery, reuse, repair, remanufacturing” (Schröder, 2019:12), in support of social and economic goals in the Global South, what are the possibilities of a large portion of these garments being remanufactured and upcycled? The next section reviews the literature on remanufacturing as a circular strategy to the issues of these garments that are commonly regarded as ‘old’.

2.4 Remanufacturing as a circular strategy

2.4.1 Defining the term remanufacturing

Remanufacturing is the process of disassembly, cleaning, and repairing, as well as the reassembly of a garment into a new-like or even superior quality (APSRG, 2014a). Data on remanufacturing are limited, and many industries and companies still have to adapt to an emerging sustainable strategy. However, this trade is advancing extremely well (Gallo et al., 2012:218). Most remanufacturers are known to be independent small to medium businesses, typically consisting of 0–249 employees (Liberto, 2022). Remanufacturers can work alongside OEMs in their practices, possibly reusing their own rejected items. OEMs also can also choose to outsource remanufacturing operations. In the case of discarded items, small niche businesses in remanufacturing are quicker to grasp trade opportunities, rather than bigger ones (Gallo et al., 2012:221).

Since 2000, worldwide clothing consumption has nearly doubled, mainly as a result of the rapid growth of fast fashion (Pulse of Fashion Industry, 2017). For example, accounting for the largest portion of consumers, the average young woman wears a garment once or twice before discarding it as old clothing (The Guardian, 2019), thus contributing to global pollution as these garments are landfilled. As a possible solution to this, Fletcher (2008:272) argued that remaking used materials into new fashion products had gained popularity since the early 21st century. Barrow, 2011 and Dissanayake and Sihna (2015:4) gave an example of this during the Second World War; in light of the shortage of fashion garments, the United Kingdom promoted the “make do and mend” campaign to promote the remodelling of old clothing into fashionable styles. Part of this study focuses on fashion remanufacturing as an important part of the circular economy (APSRG in Triple win: the economic, social and environmental case for remanufacturing, 2014b), a concept that has received much attention in recent years to address these unsustainable fashion practices stemming from the linear economy. Through remanufacturing, at their end of lives, products are restored, disassembled, and reassembled into like-new products (APSRG in Remanufacturing: towards an efficient resource economy, 2014a). To shed light on this sustainable practice, this section delves into the benefits, barriers, and drivers of remanufactured fashion, as well as a peek into the practice of remanufacturing in the African continent.

Table 2.1: Clothing remanufacturing in the literature

Remanufacturing	Source
Produces an item completely equal and even better quality than the new.	(Dissanayake & Sihna, 2010:3)
An old product is entirely taken apart (see figure 2.7). In the process of remanufacturing, a unit is reworked without seeing the original look.	(Sihna et al., 2016:5)

2.4.2 Benefits of remanufacturing

Paterson et al. (2017:653) define remanufacturing as a "product recovery approach" that allows for the return of end-of-life products to as-new condition (see figure 2.8) or better and the provision of a warranty at least as good as the original.

Clothing retailers such as Marks and Spencer and designer brands like Ralph Lauren have established collections made from remanufactured fashion and textile materials. The literature shows evidence that remanufactured fashion goods are becoming more popular, and the respective market is advancing at a pace (Choi, 2017:1385). According to Sandin and Peters (2018:i), current literature holds substantial support for statements that "textile reuse and recycling overall decrease the environmental effect in comparison to burning or landfilling, and that reuse has more to offer than recycling. Of the many existing secondary market" (used product) practices, remanufacturing demands the greatest level of labour and, because of that its products are of high excellence, consistency, using less energy". With the worldwide acceptance of sustainability, remanufacturing practices are now extensively acknowledged. Many business initiatives (H&M, Zara) (Choi, 2017:1385) are now collecting used garments from the community and remanufacturing them into like-new products. The below figures show a typical remanufacturing process (Sihna et al., 2016:37).

Figure 2.7: Disassembled pair of discarded jeans
(Source: Sihna et al., 2016:37)

Figure 2.8: A remanufactured dress made from discarded denim jeans (Source: Sihna et al., 2016:37)

2.4.3 Barriers to adopting remanufacturing in fashion

Because used products need to live up to the same standard as new products, the remanufacturing process may require much labour and specialised machinery. This creates added pressure on the manufacturer, which is part of the main reasons behind the reluctance to adopt remanufacturing practices. In addition, most clothing manufacturers are concerned about the profitability of previously used garments (Wang et al., 2014:7292).

According to existing studies, recent years have displayed increasing growth in the garment remanufacturing market. Even so, there still lies much doubt in the remanufacturer's internal process-level issues related to difficulty finding specialist skills that prohibit industrial scalability of fashion remanufacturing (Dissanayake & Sinha, 2015; Pal & Gander, 2018; Singh et al., 2019). To many niche market designers, finding adequate discarded material as well as finding storage space for materials is a major problem. The skills needed for recycling, such as the assortment of materials and disassembly, are regarded as being both time-wasting and requiring great labour as reflected in the disassembly process in figure 2.7 (Sung et al., 2017:398).

Despite the increased interest in sustainable products, consumers are still reluctant due to the lack of awareness concerning remanufactured fashion products. Consumers are likely to assess the superiority of reused units or products grounded on their purpose. Additionally, this assessment can be traced back to the apparent risks related to reused/recycled products, such as the unreliability of product quality (Essoussi & Linton, 2010:460).

2.4.4 Drivers of remanufacturing in fashion

Producing a used product by remanufacturing is less expensive than creating a new one; according to published research, this difference ranges from 40% to 65% (Wang et al., 2014:7292). The fashion sector can benefit greatly from remanufacturing by increasing resource and energy efficiency, extending the useful lives of products, and achieving circularity by preventing the deliberate and premature depletion of natural resources (Dissanayake & Sinha, 2015; Singh et al., 2019).

Existing literature suggests that in the global North, the adoption of remanufacturing has been growing at a massive rate. For instance, the remanufacturing industry in the United States is the leading and most recognised internationally. Data gathered back in 2011 reflects the industry to be valued at $43 billion (645,550,490,977.20 billion rand), adding up to 2% of sales of all manufactured merchandise (USITC, 2012). Aerospace and automotive are the main areas for remanufacturing in the US. SMEs remanufacture 25% of the goods; this makes up 17% of the country's exports. More than 180000 jobs, of which 36% were found in the SME, are supported by the US remanufacturing sector. Because 34% to 45% of manufacturing costs are spent on labour, this sustainable practice offers an advantage in creating skilled jobs (Sihna et al., 2016:2).

- Valued at £5 billion (101,994,040,200.32 billion rand) per annum, remanufacturing in the UK has been branded as a prospective backer of sustainable growth.
- With its government's strong recognition of the need for sustainability in manufacturing, the EU is said to be the next main part of remanufacturing, and it is approximately valued at €40 billion (720,113 billion rand), creating employment for 300 000 citizens.
- The UK and Germany are considered at the top in remanufacturing activities, with the UK industry worth £2.4 billion (48,9 billion rand).
- Despite the lack of substantial data conducted in China, there is evidence of the government's support towards the growth of the remanufacturing sector in China (especially in automotive) by means of government policies, subsidies, and protocols (Wang et al., 2014:7295). However, not much is known about the existence of these government policies in support of remanufacturing practices in Africa. In the next section, the study provides evidence of the practice of remanufactured fashion in the African continent.

2.4.5 Remanufactured fashion in Africa

As mentioned in the previous section, Second-hand garments in Africa are said to be extremely affordable compared to new garments. However, in buying imported apparel, capital is deducted from local textile manufacturers in Africa, causing them to lose profit. As a result, a few African nations, such as South Africa, Nigeria, and Zimbabwe, have prohibited the import

of used garments (Brooks & Simon, 2012:1273). Unfortunately, such regulations are not well-imposed as a successful black market exists for these second-hand garments from Western nations. According to Brook and Simon, this displays a major problem since the need for low-cost used garments in poor communities is a basic need. This ultimately shows that the donation of clothing is not a sustainable answer to fast fashion because the high volume of these clothes damages the economic growth in developing nations (Brooks, 2015:290).

If donating is not the answer, how about repurposing garments? In recent years a few businesses have tested remanufacturing. The fashion remanufacturing sector has not existed for a long period. Therefore, this niche market is for those who prefer vintage and/or sustainable items. St. John James and Kent (2019:8) found that the idea of sustainable practices such as remanufacturing and upcycling is not popular in Ghana. Still, given that the market is very well-developed, the youth have direct information on local trade settings. The Accra market in Zambia is a platform where evidence of remanufacturing and upcycling practices can be found in activities such as repairing and categorisation/sorting of garments by employees in the local market. Denim pieces and African cotton shirts are sourced from second-hand markets, deconstructed and reassembled, and repurposed or remanufactured for a new purpose (Global Fashion Agenda, 2021). Recent research supports this idea that although remanufacturing may be the eco-friendly alternative to manufacturing garments, the issue with niche markets in African economies is that these sustainable products are not well-known or in demand (Xu, 2020:291).

However, there is a great demand for resources from used garments to make trimmings, buttons, and substitute products like pillowcases in Tanzania. Although there was not much proof that designers or tailors were creating entire ensembles from used clothing, there was a sense that these methods were becoming more common in classroom settings (Shah et al., 2016:19).

Other SHC-using activities are imported into India as raw materials for the recycling sector (the original “shoddy” sector), provided that the SHC is mutilated (slashed) to render it unwearable before crossing the border. The recycling factories shred the clothing and turn it into recycled yarn, which is then sent to East Africa and used to make blankets for pastoral nomads like the Maasai or weaved locally into very low-cost blankets, shawls, and fabrics (Norris, 2015:186). However, as Norris (2015:186) has briefly described, the recycling industry’s material transformations, production practices, and labour relations are not sustainable.

Only 1% of used textiles are used to make new clothing, according to recent research. Still, this percentage is projected to rise as manufacturers develop cutting-edge technology and

respond to consumer demand for recycled materials. Upcycling transforms waste material from undesired things into better-quality, higher-value products, in contrast to textile recycling, which concentrates on recovering materials from trash for reuse, remanufacturing, or reprocessing (Anon., 2021). Many sustainable fashion enterprises using waste apparel in developing African countries, such as Malawi, are designer-led, often operating on a small, niche market scale with less reusable or disposable resources (Shaw, 2013; Magoum, 2021).

Once again, Sihna et al. (2010, 2016) stood out in studies dedicated to remanufacturing garments from discarded SHC and accessories through local craft markets. The authors have clearly described that the process includes gathering SHC from public donations and charity shops. The garments are sorted accordingly or categorised, cleaned, and deconstructed into new-like, exclusive pieces. In defence of remanufacturing, Sihna et al. (2010:2) argued that this practice could create a sustainable business model in addition to a decrease in harmful greenhouse emissions and less energy use. Palisaitiene et al. (2017:3225) add that in Europe alone, the remanufacturing sector is said to generate billions of euros annually and be highly beneficial to the environment. St. John James and Kent (2019:5) highlight the benefits of job creation and recycling old garments from old garments. Despite this, Mastamet's theory (2017:4) suggests that there is a lack of consumer awareness in Africa regarding the environmental impact of fashion and textiles and ethical concerns. This indicates a long way to go to achieve strictly sustainable clothing that can satisfy all environmental and ethical issues. This is because there is rarely any legislation pertaining specifically to clothing and textiles in Africa, although policies are typically applied to packaging, automobiles, and technological items (Mastamet, 2017:4). Increased public education will compel their governments to address the issues more forcefully.

Hira et al. (2022:323) recently found that the SMEs that account for most manufacturing in the Global South must overcome extra challenges to create circular supply chains. These problems include a lack of understanding among suppliers and clients, challenges measuring environmental performance, a lack of government support, a lack of technical know-how, a general lack of access to technology, a lack of belief in one's own responsibility, barriers to financial access, and high costs. Hugo et al. (2021) concluded that there is a lack of education regarding the application of CE in developing countries such as SA and India since they have major unsustainable practices, majority of studies in circular fashion are centred on the Global North.

Even so, poor working conditions in clothing factories in some parts of Africa are also a cause of concern (International Labour Office [ILO] 2000). The question is how knowledgeable consumers are in Africa regarding the environmental impact of clothing and textiles and ethical

concerns. Well-informed consumers regarding ethical and environmental issues in developing countries will inculcate cultural trends towards ethical consumerism and sustainable practices and improve workers' living conditions. The next section identifies how upcycling can be used as a circular strategy.

2.5 Upcycling as a circular strategy

2.5.1 Defining the term upcycling

Available data on upcycling focuses on defining upcycling and its process rather than the upcycler as an individual or a company. For example, Vadicherla et al. (2017:4) explain upcycling as more focused on improving fully sustainable, inexpensive and inventive goods. However, Payne (2011:11) discovered that in the UK in 2011, a few small, independent upcycling designers were efficiently utilising textile waste, a fundamentally under-used source of supply in the fashion sector. Like remanufacturing businesses, upcycling businesses are usually tiny, artisan-led ventures that produce speciality goods dependent on local sales and consumers. In summary, remanufacturing would require operations from the manufacturer, given that the product is taken apart completely. In comparison, the upcycling practice would not require much labour as it is more focused on improving or developing a product.

Although there are differences in definitions, two leading points stand out in various publications. The first one is grounded in product recovery since the goal is to preserve value and the superiority of primary resources in their next life by advanced reuse (or remanufacture) (Sung, 2015:32). The second emphasises product restoration for greater aesthetics and performance by altering and modernising waste materials by the public (Sung, 2015:32). Table 2.2 below briefly outlines the characteristics of clothing upcycling practices.

Table 2.2: Clothing upcycling in the literature

Upcycling	Sources
The making or amendment of an item from waste and accumulation of superiority to a worn-out unit.	(Sung, 2015:28)
Upcycling procedure needs a combination of influences such as ecological mindfulness invention, and the outcome is an exclusive sustainable hand-crafted unit. The practice of upcycling focuses on the improvement of goods that are fully sustainable, inexpensive, and inventive (see figure 2.11)	(Vadicherla et al., 2017:4)

The word "upcycling", which Reiner Pilz of Pilz GmbH first coined in 1994 and also defined as the "idea of adding value to old or used products," was first used (Vadicherla et al., 2017:4), contrary to popular belief that recycled products are less valuable (Sung, 2015:28; Vadicherla et al., 2017:4). The total volume of literature concerning upcycling in South Africa is still limited.

However, the United Kingdom is said to be at the top regarding recycling practices such as upcycling.

The UK is obligated by law to decrease its GHG (Green House Gas) emissions by at least 80% from its 1990 levels by 2050 (Sung, 2019:2). Therefore, it is interesting to know that since 2013 in the UK, there has been evidence of textiles being collected and resold as vintage clothing, which means 3% of these textiles, get to be resold at prices close to that of new products. Of these textiles, 75% are carried across the globe for reuse, while only 18% are retailed as recycling material (Bartlett et al., 2013:95).

The UK has been the epicentre of emerging small niche recycling enterprises. The success of these enterprises is owed to applying creativity using textile waste materials, which has also led to commercial success (Han et al., 2017:70). Supporting upcycling enterprises will contribute not only to the environment but to the economy as well as social well-being, as this is where used fashion products are utilised in manufacturing fashion products with added value. Doing so creates a new and sustainable trade for the UK fashion industry. Textile products and materials are highly legible for recycling; this was discovered by the UK government agency WRAP (Waste & Resources Action Programme) (Han et al., 2017:70).

Currently, a few small niche designers in the UK are thriving in the use of disposed textile waste, an immensely overlooked commodity in fashion production. Similar to remanufacturing, these companies are usually led by craft enterprises, producing unique pieces, which means they depend on local consumers for profit (Payne, 2011:11). PCTW is often the source material. Despite the success of used products in the high-end market, the best way of transforming the practice of upcycling into the mainstream is through utilising “post-industrial (or pre-consumer) waste” (Han et al., 2017:70, 72). Tons of textile waste is thought to have reached their life cycle when the industry could use this resource material to produce “sustainably sourced upcycled clothing” (Han et al., 2017:70-71).

Upcycling involves sourcing pre- or post-consumer trash, or a mixture of both, offering hope and a potential resolution to environmental problems due to the minimal consequences of reimaging and reusing (Teli et al., 2015:164).

Below is a demonstration of the upcycling process on a discarded T-shirt.

Figure 2.9: A defective soccer t-shirt being prepared for upcycling
(Source: Vadicherla et al., 2017:19)

Figure 2.10: A demonstration of an elasticated waist of a kiddie's skirt cut from the t-shirt
(Source: Vadicherla et al., 2017:20)

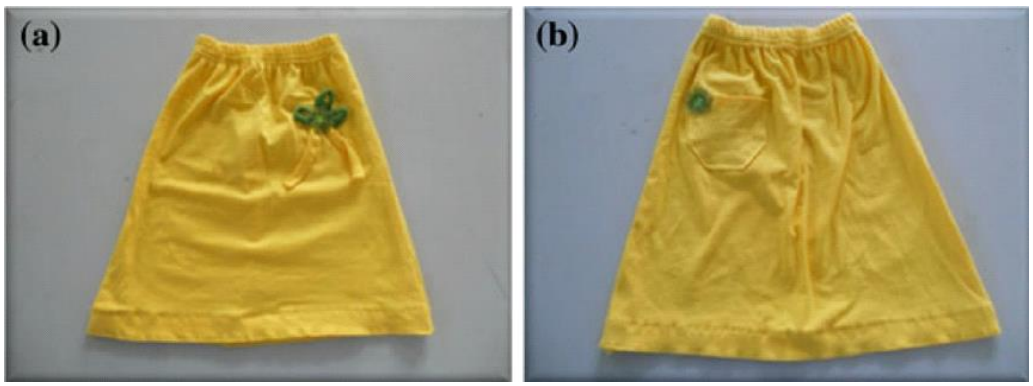


Figure 2.11: The final upcycled product: A kiddies' skirt
(Source: Vadicherla et al., 2017:20)

2.5.2 Benefits of upcycling

Upcycling: From a perspective of product longevity, upcycling extends the life of used goods and materials, improving material performance and reducing production energy use, allowing for reduced reliance on raw materials (Allwood et al., 2011:367).

The idea of upcycling provides designers with an opportunity to lead in the utilisation of significant volumes of textile waste to fulfil the industry's constant demand for new fashion, while technological innovations are structured towards sustainable production practices (Han et al., 2017:71).

The United Kingdom, in particular, has an advantage in the market to fill the cracks of fresh entrepreneurs in trade skills by providing skills development within upcycling businesses. Upcycling also assists in monetary localisation through the use of local resources, workforce, and experience, as well as the upliftment of neighbouring societies teaching (Han et al., 2017:92). Ijomah (2010:158) also adds that creating jobs is inevitable for the homeless and at an advantage as they will then be able to buy the products.

2.5.3 Barriers of upcycling

Various obstacles may reduce the appeal of upcycling for people who are customers, artists, manufacturers, or business people. Some examples of potential problems are:

- The initial barrier to the implementation of upcycling in fashion is issues involved in sourcing enough and using materials of proper quality (Aus et al., 2021).
- Space to work is an issue for those who work from home, but the high costs of renting premises to work is another major barrier (Sung et al., 2017a).
- Small current market size.
- As reflected in figures 2.9 and 2.10, upcycling is viewed as a time-consuming practice (Coote et al., 2010)
- The recycled goods' specialised nature (not everyone finds them appealing).
- Few buyers appear to be interested in upcycled products, with the majority preferring mass-produced goods (Sung et al., 2017a, 2017b).

Pandit et al. (2017) illustrates that most consumers assume ethical or eco purchases as being costlier than usual merchandise. This is partly because eco manufacturers intend to abide by the living wage rules for production ("fair trade"). At the same time, Sung et al. (2017:398) consider uncertainties in product quality to pose a big threat to many manufacturers. It is important to consider that these challenges may also be disheartening to adapt to for major companies in Cape Town. For example, Chanin, an eco- fashion company founder from the UK, sees upcycling working well on a small scale and focused products but stays unrealistic on a large scale (Sung, 2015:32). The next section looks at the drivers of upcycling.

2.5.4 Drivers of upcycling

- Creativity in upcycling reconnects people with materials, ultimately transforming the culture (Bridgens et al., 2018).

- If upcycling is aimed at a particular user group, such as persons in the art and design industries who are 30 years of age or older, scaling up may be more easily accomplished (Sung, 2017).
- Upcycling enterprises may benefit from financial and managerial assistance, such as start-up loans and subsidies. This comprises various subsidies, loans, and advantageous terms for purchasing equipment (Sung et al., 2017a, 2017b).

Support for upcycled product marketing and sales has been highlighted as a success element (Sung et al., 2017a, 2017b). Upcycled goods can be sold online and offline in traditional physical stores and pop-up shops, increasing their availability and giving them a competitive edge.

- Partnerships with large-scale retailers that have access to large volumes of rejected garments from their operations ensure a constant supply of material for upcycling (Bridgens et al., 2018).
- It offers timeless, high-quality design to ensure a longer life cycle of upcycled products (Woolley, 2010). Existing research identifies Kyungeun Sung as the top researcher in fashion upcycling relating to the UK in particular, with studies such as *"Developing interventions for scaling up UK upcycling"* in 2019. In the same year, she offered *"Factors Influencing upcycling for UK makers".* Among the many studies conducted by this author, *"Challenges and opportunities for scaling up upcycling businesses – The case of textile and wood upcycling businesses in the UK"* in 2019 had a major contribution to this study, as it specifically deals with uncovering the barriers and drivers influencing the uptake and the upscaling of clothing upcycling practices. Interestingly, these listed studies, in particular, similarly address the knowledge gap in fashion upcycling by exploring factors influencing the adoption and expansion of upcycling in the fashion industry. In the next section upcycling in Africa is addressed.

2.5.5 Upcycling in Africa

A few tailors in the Mozambique marketplaces combine discarded garments with traditional capulanas (printed sarong) to add value and produce something unique for local customers. Another example of this emerging trend is the use of SHC as a foundation to create new needed merchandise. This means taking discarded textiles and producing high-value, upcycled dresses showing local design talent (Ericsson & Brooks, 2014). Shaw (2013) defines upcycling as a process that is thought to be very complex, given the deconstruction, re-design, and reconstruction of second-hand garments. However, St. John James and Kent (2019:7) argue that designers' tactic for upcycling on a hand-craft level by sewing and repairing is found in the literature. Still, a lack of knowledge regarding design for upcycling that may be studied and practised on a broader scale in the Malawian community. Designers direct other smaller-

scale upcycling projects using used garments. Designer Mia Nisbet, for instance, showcased the use of recycled materials and traditional Malawian textiles in a collection in Malawi that fused the diversity of African textiles with Western-style (Shaw, 2013). To generate tales of legacy and identity in each produced piece, it is possible in Ghana to include regional talents, such as printing, dying, and weaving, into the design process. Each piece of clothing can become distinctive through upcycling design, whether it is produced in vast quantities or a limited edition. (Gardetti & Torres, 2013:149-162). A designer's approach to upcycling and an artisanal one used by sewers and repairers are recorded. Still, less is known about how design for upcycling can be learned and more broadly used in the community (St. John James & Kent, 2019:7). Instead of accumulating in second-hand marketplaces in developing countries or taking up space in landfills, upcycling gives the community a chance to make unique pieces even out of damaged clothing by using the resilient elements of the garment (Oxfam n.d.; Boscia, 2014). These value-adding procedures are used by workers in Zambia's local market economy when they repair and sort clothing, for example (Hansen, 2000). Similar procedures are also used in the Accra market, where workers hand-dye old, abandoned denim clothing when they believe the colour needs to be resurrected (St. John James & Kent, 2019:4). While the markets provide employment and some repair and renovation of used clothing, St. John James and Kent (2019:4) believe there is less evidence of higher value-adding activities such as upcycling in Ghana. On the other hand, South African SMEs now feel the pressure brought on by the global marketplace and developed economies such as the UK. This pressure has emerged from many SMEs' high failure rates due to their fixation on old business models. However, it is a fact that in developing countries such as South Africa, the application of green manufacturing practices as a business model remains foreign to most small and medium enterprises (SMEs) (Mafini & Loury-Okoumba, 2018:1). Furthermore, locally, there is a dearth of knowledge about recycling procedures and environmentally friendly manufacturing techniques and how they might encourage companies to change how they operate to comply with environmental sustainability guidelines (Mittal & Sangwan, 2014).

In South Africa, the only notable and recent study by Muposhi et al. (2021) reflected fashion designers' attitude-behaviour inconsistencies towards a sustainable business model. The argument here is that there is a gap in knowledge/education of sustainable manufacturing practices in developing countries, which may change if manufacturers are educated on alternative circular manufacturing methods as developing nations have come to embrace the need for sustainability in fashion. The next section deals with the circular fashion system as a framework for the study.

2.6 Conceptual framework

Being one of the most environmentally harmful businesses, the fashion industry has been under constant pressure to transition from a linear economic model to a circular economic model (CE) (Koszewska, 2018; Wang et al., 2020). The CE idea became more well-known in China in the 1990s due to the country's rapid economic development and the depletion of its natural resources (Naustdalsid, 2014). The CE models maximise a product's life cycle from origin through production, and consumption to disposal and support zero-waste design, reuse, repairability, and resource-sharing activities (Mishra et al., 2020). Since 2010, the Ellen MacArthur Foundation has promoted CE ideals worldwide and fought against linear business models, which have expanded to various industries, including the textile and fashion industries (Sandvik et al., 2019).

The conceptual framework was developed to answer RSQ 2: What are the factors influencing the adoption of sustainable manufacturing practices in Cape Town? The instrument used to address this question was semi-structured, in-depth interviews. The responses from these interviews were then applied to a framework from a similar and previous study by Jesus and Medonca, *"Lost in transition? Drivers and barriers in the eco-innovation road to the circular economy"* in 2018. However, this study focused on implementing the Circular Economy in general and had no relation to the fashion field. Despite the differences, the tabulated framework was useful in developing drivers and barriers of sustainable or circular fashion frameworks. Therefore, the most useful framework was from Hugo et al. (2021), as it included the stakeholders. This framework was of interest as it focuses on social/cultural, technical, economic, and institutional/regulatory aspects that might affect the implementation of the Circular economy business model. The alignment of various variables, including prioritising clothing items with longer life cycles, reuse and proper disposal at the end-of-life stage, money, and technology, is necessary to move from the existing linear paradigm to a circular one (Casey, 2019:1). To address these issues, to establish the main barriers to adopting sustainable manufacturing practices from the responses in the interviews. Goldratt's Theory of Constraints (TOC) was adopted as a conceptual framework to identify the single most prominent barrier or a bottleneck or main constraint to adopting sustainable practices. The background of the Cape Town fashion industry from existing literature was used to identify and list the undesirable effects (UDEs) occurring in the industry's current state. This was achieved by identifying the frequent negative occurrences in the data and condensing the text to preserve meaning. Upon establishing the UDEs from the data and literature, the current reality tree (CRT) was constructed (Eidelwein et al., 2018:114). This is a thinking process tool; the Current Reality Tree (CRT) tool was used to measure the source of the symptoms, what corrective actions and collaborations are to be taken, and how these actions may be executed (Mabin, 2015:3). From this, the researcher could identify the main hidden barrier or constraint

limiting the adoption of sustainable manufacturing in Cape Town. This process was useful in addressing the research RSQ 2: What are the dynamics influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry?

It is important to note that the research centred on the barriers and drivers of sustainable manufacturing. Thus the TOC was designed as a self-sufficient solution to establish constraints or barriers but not drivers (Puche et al., 2016:14). However, the CRT model was adapted to the drivers to establish the accelerators of adopting sustainable manufacturing practices in Cape Town. This was done systematically, ranging from the immediate drivers to the intermediate, down to the main driver.

2.6.1 Circular fashion system with focus on end of life

The circular fashion system by Dissanayake and Weerasinghe (2021:30) was chosen as the model which is most applicable to the study.

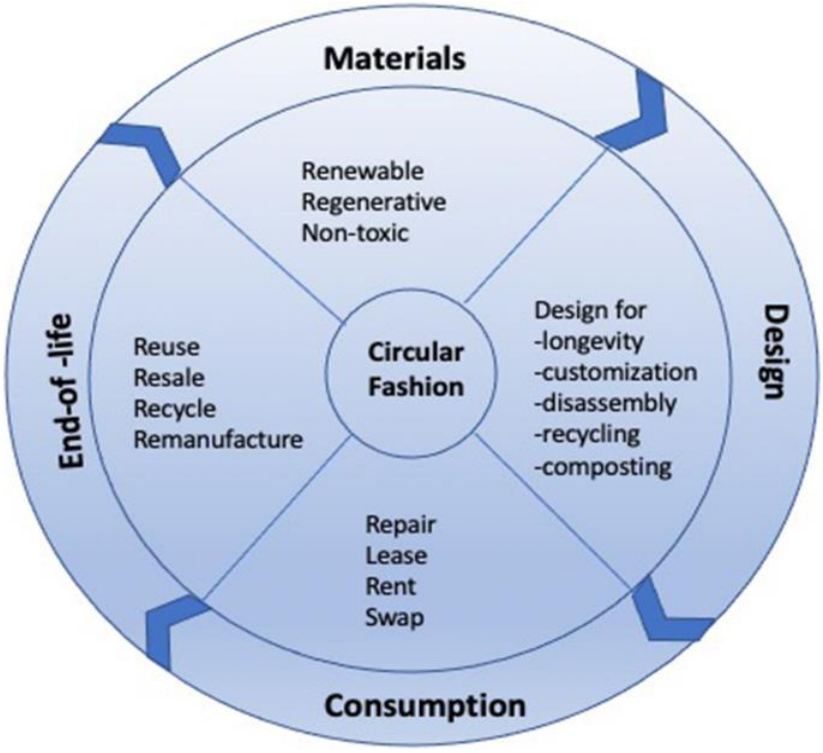


Figure 2.12: Developed from analysis of various contributions into a single circular fashion system by Dissanayake and Weerasinghe (2021:30)

This model is drawn from various contributions of previous studies, which is reflected in his study, *"Towards circular economy in fashion: Review of strategies, barriers, and enablers" in 2021.* The end-of-life segment was chosen as the focus of the study as it emphasises the various end uses of a garment as opposed to landfilling, also structured towards a prolonged use of a garment. This particular model is useful for conceptualising the end-of-life segment

that relates to the research study as it addresses the end-of-life cycles of interest to this study through the clear inclusion of reuse and remanufacturing.

i) End-of-life circularity

Every year, millions of garments worldwide end up in landfills due to cheap fast fashion. Worldwide, consumers purge over 460 billion dollars of clothing each year after only ten uses (Circular Fibres, 2016b). Due to affordability, this rapid fashion linear economy system is based on high consumption, subpar quality, and ongoing need for the newest trends. Closing the resource loops makes it possible for clothing to be circularly reused at the end of its useful life, preventing waste while maintaining the value of the materials in all their forms. As explained above, clothes can be recycled, remanufactured, or repurposed after their initial usage cycle. However, it is worth noting that recycling is not part of the discussion as the study focuses on reuse, which relates to remanufacturing and upcycling.

Without overlooking its negative effects, as it undermines local manufacturing, reuse through second-hand clothing pays increased attention to the upliftment of developing communities. Involving retailers in the circularity process would reduce sustainability problems linked with Western second-hand clothing markets while offering new avenues for reuse models and allowing for new consumer segments. In this case, the durability of a garment is essential for repeated reuse (Lüdeke-Freund et al., 2019). Remanufacturing is an alternative process of extending the life cycle of garments that would otherwise have been disposed of quickly. This entails the deconstruction of discarded garments, salvaging useful parts, and reassembly into like-new products (Dissanayake & Sinha, 2015). Such sustainably manufactured garments may not retain the original purpose of the garment. For example, a jersey may be remanufactured into a trouser. Remanufacturing is a method that saves on costs and resources, in which energy use and pollution are prevented (Sihna et al., 2016). In conclusion, the fashion sector may be affected by the use of circular principles in product manufacturing and end-of-life stages. The drivers and obstacles for the circular economy in fashion are listed in the next section.

2.6.2 Barriers and drivers to circular economy in fashion

Similar and previous studies such as *"Lost in transition? Drivers and barriers in the eco-innovation road to the circular economy"* was conducted by de Jesus and Medonca (2018). However, this study focused on implementing the CE in general and had no relation to the fashion field. Despite the differences, the following table could be useful in developing drivers and barriers of sustainable or circular fashion frameworks. This framework is of interest because it touches on social/cultural, technical, economic and institutional/regulatory aspects that might affect the implementation of the CE economy business model:

		Drivers	Barriers
"*Harder*" factors	Technical	Availability of technologies that facilitate resource optimisation, re-manufacturing and re-generation of by-products as input to other processes, development of sharing solutions with superior consumer experience and convenience	Inappropriate technology, lag between design and diffusion, lack of technical support and training
	Economic/Financial/ Market	Related to demand-side trends (rising resource demand and consequent pressures resource depletion) and supply-side trends (resource cost increases and volatility, leading to incentives towards solutions for cost reduction and stability)	Large capital requirements, significant transaction costs, high initial costs, asymmetric information, uncertain return and profit
"*Softer*" factors	Institutional/ Regulatory	Associated with increasing environmental legislation, environmental standards and waste management directives	Misaligned incentives, lacking of a conducive legal system, deficient institutional framework
	Social/Cultural	Connected to social awareness, environmental literacy and shifting consumer preferences (e.g. from ownership of assets to services models)	Rigidity of consumer behaviour and businesses routines

Following this, a study by Hugo et al. in 2021 focused on the barriers and drivers that could potentially affect how this circular economy model is implemented, particularly in the fashion industry. Thus the table below is a framework formulated by the authors:

Drivers	Short Description	Stage
Institutional/ Regulatory	Legal Issues—Companies start to adopt environmental measures to remain in the market and meet legal pressures.	Design and Manufacturing
Market/ Economic	Circular models are profitable—Profitability can come via reducing lost revenue by focusing on quality and increasing prices, or by implementing sustainable and waste reduction measures in manufacturing processes.	Design, Manufacturing, and Consumer
	Fast fashion model in decline—Fast fashion sales have been falling due to changes in consumer behavior, generating opportunities for new business models, such as circular fashion.	Design, Manufacturing, Distribution, and Consumer
Stakeholders	More aware consumers—Consumers are more aware of environmental and ethical issues and are pressuring fashion companies to change.	Collection/ Recycling, Design, Manufacturing, Distribution, and Consumer

Barriers	Short Description	Stage
Market/ Economic	Organizational—Due to globalization and many partners in the fashion industry, it is more difficult to create a completely circular/sustainable chain.	Design and Manufacturing and Distribution
	Product—Much of the fashion industry has not yet realized that everything starts with product designs that are less harmful to the environment, and there is a lack of conscientious fashion design professionals.	
Institutional/ Regulatory	Governmental—Lack of support from governments to create openness, guide efforts, and reduce costs, to implement more ecological solutions.	Design and Manufacturing and Distribution
Social/ Cultural	Consumer culture—Consumers are still very attached to fast fashion consumption and do not see the negative consequences associated with high levels of consumerism. Slow fashion has not yet conquered market space because of this.	Consumer Usage
	Consumer culture—Ideas such as second-hand clothing and rental stores are not widely used by consumers to reduce high consumption and textile waste generation due to several factors, such as clothing appearance and hygiene issues.	
Technological	Difficulties range from technical challenges, such as separating fabric mixtures, to high costs for recycling.	Collection/Recycling and Manufacturing
Stakeholders	Knowledge—Consumers are not aware of the consequences of traditional fashion models, and there few sustainable fashion brands that exist and those that do, do not convey credibility to consumers.	Consumer Usage

From these two studies, a potential framework designed specifically for establishing barriers and drivers that might influence the adoption of sustainable manufacturing practices in fashion was adopted.

2.6.2.1 Barriers

Although numerous studies have recommended the move towards a circular economy for various industries, there are many barriers and drivers, especially in the fashion industry.

The apparel and textiles industry is not yet completely established to accomplish the comprehensive goals of the circular economy, according to Claxton and Kent (2020). Circular transparency is difficult to achieve, as far too many stakeholders are involved, making it a highly complex barrier to establishing a circular fashion system (Ki et al., 2020). Designers are not equipped to make circular decisions due to the strong influence of business profit margins. Reused garments remain a niche market, making them more expensive than newly produced ones (Kirchherr et al., 2018; Jia et al., 2020). This indicates that some companies are concerned about the quality risks of these garments (Jia et al., 2020).

The adoption of circular processes by a company is heavily influenced by the fashion industry's lack of knowledge and education on sustainability and its effects on the environment and by the absence of corporate policies (Kirchherr et al., 2018).

A major barrier to developing a circular economy is the lack of technology (Su et al., 2013; Kirchherr et al., 2018). Emphasised as another key barrier to putting a halt to circular activities is the lack of customer interest and awareness. According to Guldmann (2016), the consumer is well-acquainted with the linear business models, suggesting that despite the availability of textile collection schemes in developed nations, the collection statistics remain low, while in developing nations, there are no such programmes.

2.6.2.2 Drivers

Fashion companies must re-evaluate and modify their current business strategies in light of the factors driving the shift to a circular fashion model. These drivers are listed below to provide context.

- Transitioning from a linear to a circular fashion involves participation from all parties, including producers, retailers, suppliers, and consumers in the supply chain (Guldmann, 2016).
- Incentive programmes may encourage consumers to gather and drop off unwanted clothes, increasing the collection levels (Ellen MacArthur Foundation, 2012).

Governments need to enforce restrictions for companies to choose sustainable suppliers to promote sustainable production activities (Jia et al., 2020).

- The lack of enforcement from the government initiatives for customers to collect and drop off used garments for reuse.

Circular business models are encouraged by proper policy implementation, and Kirchherr et al. (2018) recommended the government as the major player in the fast tracking of a circular economy.

- Education and awareness systems will strongly influence the shift towards the circular economy. Conventional design education should be readjusted to attend to major factors of a circular economy (Atalay, 2020).
- Offer start-up funding for SMEs to implement circular business models based on the collection, reuse, and repair, as well as tax subsidies to promote the adoption of innovative circular business models. (Galatti & Baruque-Ramos, 2019).
- Social responsibility can be shifted to the customer through eco-labelling details on garments, thus communicating the social and ecological effects of the product (Manshoven et al., 2019).
- Prominent studies regarding circular fashion have been highly promoted by Niniimaki's book, *"Sustainable fashion in a circular economy"* in 2017. However, the two most recent studies that contributed greatly to this study section were, *"Can fashion be circular? A literature review on circular economy barriers, drivers, and practices in the fashion industry's productive chain",* by Hugo et al. This study adds to the research and new fashion business models that offer investment opportunities and barriers to overcome to attain a CE in fashion. The second study is by Dissanayake and Weerasinghe, *"Towards circular economy in fashion: Review of strategies, barriers, and enablers"* in 2021. This paper truly resonated with this study as it provides a detailed insight into circular fashion through a thorough investigation into the barriers and enablers to accelerate the move towards a circular fashion. The next section is centred on the Theory of Constraints as the theoretical framework of this study.

2.6.3 The Theory of Constraints

2.6.3.1 Theoretical Framework: Origin of TOC

The Theory of Constraints was developed by an Israeli Physicist Dr. Eliyahu Moshe Goldratt. This theory is aimed at the application of experimental science ideas in organisations. The Optimised Production Technology (OPT®) system, which was later commercialised, was developed from the OPT (Optimised Production Timetables) system (Goldratt, 1988). Since his book, The Goal, in 1984, TOC has been applied and spread in various fields such as accounting, retail, and manufacturing. This aimed to introduce constant improvement and

successful decision-making towards competitive advantages for companies. TOC has continued to evolve as an effective management tool (Ikeziri et al., 2019:5068; McClesckey, 2020:66).

2.6.3.2 Introduction

The Theory of Constraints is a management tool for detecting a major limiting factor (i.e., constraint) that inhibits the achievements in an organisation and systematically improving that constraint until it is no longer a constraint (Orouji, 2016:45). In production, the constraint is known as a bottleneck. In this study, the bottlenecks in adopting remanufacturing and upcycling practices are explored to better the existing system for the uptake of sustainable manufacturing by the SA fashion industry. One of its enticing features is that the Theory of Constraints primarily stresses improvement activities. The top priority is always the current constraint (Theory of Constraints (TOC), 2011-2021).

TOC is applicable to this study because it assisted in understanding the complex limiting factors in sustainable manufacturing growth in the Cape Town/SA clothing industry. Secondly, it served as an effective tool for improving on or possibly eliminating the identified constraint, specifically in the current clothing manufacturing system. In this study, we first looked at the dynamics/factors influencing the current status of sustainable production in the fashion industry in Cape Town fashion industry. This was done strategically by adopting Goldratt's methods and tools, which is described in detail in this section. All of this attempted to establish the main constraint to adopting sustainable manufacturing in the Cape Town fashion industry.

This study adopted the Five Focusing Steps method for solving system issues founded upon continuous improvement by Goldratt (1990b, Goldratt and Cox 1992). However, it is important to emphasise that this study only adopted the first two of the five steps of TOC, as the study aimed specifically to identify and explore, and not necessarily to prescribe definite solutions. The steps are: **i) Identifying the constraint:** In clothing manufacturing, this step identifies the factors/dynamics limiting the adoption of sustainable manufacturing practices. This constraint may be a policy or a physical constraint. **ii) Exploiting the constraint:** Once the constraint has been singled out, TOC can now be applied to evaluate and analyse the existing issue in line with the identified goal (Scoggin et al., 2003:767). For this study, TOC has been used to identify the limitations that inhibit the uptake of sustainable practices in the Cape fashion industry. In this manner, the constraint was exploited to the fullest. The thinking process relates how these steps were implemented.

2.6.3.3 The thinking process

Goldratt (1994) introduced the 'TOC thinking processes' through his book, "*It's not luck"* in a quest to allow for the process of continuous improvement in any company. The thinking

process offers a set of logical tools or trees, such as the current reality tree (CRT), evaporating clouds (EC), and the future reality tree (FRT) (Mabin & Davies 2013). In manufacturing situations such as this, the TOC thinking processes are essential in "deciding what to change, what to change to, and how to cause that change" (Mabin, 2015:3). Therefore, these tools are implemented as a guide for the decision-making process in addressing these questions by creating visual representations of the current situation, identifying the bottleneck, and structuring ideas to overcome the bottlenecks (Theory of Constraints (TOC), 2011-2021).

2.6.3.4 The thinking process tools

In a similar manner that the five focusing steps are centred on the bottleneck, the thinking processes are aimed at the factors currently inhibiting the adoption of sustainable manufacturing practices (Mabin, 2015:3). This is done by first establishing the symptoms within the local clothing manufacturing and presenting proof that the current manufacturing system/practices are causing environmental, social, and economic harm. From there, the **Current Reality Tree (CRT)** tool is used to measure the source of the symptoms, what corrective actions are to be taken, and how these actions may be executed (Mabin, 2015:3). The CRT is a logical tool focusing on sufficiency and used to identify and explain source and impact collaborations that may assist in establishing the undesirable effects (UE) of the current manufacturing system (Mabin & Davies 2013). The current logical structure or diagram is constructed to portray the current state of reality in the SA clothing manufacturing system. The CRT depicts and validates the chain of cause and effect in the specific, fixed situation (Eidelwein et al., 2018:4).

The first step has sufficient knowledge; therefore, this study used the background of the Cape Town fashion industry, existing literature, and field research data on sustainable clothing manufacturing practices in SA compared to the rest of the globe. The next step drew a list of undesirable factors occurring in the current state of the Cape Town fashion manufacturing industry. This is also known as "undesirable effects" or UDEs. The CRT diagram is constructed from the top down, by identifying undesirable effects, suggesting possible causes of the effects, and then testing through the CLR. This test predicts and assesses other effects that may emerge if the cause is evident, "hence the term Effect-Cause-Effect" (Mabin, 2015:4). From this, the researcher identified the main hidden barrier or constraint limiting the adoption of sustainable manufacturing in Cape Town. Secondly, this allowed for the scrutiny of the constraint towards the ongoing sustainable improvements in the current fashion manufacturing system.

2.6.3.5 Integrating Theory of Constraints with sustainable production

The Theory of Constraints and Sustainable Manufacturing are strategic concepts for improving manufacturing efficiency. However, they serve very different purposes:

The Theory of Constraints is centred on identifying and eliminating bottlenecks that limit output. Therefore, effective use may potentially improve manufacturing capacity, whereas sustainable clothing manufacturing is centred on minimising waste from the production process, and therefore effective use may potentially shrink production costs (PlanetTogether, 2016; Theory of Constraints (TOC), 2011-2021). In conclusion, both entities focus on improving the people, planet, and profit.

2.7 Summary

The chapter reflected on major issues in the fashion industry, such as the second-hand clothing market, which is a crucial stepping stone to building an argument for how these garments may be used further for a longer life span. The findings identified an emerging problem arising from the unanticipated over-consumption of these affordable unused garments in Africa. Although the second-hand market may not be a major problem in South Africa, the literature covered the existence of sustainability in fashion with a focus on South Africa. Thus, the literature introduced remanufacturing and upcycling as the proposed sustainable manufacturing practices.

The findings indicate the existence of sustainable fashion on a small scale and lack of substantial research regarding the implementation of remanufacturing and upcycling practices in the South African fashion industry. This chapter also presented the various existing CE models as well as their importance towards achieving a circular fashion system. The most important part of the literature was the focus on the application of the circular fashion system in the Global South. In this instance, the findings indicate that circularity in the Global South was centred on social aspects such as livelihoods, employment, and education, among others. The Global North, on the other hand, mainly considers the environmental aspect of sustainability, with concerns such as levels of greenhouse gas emissions. In summary, this suggests different understandings of circular fashion systems based on different priorities between developing and developed economies.

Chapter 3: Research Methodology

3.1 Introduction

In this chapter, the nature of the research design used for this study known as qualitative research, centred on human perceptions, is explained. The decision to embark on a qualitative research design was atrributed to the study's reliance on human perspectives and experiences with sustainable manufacturing within the Cape Town fashion industry. It corresponds with the research questions and the objectives of investigating and exploring the phenomenon of upcycling and remanufacturing in this city in South Africa.

The over-arching objective of the research was to explore the current practice and existing perceptions towards recycling practices, with a strong emphasis on remanufacturing and upcycling within the Cape Town clothing manufacturing hub. Therefore, an explorative study design was appropriate for this enquiry to uncover a new phenomenon in order to gain a deeper understanding before making generalisations. The research design deals with a particular population, area, or matter where there has been very little or no experimental analysis (Sahay, 2016:4). In order to obtain primary or secondary data, such as interviews, through non-structural systems, an exploration frequently adopts an inductive strategy (O'Gorman & MacIntosh, 2014:4). The data analysis process was achieved by adopting the Theory of Constraints (Goldartt, 1988) method, which has been introduced and discussed in detail in the previous section. This is an attempt to determine the major barrier to the adoption of sustainable production in the Cape Town fashion industry through a Thinking process tool called the CRT diagram, aimed specifically at pinpointing the barrier through identifying the UDEs (undesirable effects) in the data, the intermediate effects and subsequently, the root cause, serving as the main constraint to the implementation/incorporation of sustainable manufacturing locally.

Textile waste management is a major sustainability challenge for any nation (Sihna et al., 2016:v). This study views sustainability in fashion design as a matter of urgency and aims to ascertain current practices and applications of sustainability in fashion and fashion production to identify key barriers and drivers. The study explores remanufacturing and upcycling practices in the Cape Town Fashion manufacturing industry. This review aims to explore the dynamics that influence the adoption of practices of sustainable manufacturing.

The selected cases for this study include three small, independent businesses that remanufacture and upcycle second-hand garments. One SME manufactures school wear and supplies for a babywear retailer. One of the cases is a marketing consultant to local retailers, and the other is a team leader for a major outdoor wear retailer in Cape Town, South Africa.

Therefore, it is important to situate this topic within the wider context of sustainable fashion in developing nations and Africa in particular.

It is important to reiterate the research questions as well as the objectives of the research as a reminder of what the research addressed.

PRQ: What are the dynamics that influence the adoption of sustainable manufacturing practices, such as remanufacturing and upcycling in selected apparel manufacturing companies in Cape Town?

RSQ 1: What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry?

RSQ 2: What are the factors influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry?

RSQ 3: How are the identified factors related across the cases?

The objectives were:

- To ascertain current practice of sustainable manufacturing in the fashion industry locally.
- To determine the perceived barriers and drivers to the incorporation/adoption of sustainable practices from a manufacturing perspective.
- To understand of dynamics between the factors that might influence the adoption of sustainable manufacturing practices.

This chapter presents and discusses the significance of qualitative research design in this study, and the research paradigm reveals the assumptions under which the research is centred. The research type sheds light on how the investigation will be performed, while the research strategy explains the type of investigation and the unit upon which it is to be conducted. The sampling illustrates the selected population and the size, while data collection methods speak of the instruments used to perform the investigation and their appropriateness. In the data analysis section, there are clear presentations and explanations of how the data were synthesised. The methodological limitations shed transparency on the possible shortfalls of the research design and a concluding summary reflects on the entire chapter.

3.2 Research design

Literature reveals that the implementation of green practices is still foreign to companies in general in South Africa (Mafini & Loury-Okoumba, 2018:1). Additionally, previous research indicated that in SA all other recycling and reuse practice activities usually resort under the manufacture of paper or production of glass (Lowitt, 2007:19), but rarely clothing. Therefore,

I wanted to establish the main reasons behind the barriers towards the adoption of sustainable manufacturing practices in SA as compared to developed countries or Western nations. Conducting a qualitative research design, in addition to a quantitative presentation of the results would assist in gaining an even broader picture and more reliable outcomes than a standalone qualitative study, as it incorporates the profits of both research methods (Almeida, 2018:137).

Qualitative research has been adopted as the research design because it has proved to be best suited for the study. This type of approach focuses on examining social intricacies to thoroughly investigate and comprehend interactions and lived experiences that are a part of people's or institutions' daily lives (O'Leary, 2010:114). Explorative interpretive qualitative research design is necessary for conducting and analysing in-depth interviews. Researchers use qualitative methods in various research fields, and it is specifically suitable for gathering data in natural or real-world settings (Leedy & Ormrod, 2015; Maree, 2020).

I found in-depth interviews as the core instrument in the research as they are very significant in exploratory research. In essence, the data gathered from the semi-structured interview sessions produced adequate answers to the research questions and addressed the research problem. The research questions were structured around the lack of existing research on sustainable manufacturing practices such as remanufacturing and upcycling in the Cape Town fashion industry. The theoretical framework formed a good foundation for the research questions.

3.3 Research paradigm/philosophy

An explorative (interpretivist) paradigm was implemented to conduct research into remanufacturing and upcycling in the Cape Town fashion manufacturing industry. This research paradigm is based on assumptions that reality is constantly evolving and is shaped by humans (MacIntosh & O'Gorman, 2015:57). Therefore, this qualitative study acknowledges the assumption that reality is subject to the experiences, perceptions, and views of participants regarding remanufacturing and upcycling in Cape Town. In essence, it is dependent on human views of the phenomena. Exploring and understanding lived experiences that are part of participants' everyday life in this qualitative investigation, required the researcher's active role to build a sense of truth (Haradhan, 2018:2).

3.4 Research type

The investigation of the study was conducted deductively by having explored the literature regarding remanufacturing and upcycling phenomena in the Cape Town fashion industry before engaging in the investigation. This process was extremely important as the semi-structured interviews require a considerable amount of prior research about the subject of the

inquiry for semi-structured interviews as the interview questions are created based on existing literature. The interview guide was used to select and develop the questions prior to the interview. The semi-structured interviews followed the guidelines in the topic guide. The topic outline ensured that the interview's primary topics of interest were covered and enhanced the reliability of the qualitative research data (Kallio et al., 2016: 2955). However, the overall direction of the research/investigation was shaped by the participants' perceptions and first-hand experiences with undertaking fashion upcycling and remanufacturing practices in their businesses, which may have an influence on the adoption of these sustainable manufacturing practices.

3.4.1 Qualitative research

Qualitative research, adopted as the research design, that has proved to be best suited for the study because in order to thoroughly investigate and comprehend interactions and lived experiences that are a part of people's or institutions' daily lives, this type of approach focuses on sifting through social intricacies (Haradhan, 2018:2). An explorative, qualitative research design is necessary for conducting and analysing in-depth interviews. Therefore, as previously-mentioned, qualitative research requires a relationship between the researcher and participant to build a sense of understanding. The choice to use this method in the fashion research field was based on its suitability for data collection in a natural or practical environment (Leedy & Omrod, 2015:269; Leedy & Ormrod, 2015; Maree, 2020).

3.5 Research strategy

The research has been conducted with six participants, described as individual cases representative of the Cape Town fashion manufacturing population. Case study research is an experimental investigation that looks closely at a real-life event and its surroundings, particularly when the lines separating the phenomenon and context are not clear (Yin, 2014). In this study, case studies gave insight into the actions and encounters of individuals from the Cape Town fashion manufacturing population (Duff & Anderson, 2015:112). The choice of the research study was made on the bases of aiming to explore the current practice and existing perception of sustainable manufacturing with a focus on remanufacturing upcycling in the Cape Town fashion industry. This was meant to explore how the adoption of sustainable local manufacturing, in the form of remanufacturing and upcycling, could be accelerated in Cape Town.

3.6 Sampling strategy

Since generalisability was not the goal of this qualitative research, non-probability sampling is the method that is commonly used. Purposive sampling is the most typical type of non-probability sampling. With purposive sampling approach, I was able to intentionally choose

respondents using my judgement as the researcher based on the criteria of quality and their capability to offer richly-textured information applicable to remanufacturing and upcycling in the Cape Town fashion manufacturing (Adeoye-Olatunde & Olenik, 2021:1361). In this manner, I could carefully select a similar group of participants/cases that will assist in answering my research questions. It is crucial to acknowledge right away that non-probability sampling is not random. The participants had to agree to be included in a list of people who could be contacted as potential research respondents (Lamm & Lamm, 2019:54).

The benchmark for the sampling was based on pre-set criteria. The criteria or the target population for this sample were men and women from the Cape Town clothing manufacturing industry. The participants selected were three niche-market sustainable businesses (fashion remanufacturing and upcycling), an SME manufacturer and supplier of school wear and baby wear, a marketing consultant to major local retailers and independent designers, as well as a kiddies' wear product development team leader, with a major outdoor wear retailer. The intention behind the choice of participants was to obtain first-hand behavioural dynamics and perspectives of the clothing manufacturing population towards remanufacturing and upcycling. The initial research was based in Salt River, a known historical hub for clothing manufacturing, but as the research progressed there was a need for a much wider audience of manufacturers. This led to spreading the research to Cape Town as the research site.

3.7 Data collection methods

3.7.1 The literature review

The literature (Cao et al., 2017; Mafini & Loury-Okoumba, 2018:1; May, 2019) revealed a lack of existing research on fashion remanufacturing and upcycling in South Africa and a gap in the total volume of literature concerning application of green manufacturing practices in fashion in developing countries. despite the fact that it is a growing trend in most developing nations. On the other hand, existing literature (Wang et al., 2014:7295; Han et al., 2017:70) indicates that with increased environmental concerns, the UK and Germany have been the epicentre of remanufacturing and upcycling practices.

The literature review afforded a secondary and confirmatory perspective for the research from previous researchers to verify the research problem. I have used the literature to demonstrate both what is known and additionally assisted in identifying the potential gaps in the existing body of knowledge on the topic. The literature has also assisted in relating the study with previous research, which was very useful in formulating interview questions guide in the preparation for data collection.

3.7.2 Semi-structured interviews

In this study, in-depth semi-structured interviews were used as a method to determine the perceived barriers to the incorporation of sustainable practices from a manufacturing perspective. It was also an effective method for addressing more challenging social behavioural research topics and objectives, including research questions aimed at better understanding the current complex factors influencing the adoption of remanufacturing and upcycling within the local fashion industry from a manufacturer's perspective (Adeoye-Olatunde & Olenik, 2021:1361). Once again, because semi-structured interview questions are centred on previous information, using it required a certain amount of background knowledge in the research topic area. Prior to the interview, the questions were chosen and created utilising the interview guide (Kallio et al., 2016:2955). There had to be a tight link between the research questions and the interview questions. Thus, existing literature on remanufacturing and upcycling practices in the South African fashion industry was very useful in the preparation for the data collection process and during the process. These existing theories/findings from other researchers on the topic formed a foundation on which to develop research questions which would address the research problem of the study. Therefore, with guidance from the research questions, the researcher was able to develop and structure the interview guide. The interview guide (see Appendix C) consisted of in-depth, semi-structured, open-ended questions to probe participants' responses (Marshall et al., 2015:2). The list of questions amounted to 13.

The interview participants comprised independent fashion designers, pattern makers, buyers, CEOs, etc. The interview recruitment was intended for those who practice sustainable manufacturing as well as those who do not. The focus was on individuals, not groups. The sample was not gender-specific, rather required that all participants had to contribute to the collection of data. This means both males and females participated in the research study.

Participants were recruited in four ways: *surfing the net* for clothing manufacturing companies. From this, a long list of potential participants were contacted by means of *telephone calls*. Through sending formal and detailed requests *via e-mail*, I was able to reach a number of potential participants. This also allowed for *referrals* to other companies by industry representatives.

The research was limited to individuals in the fashion design industry, who own niche-market businesses as independent designers, and individuals in big and more established clothing manufacturing companies such as CEOs, fashion buyers, marketing coordinators, pattern makers etc. LinkedIn, the world's largest professional networking platform, was used to reach individuals in the clothing manufacturing industry by means of a brief request to take part in

the research. Through Instagram, requests were sended enquiring from possible individual participant's willingness to participate in such a research. Upon showing interest, the potential participants willingly gave their e-mails and mostly their mobile numbers to be reached for the interviews.

The participants were interviewed randomly rather than successively, according to their availability and space. The first interview took place in September 2021 and the last interview took place on 6 November 2021. The interviewees were given the option to be interviewed either telephonically or online (MS Teams). All participants took interest in telephonic interviews. The semi-structured interviews took on average about 25 minutes each. Each telephonic interview audio was recorded with a Mobicel laptop recorder app titled Voice Recorder.

3.8 Data analysis

Through the content analysis approach, the qualitative data was analysed both inductively (data-driven) and deductively (theory-driven) (Sahay, 2016:4). The reason for a qualitative content analysis in this study was to organise and condense a big volume of text into a clear, short overview of the main findings (Erlingsson & Brysiewicz, 2017:94). During this process, the results were presented in a quantitative manner to achieve accuracy of the number of instances identified in the data, validating the instrument used to produce the results. Secondly, this method of presentation ensured reliability of the interviews, as the similarities and frequencies in data were easily identified (Heale & Twycross, 2015: 66) and this was achieved in the form of tables evident in the next chapter.

Crystalisation was used instead of triangulation in this qualitative research by means of an adopted Circular economy framework, as a coding framework, content analysis of multiple perspectives as well as identifiying and extracting themes. Crystalisation is a practice of validating results through the use of numerous methods of data gathering and analysis (Maree & Van der Westhuizen, 2009). This practice is suitable for this research as it "provides us with a deepened, complex and thoroughly partial understanding of the topic", which is very aligned with the aim of this qualitative research study.

Content analysis has the capabilities to be an effective strategy in this fashion research because it assisted in developing a deeper understanding of the factors/dynamics that influence the adoption of remanufacturing and upcycling phenomena by providing structure in a large amount of textual data through a systematic process of interpretation. Secondly, it was extremely useful in identifying the potential barriers to sustainable manufacturing in the Cape Town fashion industry by a methodical process of interpretation, giving shape to a great volume of textual material (Kleinheksel et al., 2020:127). Therefore, during the data analysis

process, themes and patterns were developed and more focused in an inductive manner, which represents the content of primary research data from Cape Town clothing manufacturers' experience with sustainable clothing manufacturing practices. The interpretation process of the data findings took place deductively as a confirmatory approach supported by secondary research from the literature review.

Both the latent and semantic coding were adopted to interpret meanings beyond what was being said by the participants within the data and to identify the descriptive (surface meaning) level of what was being said. This inevitably demanded more involvement from the researcher to shape a sense of reality from participants' true experiences with adopting remanufacturing and upcycling in the fashion industry (O'Gorman & MacIntosh, 2014:4). In this empirically-oriented research, the study drew from the interpretivist and social norms with the intention of gaining a thorough understanding of the phenomena from the manufacturers' perspectives and to get an insight into remanufacturing and upcycling practices in reality "as experienced by social actors themselves".

Interviews were transcribed with the use of an online transcription programme called Otter A.I. Following this, the resulting transcripts were edited for accuracy. The transcripts were then read and re-read to understand and familiarise oneself with the data. Following this, was the first round of open manual coding by sifting through data for points of interest relevant to the study.

3.8.1 Research sub-question 1

RSQ 1: What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry?

To answer RSQ 1, a rigorous data analysis process had to take place. This question was intended to ascertain the current practice of sustainable manufacturing in the fashion industry globally and locally. The instrument used to address this question was semi-structured, in-depth interviews. The coding process began by means of manual coding, highlighting points of interest that emerge from the data and facts relating to the research. These were then categorised into the developed framework which was formulated into an excel spreadsheet according to the befitting codes.

3.8.2 Research sub-question 2

RSQ 2: What are the factors influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry?

To answer RSQ 2, a round of open coding, directly from the transcripts took place. The newly developed framework was populated with the coded data. This led to the development of new codes, which were added to the adopted framework, inductively (codes emerging from the data). At a later stage, a code count was undertaken to identify the undesirable effects (UDEs). The intention of this question was to determine the perceived barriers to the incorporation of sustainable practices from a manufacturing perspective. The instrument used to address this question was semi-structured, in-depth interviews.

3.8.3 Research sub-question 3

RSQ 3: How are the identified factors related across the cases?

To answer RSQ 3, the next section demonstrates the analysis process as to how this question was addressed. The intention behind this question was to accelerate the adoption of local sustainable manufacturing. During this, the responses from the developed framework were then applied to one of Goldratt's Theory of Constraints (TOC). I conducted content analysis process by means of conducting a code count from the framework, taking into account the number of instances a code appears in the data. The codes with the highest total were then used to construct the CRT diagram. This was made possible by means of direct responses to the semi-structured interview questions evident in transcripts. A content analysis of the data enabled me to identify and list the undesirable effects (UDEs) from each case in the data as well as across the cases. The UDEs were then applied to the construction of a thinking process tool called the Current Reality Tree (CRT) diagrams. This allowed the researcher to identify the main hidden barrier, limiting the adoption of sustainable manufacturing.

Table 3.1: Adaptation of the three pillars of sustainable development to the data (adopted from Villeneuve et al., 2017:5)

Dimensions	Short description
Environmental	Output from human activities, renewable energy
Economic	Wealth sharing, responsible consumption, healthy working conditions
Social	Education, freedom, culture, integration

During this process, the transcripts were coded and organised into the three categories or pillars of sustainable development namely: environmental, economic and social. Thus, the table above was used as a coding framework to present existing sustainable practices from the data.

To answer RSQ 2, "What are the factors influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry?" the analysis process

has to take place. The intention of this question was to determine the perceived barriers to the incorporation of sustainable practices from a manufacturing perspective. The instrument used to address this question was semi-structured, in-depth interviews. The responses from these interviews were then applied to a framework from a similar study such as *"Lost in transition? Drivers and barriers in the eco-innovation road to the circular economy"* were conducted by de Jesus and Medonca in 2018. The focus of the study was on the implementation of a Circular Economy in general. This framework was of interest as it focuses on Social/ Cultural, Technical, economic, as well as Institutional/ regulatory aspects that might affect the implementation of the Circular economy business model:

		Drivers	Barriers
"*Harder*" factors	Technical	Availability of technologies that facilitate resource optimisation, re-manufacturing and re-generation of by-products as input to other processes, development of sharing solutions with superior consumer experience and convenience	Inappropriate technology, lag between design and diffusion, lack of technical support and training
	Economic/Financial/ Market	Related to demand-side trends (rising resource demand and consequent pressures resource depletion) and supply-side trends (resource cost increases and volatility, leading to incentives towards solutions for cost reduction and stability)	Large capital requirements, significant transaction costs, high initial costs, asymmetric information, uncertain return and profit
"*Softer*" factors	Institutional/ Regulatory	Associated with increasing environmental legislation, environmental standards and waste management directives	Misaligned incentives, lacking of a conducive legal system, deficient institutional framework
	Social/Cultural	Connected to social awareness, environmental literacy and shifting consumer preferences (e.g. from ownership of assets to services models)	Rigidity of consumer behaviour and businesses routines

Table 3.1: A framework of typology and definition of drivers and barriers to a CE (De Jesus & Medonca, 2018:78)

		Drivers	Barriers
"Harder" factors	**Technical**	Availability of technologies that resource optimisation, remanufacturing and re-generation of by-products as input to other processes, development of sharing solutions with superior consumer experience and convenience.	Inappropriate technology, lag between design and diffusion, lack of technical support and training.
	Economic/ Financial/ Market	Related to demand-side trends (rising resource demand and consequent pressures resource depletion) and supply-side trends (resource cost reduction and stability).	Large capital requirements, significant transaction costs, high initial costs, asymmetric information, uncertain return and profit.
"Softer" factors	**Institutional/ Regulatory/ Social/ Cultural**	Associated with increasing environmental legislation, environmental standards and waste management directives. Connected to social awareness, environmental literacy and shifting consumer preferences (e.g. from ownership of assets to services models).	Misaligned incentives, lacking of a conducive legal system, deficient institutional framework Rigidity of consumer behaviour and business routines.

The second framework from a study by Hugo et al. (2021), which focused on the barriers and drivers that may potentially influence the application of this circular economy model, particularly in the fashion industry was adopted. Thus the table below is a framework

formulated by the authors with an additional factor which is Stakeholders, centred more on the consumer:

Drivers	Short Description	Stage
Institutional/ Regulatory	Legal Issues—Companies start to adopt environmental measures to remain in the market and meet legal pressures.	Design and Manufacturing
Market/ Economic	Circular models are profitable—Profitability can come via reducing lost revenue by focusing on quality and increasing prices, or by implementing sustainable and waste reduction measures in manufacturing processes.	Design, Manufacturing, and Consumer
	Fast fashion model in decline—Fast fashion sales have been falling due to changes in consumer behavior, generating opportunities for new business models, such as circular fashion.	Design, Manufacturing, Distribution, and Consumer
Stakeholders	More aware consumers—Consumers are more aware of environmental and ethical issues and are pressuring fashion companies to change.	Collection/ Recycling, Design, Manufacturing, Distribution, and Consumer

Barriers	Short Description	Stage
Market/ Economic	Organizational—Due to globalization and many partners in the fashion industry, it is more difficult to create a completely circular/sustainable chain.	Design and Manufacturing and Distribution
	Product—Much of the fashion industry has not yet realized that everything starts with product designs that are less harmful to the environment, and there is a lack of conscientious fashion design professionals.	
Institutional/ Regulatory	Governmental—Lack of support from governments to create openness, guide efforts, and reduce costs, to implement more ecological solutions.	Design and Manufacturing and Distribution
Social/ Cultural	Consumer culture—Consumers are still very attached to fast fashion consumption and do not see the negative consequences associated with high levels of consumerism. Slow fashion has not yet conquered market space because of this.	Consumer Usage
	Consumer culture—Ideas such as second-hand clothing and rental stores are not widely used by consumers to reduce high consumption and textile waste generation due to several factors, such as clothing appearance and hygiene issues.	
Technological	Difficulties range from technical challenges, such as separating fabric mixtures, to high costs for recycling.	Collection/Recycling and Manufacturing
Stakeholders	Knowledge—Consumers are not aware of the consequences of traditional fashion models, and there few sustainable fashion brands that exist and those that do, do not convey credibility to consumers.	Consumer Usage

Table 3.2: A framework outlining Circular economy drivers and barriers in the fashion industry (Hugo et al., 2021:11)

Drivers	Short Description	Stage
Institutional/ Regulatory	Legal Issues–Companies start to adopt environmental measures to remain in the market and meet legal pressures.	Design and Manufacturing (Sandvik & Stubbs, 2019:366)
Market/ Economic	Circular models are profitable–Profitability can come via reducing lost revenue by focusing on quality and increasing prices, or by implementing sustainable and waste reduction measures in manufacturing processes.	Design, Manufacturing, and Consumer (Brydges, 2021:293)
	Fast fashion model in decline–Fast fashion sales have been falling due to changes in	Design, Manufacturing, Distribution, and Consumer (Yoon et al., 2020:5-7)

	consumer behaviour, generating opportunities for new business models, such as circular fashion.	
Stakeholders	More aware consumers–Consumers are more aware of environmental and ethical issues and are pressuring fashion companies to change.	Design, Manufacturing, Distribution, Consumer, and Collection/Recycling (Ciasullo et al., 2017:430-162)

Thus the framework by Hugo et al. (2021) was used as a coding frame and data were coded taking into account barriers or drivers as well as the dynamic. The description of the factors was developed as needed/ deductively (adopted from existing data) and coded to determine the current practice of sustainable manufacturing in the fashion industry globally and locally. It is worth noting that the descriptions of the deductive codes were altered to a certain extent to accommodate the research.

Step 1 & 2: Familiarising yourself with the data and determining the coding categories

The deductive codes (adopted from existing frameworks) were as follows: B_Globalisation challenges, B_Conscientious fashion designers, D_Profitable circular models, D_Decline in fast fashion, B_Lack of government support, D_Legislation/obligation, B_Attachment to Fast Fashion, B_Appeal and perception of reused clothing, B_Sorting issues and expensive disassembly tools, B_Consumer awareness, B_Brand availability & credibility, D_More aware consumers.

The inductive codes (emerging from the data) were as follows (Note: Globalisation and cheap Chinese fast fashion imports are a result of two codes merged due to similarities): B_Globalisation and cheap Chinese fast fashion imports, B_Small-scale, niche-status businesses- B_Small market size, B_Potential growth, B_Cost is an issue, B_Company struggles, B_Impact of COVID-19, D_Investment and Funding, B_Legalities, D_Economic/ social sustainability, D_Government support, B_Informal sustainability discussions, D_Formal sustainability discussions, B_Perceptions influenced by background (Educational/ Generational/Cultural/historical), B_Sustainability is for big companies, D_Knowledge sharing platforms, B_Retailer demands/requests, B_Consumer demands, D_Partnerships, D_Unused knowledge and skills, D_Conscious and more aware designer/manufacturer, B_Greenwashing.

Step 3: Coding the content

The next step was coding the content into the newly developed framework. The newly developed framework looked like this:

Table 3.3: Illustrates six inductive codes that were categorised as market/economic barriers in the data, were added to the developed framework and were all indicated in bold italics

Factor	Code	Short Description
Market/ Economic	B_Globalisation and cheap Chinese fast fashion imports	Barrier_Organisational: Due to globalisation and many partners in the fashion industry, it is more difficult to create a completely circular/sustainable chain. In addition to this, as China became a major exporter of manufactured products into South Africa, so did the displacement in local manufacturing and significant losses in jobs and revenue in the clothing industry. Therefore, sustainability became more unappetising for many local companies (Fung et al., 2020:883).
	B_Conscientious fashion designers	Barrier_Product: Much of the fashion industry has not yet realised that everything starts with products designs that are less harmful to the environment, and there is a lack of conscientious fashion design professionals (Todeschini et al., 2017:759).
	B_Small-scale, niche-status businesses	*The small, privately owned sustainable businesses, operating from their home spaces do face some difficulties in upscaling in the market.*
	B_Small market	*Small market: There is not enough consumer demand, thus retailers are not under pressure.*
	B_Cost is an issue	*Large capital requirements needed towards sustainability will also influence the price of products and retailer knows consumer won't want to pay more.*
	B_Company struggles	*Local businesses struggling to survive because of economic feasibility will not consider adopting sustainable manufacturing as they see it as too expensive.*
	B_ Impact of Covid 19	*The pandemic has had a significantly negative impact on local businesses.*
	B_Investment & Funding	*If the clothing industry is to grow, investment needs to be implemented.*

Table 3.4: One inductive code emerged as a market/economic driver in the data, and was added to the developed framework

Factor	Code	Short Description
Market/ Economic	***D_Potential growth***	*Despite the lag, there is a slow increase/growth in the market popularity of sustainable manufacturing practices among SA fashion consumers and other stakeholders, especially the youth.*
	D_Profitable circular models	Drivers_Circular models are profitable—Profitability can come via reducing lost revenue by focusing on quality and increasing prices, or by implementing sustainable and waste reduction measures in manufacturing processes (Fung et al., 2020:883).

	D_Decline in fast fashion	Drivers_Fast fashion model in decline—Fast fashion sales have been falling due to changes in consumer behaviour, generating opportunities for new business models, such as circular fashion (Todeschini et al., 2017:759).

Table 3.5: Two inductive codes: Legalities and Informal sustainability discussions emerged as the institutional/regulatory drivers in the data

Factor	Code	Short Description
Institutional/ Regulatory	B_Lack of government support	Barrier_Governmental—Lack of support from governments to create openness, guide efforts, and reduce costs, to implement more ecological solutions. (Nayak et al., 2019:303; Warasthe et al., 2020:19).
	B_Legalities	*The red tape and the documentation that comes with running a formal business with employees in SA make it even more unattractive to adopt a sustainable model.*
	B_Informal sustainability discussions	*Consumers, retailers, manufacturers and other stakeholders are definitely having talks towards being sustainable, however, no strategies have been put in place.*

Table 3.6: Three more inductive codes emerged as the institutional/regulatory drivers in the data with their descriptions

Factor	Code	Short Description
Institutional/ Regulatory	***D_Economic/Social sustainability***	*Employing people, fair wages, good working conditions, saving energy, etc.*
	D_Government support	*The existence of government support in the form of skills development and initiatives serve the clothing industry well.*
	D_Legislation/obligation	Legal Issues—Companies start to adopt environmental measures to remain in the market and meet legal pressures (Warasthe et al., 2020:19)
	D_Formal sustainability discussions	*Clothing companies are starting to talk towards the move to a sustainable model.*

Table 3.7: Perceptions influenced by background (educational/generational/cultural/historical) were added as an inductive code and categorised as a social/cultural barrier in the data

Factor	Code	Short Description
Social/ Cultural	B_Attachment to Fast Fashion	Barrier_Consumer culture—Consumers are still very attached to fast fashion consumption and do not see the negative consequences associated with high levels of consumerism. Slow fashion has not yet conquered market space because of this (Park et al., 2017:298; Liang & Xu, 2018:120-130).

	B_Appeal and perception of reused clothing	Barrier_Consumer culture—Ideas such as second-hand clothing and rental stores are not widely used by consumers to reduce high consumption and textile waste generation due to several factors, such as clothing appearance and hygiene issues (Park et al., 2017:298; Liang & Xu, 2018:120-130).
	B_Perceptions influenced by background (Educational/ Generational/ Cultural/ Historical)	*The dynamics in education and the generational mindset have had an effect on the current state of the Cape Town fashion industry. The way in which people have done things has an effect on how they perceive new things such as discarded clothes, which have been reused into new garments.* *The history of South Africa as well as the rich history of the Cape Town clothing industry as the hub of manufacturing does have an effect on the current state/mindset towards the adoption of sustainable practices.*

Table 3.8: Sustainability is for big companies was added as an inductive code and identified as the main technological barrier to the adoption of sustainable manufacturing in the data

Factor	Code	Short Description
Technological	B_Sorting issues and expensive disassembly tools	Barrier_Difficulties range from technical challenges, such as separating fabric mixtures, to high costs for recycling because of expensive technology (Colucci & Vecchi, 2021:873; Sandvik & Stubbs, 2019:366).
	B_Sustainability is for big companies	*The infrastructure needed for initiating and maintaining sustainable manufacturing can only be handled by big companies. The specialised machinery, labour and time put into sustainable manufacturing often puts financial pressure on SMEs.*

Table 3.9: Seven inductive codes surfaced from the data and were identified as stakeholder barriers in the data, and were added to the developed framework

Factor	Code	Short Description
Stakeholders	B_Consumer awareness	Barrier_Knowledge—Consumers are not aware of the consequences of traditional fashion models (Mcneill & Moore, 2015:212; Neumann et al., 2020:571).
	B_Brand availability & credibility	There is a lack of accessibility to local sustainable brands, and the few sustainable fashion brands that exist and those that do, do not convey credibility to consumers (Mcneill & Moore, 2015:212; Neumann et al., 2020:571).
	B_Marketing gap	*Sustainable products require a significant level of marketing, as these products tend to be novel among South Africans.*
	B_Knowledge sharing platforms	*The lack of knowledge concerning upcycled/ remanufactured and overall sustainable fashion in SA suggests a need for teaching platforms.*

Factor	Code	Short Description
	B_Skills gap	*The gap in skills needed for running a niche market business such as the use of disassembly tools serves as a barrier to the adoption of sustainable manufacturing.*
	B_Retailer Demands	*The manufacturer is likely to adhere to the demands of the retailer as well as the consumer.*
	B_Consumer demands	*Consumers are not willing to pay more for sustainable garments.*
	B_Fear of upscaling	*With the increase in environmental consciousness in SA, more consumers, particularly the youth are starting to buy into second-hand shopping and thrifting. This puts added fears and scepticism on the manufacturer and the designer on whether to make this a sole income source.*
	B_Greenwashing	*With the popularity of false representation of many brands and retailers claiming to be using sustainable materials and practices to gain the favour of environmentally-conscious consumers, sustainability efforts remain difficult for authentic designers, manufacturers and many stakeholders.*

Table 3.10: Inductive codes were added to the developed framework, emerging as stakeholder drivers in the data

Factor	Code	Short description
Stakeholders	D_More aware consumers	More aware consumers—Consumers are more aware of environmental and ethical issues and are pressuring fashion companies to change (Ciasullo et al., 2017:143-162).
	D_Partnerships	*Collaborations between the various stakeholders in the fashion industry are essential in creating a more efficient and sustainable supply chain.*
	D_Unused skills and knowledge	*There is a wealth of knowledge from those who were previously in the fashion industry, however that knowledge is not transferred/shared, leaving a gap in skills in the new generation of fashion professionals.*
	D_Conscious & more aware designer/ manufacturer	*The few existing conscious designers, manufacturers and retailers may just be the ones to spread the urgency of sustainability in fashion through their mindset and practices.*

3.9 Methodological limitations

The lack of existing research on the remanufacturing and upcycling phenomena in the South African fashion industry, influence the outcomes of the research and may not fully confirm the definite barriers to the adoption of sustainable practices, beyond a reasonable doubt. The sample was selected based on pre-set criteria of the participants, therefore, I do recognise biases in sampling and constant critical reflection of methods to ensure sufficient gravity and significance of data gathering. Although qualitative studies may not require large samples, the sample size may have had an impact on the research results in the following ways: i) Due to time constraints and the availability of the participants, the generalisability of the results was

limited by the sample size of the research; ii) The interpretation of the research findings may not be representative of the entire clothing manufacturing population's perceptions, as a result of the small sample size; iii) Due to the level of uncertainty in undertaking explorative research and entering into an area of an unknown or under-researched phenomenon, the construct of the interview script could be improved for a more effective primary data collection process; iv) As per the nature of in-depth, semi-structured interviews, the process tended to be time-intensive and costly; v) Face-to-face interaction between the researcher and respondent, during the interview process, may have yielded more transparent and more truthful results. As a result, technical problems such as bad connectivity of the telephone lines distracted the interview process; vi) The physical disconnect between the researcher and the participant may have affected the qualitative nature of the study, as shaping a sense of reality, through lived their experiences required a close connection to the participants. Because of Cape Town's long history as a centre of the clothing manufacturing, the scope of the study restricted to this area only, as it was chosen. Instead of typical recycling, the scope of the study's was aimed at fashion remanufacturing and upcycling only.

The analysis of the study was limited to only identifying CE barriers and drivers to the adoption of circular economy practices in fashion for fashion manufacturers in particular. The research's findings would only be reported based on the researcher's comprehension of the behaviours and attitudes of sustainable manufacturing practitioners toward the remanufacturing and upcycling phenomena among Cape Town's manufacturing community. The qualitative nature of the research required the involvement of the researcher in the interview and in the analysis process thus, the interpretations were subject to bias and the results simply being an assortment of the researcher's personal views subject to inevitable bias (Smith & Noble, 2014:17). To minimise this, I have aimed to design and integrate methodological tactics to assess the validity and confirm the trustworthiness of the research results.

Such strategies include:

i) Acknowledging sample biases and doing ongoing critical reflection on procedures to ensure that data collection and analysis are sufficiently serious and significant.
ii) Keeping a careful record is representative of strong decision-tracking to guarantee interpretations of collected information are transparent as well as reliable.
iii) Recorded audio of the semi-structured interviews data collection process, permit for repetitive revisiting of the responses to check developing themes and this maintains participants' true experiences with engaging in sustainable manufacturing practices.
iv) Since the data were extracted from the original transcripts, I have verified the correctness of the information in terms of representation and continuous comparison. This was applied in a data spreadsheet during the coding process.

v) I have shown clarity in terms of the thought process during data analysis and consequent interpretations by demonstrating how I generated the final themes presented and how they were labelled.

vi) During the presentation of findings, I have done a continuous comparison in the data sets of the respondents in search of similarities and differences across the recorded experiences to ensure that a variety of viewpoints are represented (Slevin, 2002).

vii) During the interpretation process, I have verified the validity of existing research to minimise bias in my own research. Secondly, a reflection of the researcher's own perceptions of participants' responses further strengthened the purpose and the design of the study. Nonetheless, the outcomes are reliable for addressing the main research question: How can the adoption of sustainable local manufacturing, in the form of remanufacturing and upcycling, be accelerated in Cape Town?

3.10. Ethical considerations

Ethical approval for the research was obtained from the Cape Peninsula University of Technology on 22 April 2021 (see Appendix A). Upon agreement to take part in the study, the participants signed a non-binding consent form, with the option to also give verbal consent via telephonic interviews. The participants had the option of telephonic or online (via Microsoft Teams) interviews due to accessibility reasons.

Participants had the opportunity to either sign a Consent of Principle form (see Appendix B) or give consent verbally through the telephone. Participants were made fully aware of their right to privacy and confidentiality, and that all information they shared would stay strictly with the researcher. All participants were asked permission for the researcher to use data collected from the research activity. They were fully informed of their right to withdraw at any given time. Secondly, all participants involved in the study remained completely anonymous and pseudonyms where used, as protecting the participants' identities was of top priority. No incentive or enticement was offered to the participants for taking part in the research and all participation was completely voluntary. Intellectual property ethics of the companies were strictly adhered to, and participants were assured that their participation in the study would in no way expose the company or their profession to harm or risk. Data collected during the investigation were stored, password-protected and backed up online for the researcher's and supervisor's access only.

3.11. Summary

This chapter presented detailed yet concise information on the journey of the study design. One learns of the close alignment and correspondence between an explorative study,

qualitative research as well as case study and how they all fit into a single investigation. The common factor here is the human element required to conduct the research, making it more authentic. The chapter also reflected on the critical areas of inevitable errors that may occur in any research field.

Chapter 4: Findings

4.1 Introduction

The South African clothing manufacturing industry has constantly suffered under the shadow of low-cost international imports. These imports gave birth to fast fashion, which came along with unfair trade, cheap labour, cheap and fast mass-produced garments, and inevitable compulsive consumption. Consequences of these were discarded garments or the 'throw-away' culture, local factory closures, and current environmental problems globally. These unsustainable practices have caused more pressure to become sustainable, an additional issue facing the South African fashion industry today. In Chapter 1, these issues were unpacked by digging through underlying factors in the background of the problem. Therefore, considering these issues, the following research sub-questions (RSQs) were formulated:

RSQ 1: What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry?

RSQ 2: What are the factors influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry?

RSQ 3: How are the identified factors related across the cases?

Chapter 2 provided the literature on these sustainable manufacturing practices aligned with this research project from a local and global lens. Chapter 3 presented the methods and research design of the study. In this regard, in-depth, semi-structured interviews were conducted to explore current practices and existing perceptions towards recycling practices, focusing on remanufacturing and upcycling within the Cape Town clothing manufacturing hub.

Furthermore, the exploratory nature of case studies was specifically suitable for gathering data in real-time, as it happens. In this chapter, the findings are presented in a manner that addresses each of the research sub-questions (RSQs). The adopted frameworks are presented to address RSQ 1. The coding analysis process was presented as tables from the newly developed frameworks to address RSQ 2. Case analysis findings are presented according to the background, current sustainable practice, perceptions on barriers to the circular economy in fashion, and perceptions on drivers to the circular economy in fashion through tables, diagrams, and pie charts to address RSQ 3.

4.2 Individual case analysis findings

In this section, I will present and briefly discuss the findings (information) of the responses from the semi-structured interviews (instrument) on each of the six cases. Once again, these

responses were structured to directly address the above-mentioned research sub-question: What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry? In this section, the findings are structured according to each case's profile regarding their company or business, background, current sustainable practices, perceptions of barriers to the circular economy in fashion, and perceptions of drivers to the circular economy in fashion.

Table 4.1: Case profiles

Case	Business Profile	Form of Sustainable Practice
Case 1: Remanufacturer, upcycler, designer	SME, serving a niche market that is predominantly aimed at the Punk rock community (men's and ladies' wear) through reuse and repurposing	Remanufacturing, repurposing, and refashioning vintage garments. Wearing only second-hand clothing. Empowering through education
Case 2: School uniforms, sleepwear, baby wear manufacturer	The owner of a small clothing manufacturing company, run from a home space. C2 is also the supplier of a clothing shop located in Fishhoek and offers a manufacturing service of small runs of CMT services to small to medium companies and supplier services	Recycling of paper and waste, in-house cutting of fabric. Employment of local women. Sharing unused knowledge and skills through education.
Case 3: Consultant, marketing partner to major retailers and designers	Represents a share of a marketing partner and consultancy in a local apparel production company located north of Cape Town. C3 caters for major retailers and independent designers.	Solar panelling energy ; sustainable fabric option ; sustainably-sourced wool, Reuse. Job creation, Providing good working conditions, Bargaining council accredited wage rates.
Case 4: Team leader to a leading outdoor wear retailer	Company provides Clothing manufacturing and retailing service to the public, using CMT services and outsourcing mass production	Recycling fabric and paper; reducing waste, reducing electricity usage, Job creation by employing women and skills development.
Case 5: Upcycler, designer	SME, offering a niche market service of online vintage and upcycled clothing retailing to the public. C5 operates both from her private home space and rented storage space in Woodstock	Upcycling, mending, and repurposing discarded garments, recycling clothing, and not buying from fast fashion houses. Employment of local women and creating consumer awareness of global warming and greenwashing

Case 6: Upcycler, designer	Niche status SME, producing once-off sustainably manufactured pieces.	Upcycling, creating new garments from old bedding, curtains, and garments. Choosing second-hand clothing; paper, glass and plastics recycling

Table 4.1 presents the cases according to their business profiles and models.

4.2.1 Case 1: Remanufacturer, upcycler, designer

4.2.1.1 Background

Participant 1 (P1) takes old garments and repurposes them by deconstructing and reconstructing them into a new and alternative Victorian look as a form of sustainable practice. She occupies a small shop in a suburb of Cape Town as her selling platform. Although she employs 1–2 shop assistants, she takes responsibility for the bulk of the work, from sourcing vintage clothing and old matric ball dresses from charity shops to cutting, designing, and sewing. This is mainly done from her home space. The main focus of her business model is clothing remanufacturing and retailing, serving a niche market that is predominantly aimed at the Punk rock community (men's and ladies' wear) through reuse and repurposing. P1 expressed concern about the environmental results of throw-away culture and fast fashion as the motivating factor behind producing remanufactured, repurposed and upcycled fashion strictly.

4.2.1.2 Current sustainable practice

Table 4.2: Current sustainable practice of Case 1

Pillars of sustainability	Sustainable practice	Participant quotes
Environmental	Remanufacturing, repurposing, and refashioning of vintage garments Wearing only second-hand clothing	*Participant 1 4:36* *"So what we really liked about this brand in particular, is that we reuse and repurpose clothing, and so they can go on to be used again and again and again."*
Economic	n/a	
Social	Empowering through education	*Participant 1 11:18* *"Making more people aware. Uhm, really just try to get the message out there to people to say that it's better quality, the clothing's better manufactured, it's a better structure."*

The environmental pillar (Table 4.2) was addressed through P1's deep concern for the current unsustainable practices such as landfilling and the throw-away culture in the fashion industry,

displaying her passion for remanufactured, repurposed clothing that is aimed at reuse and longer lifecycle. The social pillar is addressed through her pursuit to educate people to buy repurposed vintage and locally-produced clothing instead of cheaply-manufactured and imported fast fashion. In addition, the data reveals how P1 proudly subscribes to second-hand clothing, even on a personal level. According to the data on Case 1, economic sustainability was not addressed.

4.2.1.3 Perceptions on barriers to the circular economy in fashion

The CRT diagram (Figure 2.1) represents Case 1's major barriers as potential constraints impeding the adoption of sustainable manufacturing practices. The undesirable effects (UDEs) were carefully chosen according to the frequent occurrences in the data or the most prominent barriers to the adoption of sustainable manufacturing practices from the responses of the participant. Therefore, it is worth noting that not all barriers were included in the construction of the CRT diagram. These were divided into three categories, namely: The immediate effects, intermediate effects as well as the root cause. In the table, they are constructed from top to bottom (Mabin, 2015:4). Figure 4.2 presents the analysis process of identifying the main UDEs from Case 1.

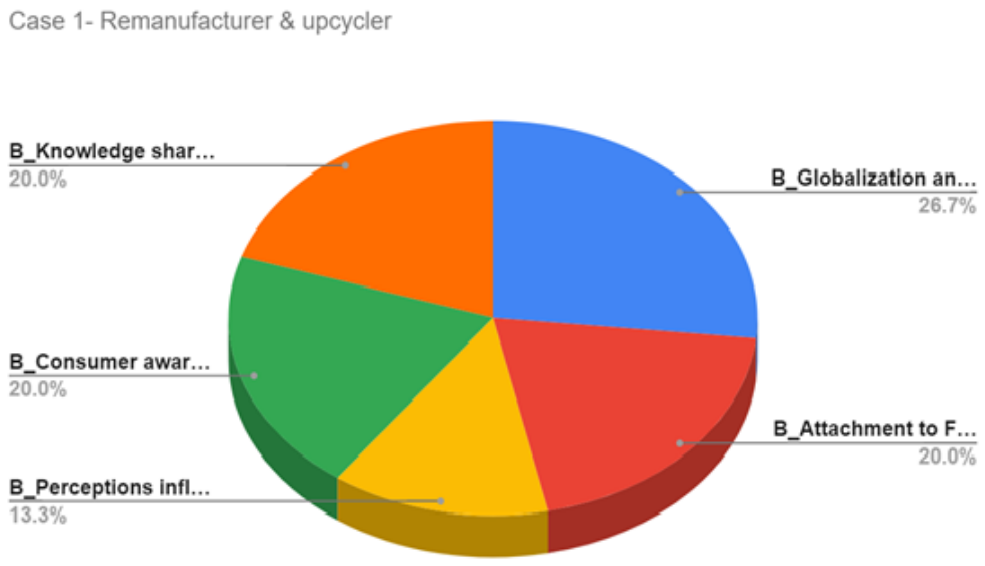


Figure 4.1: The main UDEs from Case 1

The UDEs were then applied to the CRT diagram, which would identify the major constraint to the adoption of sustainable practices. At 26,7%, the findings identify *globalisation and fast fashion* as the most prevalent barrier, according to Case 1.

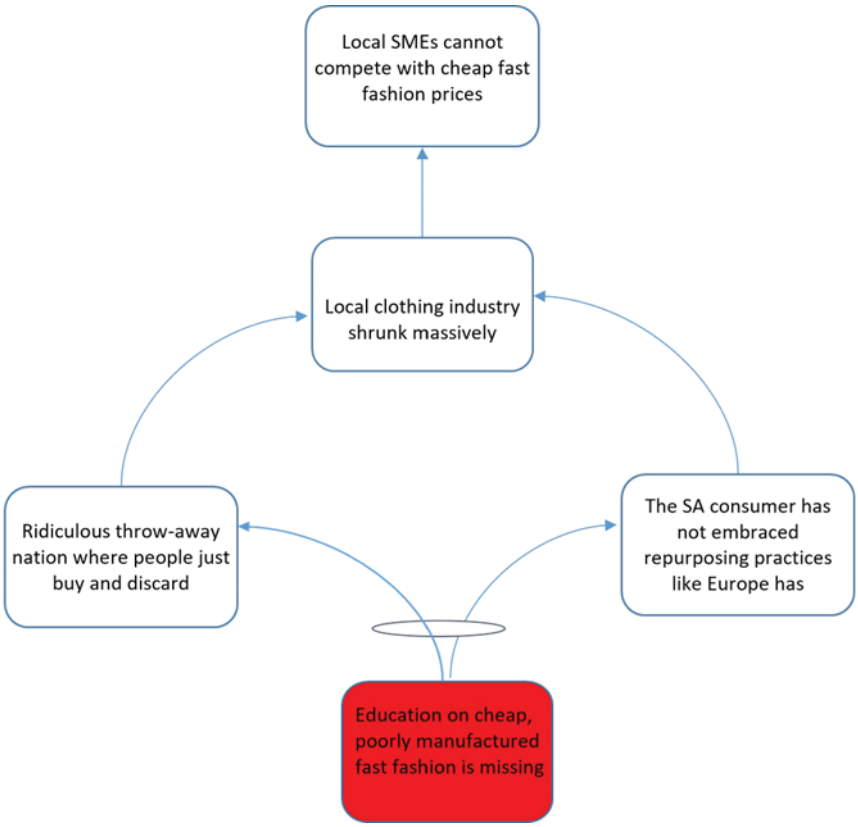


Figure 4.2: Case 1 Current reality tree

The immediate effects: The respondent emphasised fast fashion posing a great threat to local fashion businesses as they produce and sell their goods at such a low cost that local clothing businesses cannot compete.

Intermediate effects: P1 explored the history of the Cape Town fashion industry, sharing her knowledge of how the local fashion industry was three decades ago. She mentioned Woodstock and Salt river, the hub of hundreds of successful clothing production houses, which are currently no more. P1 stated that:

> The industry was massive, massive, massive, massive. There used to be a book so that you could get the A to Z of factory shops, and you could go through the whole of Cape Town and buy absolutely anything you wanted from the factory shops or from factories here in Cape Town. Those factories are all gone, which is so sad.

She proceeded by condemning the behaviour of manufacturers who are continuously mass-producing clothing. Another hurdle she mentioned was the slow acceptance of sustainable practices compared to Europe.

The root cause: The data from P1 highlighted the negative perception of reused garments as an issue, suggesting the lack of education/awareness regarding sustainable manufacturing practices as a barrier.

4.2.1.4 Perceptions on drivers to the circular economy in fashion

P1 promoted education through awareness programmes as a driver of sustainable practices in the local fashion industry. She strongly emphasised educating more people, particularly on the bad quality garments they buy, unaware of the poor quality. She mentioned legislation and obligation as a regulatory driver of sustainable manufacturing through government enforcing manufacturers to return to locally-producing their clothing and supporting local businesses, restricting fast fashion imports. The table below presents the analysis of these drivers.

Table 4.3: Presentation of major drivers of sustainable manufacturing from Case 1

Factor	Code	Case 1: Remanufacturer, upcycler
Market / Economic	D_Decline in fast fashion	1
Institutional / Regulatory	***D_Government support***	1
	D_Legislation/obligation	1
Stakeholders	D_More aware consumers	1
	D_Conscious and more aware designer/ manufacturer	8

Table 4.3 presents findings from the analysis of drivers of sustainable manufacturing from Case 1. *Conscious and more aware designers* were revealed as major stakeholder drivers. The *market/economic* factors and the *institutional/regulatory* factors did not contain sufficient substantial data for the analysis.

4.2.2 Case 2: School uniforms, sleepwear, baby wear manufacturer

4.2.2.1 Background

Participant 2 (P2) is the owner of a small clothing manufacturing company, run from a space at the back of her yard. She is also the supplier of a clothing shop located in Fishhoek. She is based in a Cape Town suburb, employing two ladies working as machinists. With the company's struggles, she makes all the patterns and grading herself, sees to the company sales, and sourcing new work from bigger companies. P2 offers a manufacturing service of small runs of CMT services to small to medium companies and supplier services. She specialises in clothing manufacturing, specifically sewing and ironing operations, and outsourcing other operations. With her experience in the corporate world for three decades as a children's wear designer, she has also spread her wings to manufacturing school uniforms, which is her bread and butter, sleepwear, and babywear. Her target market is mostly toddlers and children.

4.2.2.2 Current sustainable practice

Table 4.4: Current sustainable practice of Case 2

Pillars of sustainability	Sustainable practice	Participant quotes
Environmental	Recycling of paper and waste, in-house cutting of fabric	*Participant 2 6:20* *"Look, personally, I think it's the way to go, because I'm an environmentalist, you know, I recycle everything."*
Economic	Employment of local women, paying fair wages	*Participant 2 3:45* *"I reduced the amount workers...and at the moment I only have two. Because with COVID, when it started, I retrenched all of them first, paid them out,...But, I paid them for five weeks…"*
Social	Sharing unused knowledge and skills through education	*Participant 2 5:34* *"…I've taught many, many a person, young person, you know, and because of my experience within the clothing for all those years. It was a good platform to teach people. This company has always been a platform to teach…"*

The environmental pillar in Table 4.4 was addressed through P2's broad take on sustainable practices in her daily business routine, such as recycling paper. The economic pillar is addressed by creating employment for local women and paying them fair wages. Her passion for sharing her unused skills and experience from the industry through education platforms would address the social pillar.

4.2.2.3 Perceptions on barriers to circular economy in fashion

Figure 4.3 presents is the identification process of UDEs for Case 2.

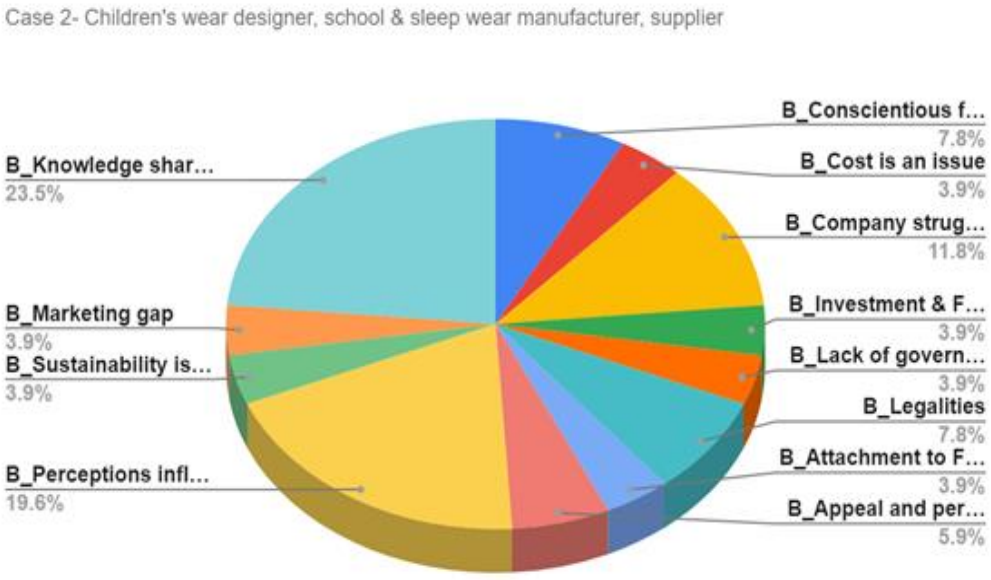


Figure 4.3: The main UDEs from Case 2

Rated at 23,5%, the results revealed *knowledge sharing platforms* as a major barrier, which was applied to the CRT diagram to demonstrate the logic behind this outcome, while

perceptions influenced by *background (educational/generational/cultural/historical)* were identified as the second most pressing barrier at 19,6%.

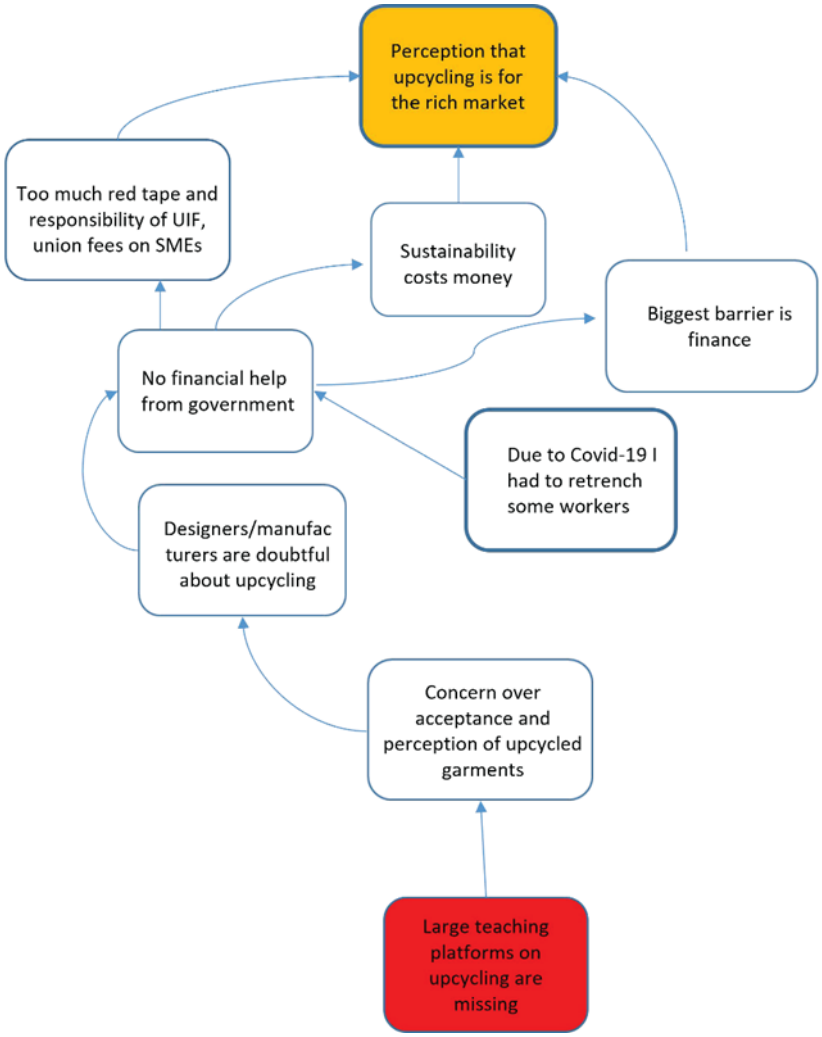


Figure 4.4: Case 2 current reality tree

The immediate effects: P2 believed that the cost of sustainability makes it a market that would only appeal to the rich.

Intermediate effects: P2 considered funding to be one of the major barriers to running a small sustainable business due to the difficulty of a small business covering additional fees such as the Unemployment Insurance Fund (UIF), paying union fees, and the responsibility of paying rent to the building owners. P2 also shared her constant doubt about the perception and appeal of reused garments and how this would contradict black people's high-quality standards, even bluntly questioning the value and quality of upcycled garments. P2 furthermore displayed frustration with the lack of support from the government.

The root cause: P2 stated that workshops and large-scale teaching platforms are not in place to educate South African people about these sustainable practices.

4.2.2.4 Perceptions on drivers to the circular economy in fashion

P2 emphasised education on upcycling as a matter of urgency towards adopting sustainable manufacturing. She suggested teaching platforms on upcycling, such as schools to teach children and communities where the masses are jobless (P2, 21:49; P2, 22:06). P2 further emphasised tapping into unused knowledge, referring to the older generation who need to share their expertise with the youth in the fashion industry. The table below presents the analysis of these drivers.

Table 4.5: A presentation of major drivers of sustainable manufacturing from Case 2

Factor	Code	Case 2: Children's wear designer, school & sleepwear manufacturer, supplier
Stakeholders	D_More aware consumers	4
	D_Unused skills and knowledge	2
	D_Conscious and more aware designer/ manufacturer	2

4.2.3 Case 3: Consultant, marketing partner to major retailers and designers

4.2.3.1 Background

Participant 3 (P3) represents a share of a marketing partner and consultancy in a local apparel production company located north of Cape Town. He has a team of more than 20 employees, facilitating and opening accounts, ensuring the appropriateness of production requirements to the customer's needs in terms of product, price, and quality standards. Not only does P3 cater to major retailers, but he also does marketing for independent local designers. He also specialises in introducing potential customers and clients to effective opportunities. P3 offers marketing services to both Full Production Package as well as CMT, manufacturing men's and ladies' leisurewear, corporate wear, and a variety of other products for major retailers and smaller brands. Ready-to-wear mass market (retail) is his business model.

4.2.3.2 Current sustainable practices

Table 4.4 displays *more aware consumers* as a major stakeholders driver, evident from Case 2. This was followed by two other drivers, holding equal positions at 2.

Table 4.6: Current sustainable practice of Case 3

Pillars of sustainability	Sustainable practice	Participant quotes

Environmental	Solar panelling energy; sustainable fabric option; sustainably-sourced wool; reuse	*Participant 3 10:43* *"And that in terms of…in terms of our fabric sourcing, and going back to wool and dying and make sure that that all is done right..."*
Economic	Job creation, good working conditions, bargaining council, accredited wage rates.	*Participant 3 10:43* *"So, until it got involved, so we opened up April last year, and now we employ over 100 people. So we, so that's part of sustainability is about employing people."* *"So we employ people, we pay them, National Bargaining Council rates. We have got a certificate from the DNBC so, we pay the people well, and we employ jobs."*
Social	N/A	*N/A*

The environmental pillar is addressed through saving energy using solar panelling and advocating for the use of sustainable fabrics. Economic sustainability is reflected in their main focus, which is employment creation, as they have reopened one factory that previously closed down, stressing the matter of fair wages being paid to the employees and ensuring good working conditions, which form a significant part of sustainability. There was little to no attention paid to social sustainability.

4.2.3.3 Perceptions on barriers to the circular economy in fashion

The pie chart in Figure 4.4 demonstrates the identification process of UDEs from Case 3.

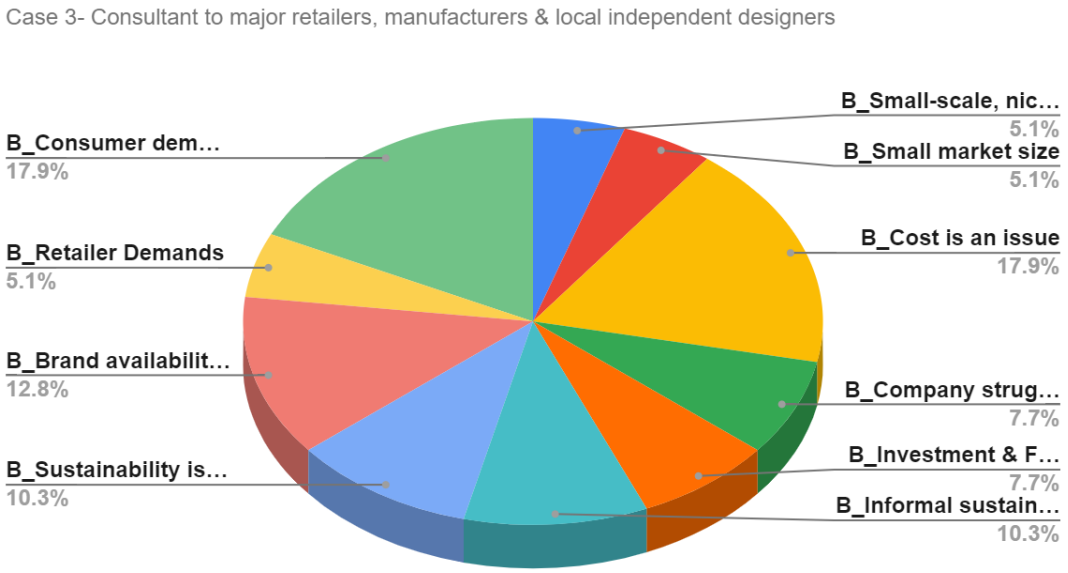


Figure 4.5: The main UDEs from Case 3

Rated at 17,9%, the analysis revealed *consumer demands* as a major barrier, which were then applied to the CRT diagram to demonstrate the logic behind this outcome, while *brand availability* was identified as the second most pressing barrier at 12,8%.

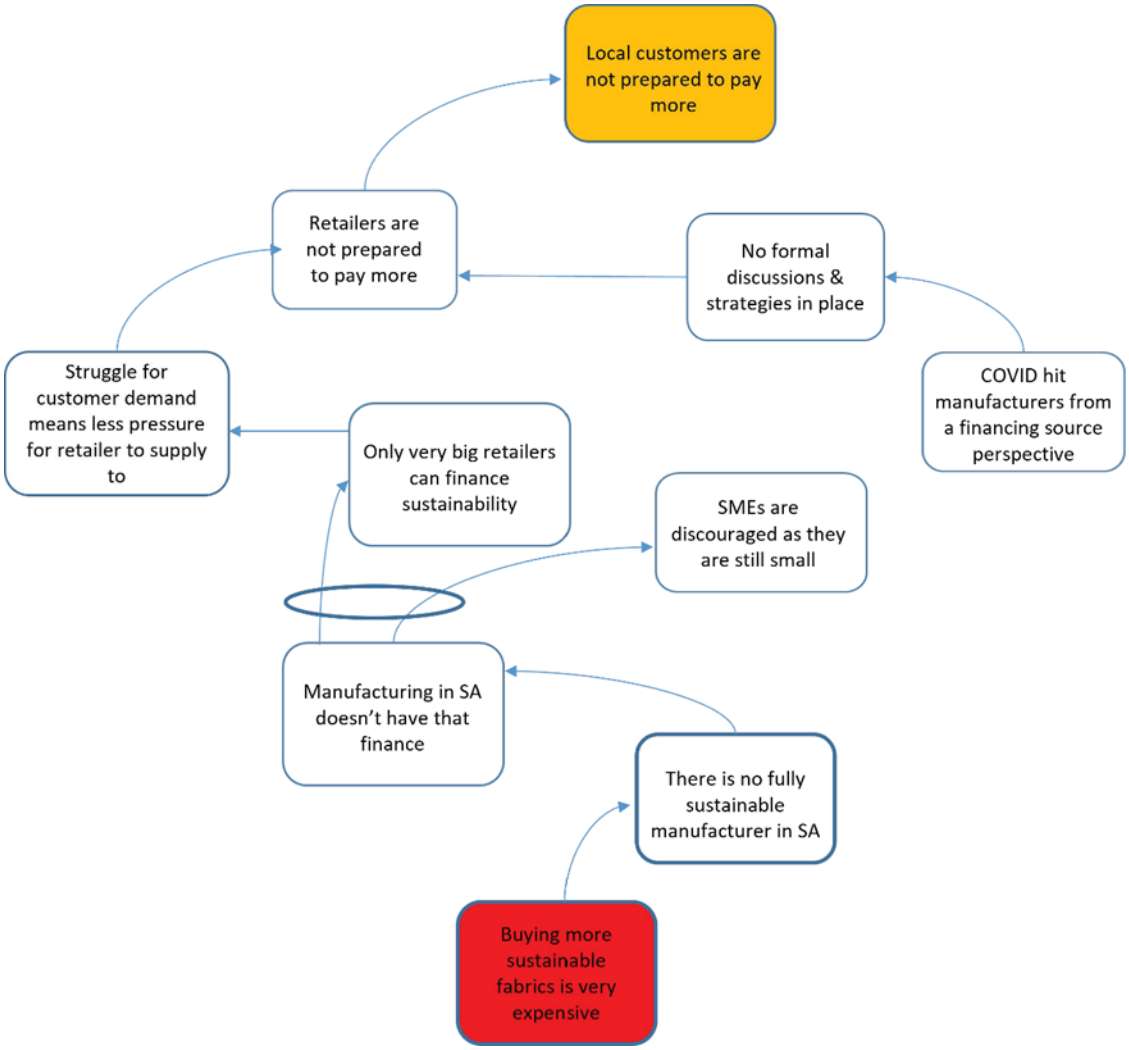


Figure 4.6: Case 3 current reality tree

Immediate effects: P3 raised concerns from his experience that local consumers are not ready to pay for garments at higher prices in the name of sustainability. Although there may be recognition, they do not yet project any interest.

Intermediate effects: According to P3, there is a lack of funding for local manufacturing. He believed that bigger manufacturing companies stand a better chance financially to undertake a sustainable chain as he stated that "the only people who could finance this is really big, big, big retailers" (P3, 23:18). It was also interesting that in his line of work, he mentioned that he still could not find a fully sustainable local manufacturer. P3 was of the opinion that the very

low consumer demand for sustainable products makes the market not strong enough for the retailer to pursue.

The root cause: P3 identified the high expense of sustainable fabrics as a major issue.

4.2.3.4 Perceptions on drivers to the circular economy in fashion

P3 argued that developing a fully sustainable brand would allow for funding through government initiatives. Additionally, he recommended relationships and partnerships between the various stakeholders in the fashion industry as a necessity in the journey towards a successful sustainable chain in the following statement:

> "...right now purely the victor is a collaboration of the matching of fabric of the retailer coming together, making a sustainable pipeline" (P3, 22:13).

Table 4.7 presents the analysis of these drivers.

Table 4.7: A presentation of major drivers of sustainable manufacturing from Case 3

Factor	Code	Case 3: Consultant to major retailers, manufacturers & local independent designers
Institutional / Regulatory	***D_Economic/social sustainability***	7
	D_Government support	7
Stakeholders	D_More aware consumers	2
	D_Partnerships	4
	D_Conscious & more aware designer/ manufacturer	4

Table 4.7 presents the analysis of drivers from Case 3. The outcome shows *social sustainability* and *government support* holding the same position as the main Institutional drivers at 7. In the same table, *partnerships* and *conscious and more aware designers/ manufacturers* hold equal positions as major stakeholder factors at 4.

4.2.4 Case 4: Team leader to a leading outdoor wear retailer

4.2.4.1 Background

Participant 4 (P4) works for the manufacturing arm of a bigger clothing company, well-known for high-quality outdoor wear, and under this name, they manufacture other in-house brands locally. The company is based in Cape Town, employing more than 230 employees in this region alone. They provide Clothing manufacturing and retailing service to the public, using CMT services and outsourcing mass production. P4 is an appointed team leader for this company's development and pre-production department and sees to the development of the

brand. Her department also receives design specifications from retail buyers, which are transferred to patterns and fabric to create samples. P4 is responsible for developing kiddies wear products manufactured by this particular brand, which is under the major retailer. Their business model speaks to the ready-to-wear mass market (retail).

4.2.4.2 Current sustainable practice

Table 4.8: Current sustainable practice of Case 4

Pillars of sustainability	Sustainable practice	Participant quotes
Environmental	Recycling of fabric and paper; reducing waste, recycling paper, reduction in electricity usage	*Participant 4 4:02* *"...all our lights in our factory is, uhm, you know, for reduction in electricity usage, all of those things are, are there. Yes."* *Participant 4 16:37* *"...the [redacted] factory, uhm they've been a little bit longer in...they've got uhm their electricity is through uhm...the sun."*
Economic	Job creation by employing women	*Participant 4 12:58* *"…because we are 90% women-heavy. For every woman we employ, we are actually feeding eight family members."*
Social	Skills development	

Environmental sustainability is addressed through textile recycling, general waste, and paper reduction. This has spread over to conserving the energy used in their lighting in the factories. P4 spoke passionately about economic sustainability through employing and empowering women as providers in their homes. Social sustainability is demonstrated through their focus on developing local skills.

4.2.4.3 Perceptions on barriers to the circular economy in fashion

Figure 4.7 is a demonstration of how the UDEs were identified. The pie chart in Figure 4.7 illustrates the analysis of the UDEs according to Case 4. At 21,2%, the results drawn from the presented list of undesirable effects identified *cos*t as the most pressing barrier, followed by *knowledge sharing platforms* at 18,2%.

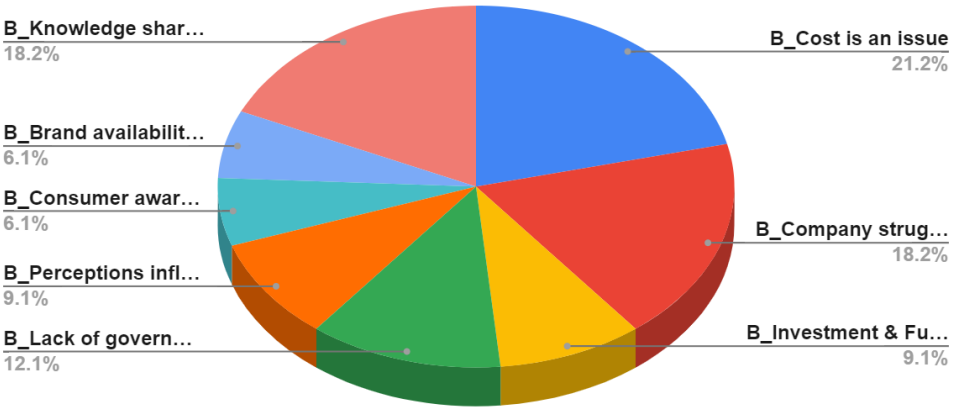


Figure 4.7: The main UDEs from Case 4

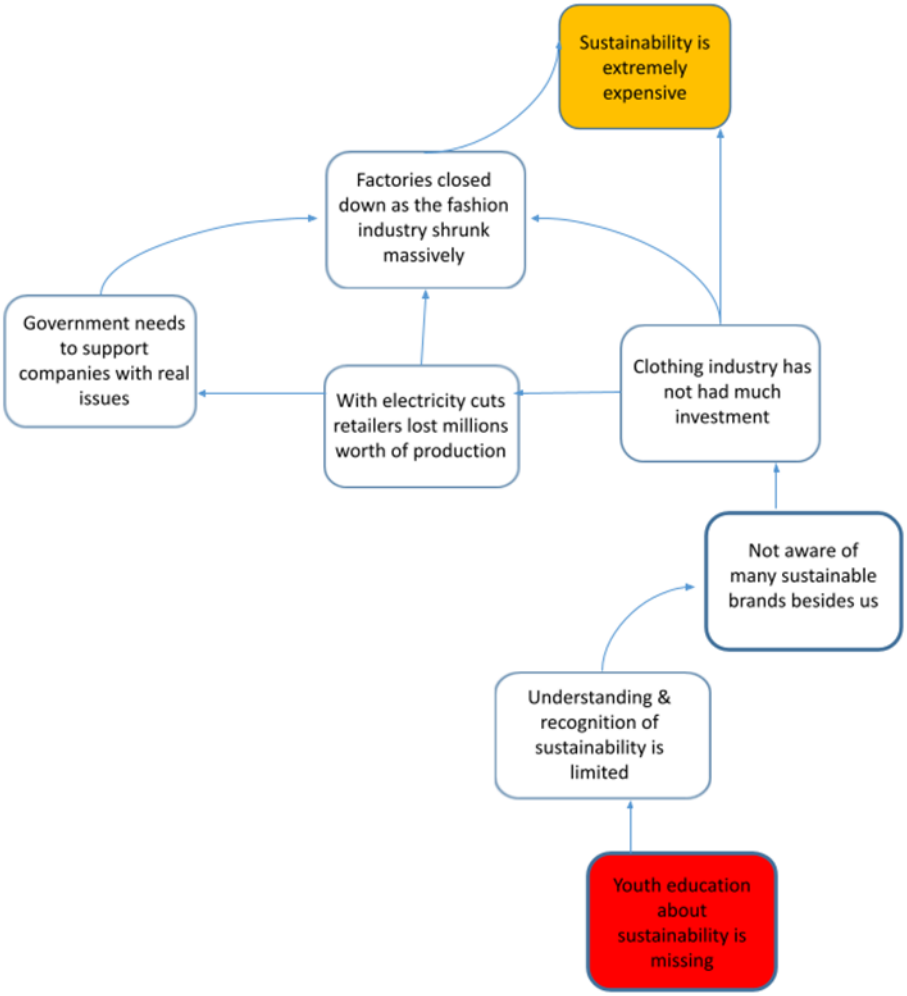


Figure 4.8: Case 4 current reality reality tree

Immediate effects: P4 shared her recognition of the expense at which sustainability comes.

Intermediate effects: P4 shared the same sentiment as P1 and clear frustration at the rate at which the government allows Chinese imports resulting in the current shrinkage of the local fashion industry. She was of the opinion that there is a lack of understanding regarding such practices locally in the following statement: “Uhm, I don’t think it gets recognised at all, and the understanding of what it is, is limited”. In support of P3, , P4 also raised the issue of cost as another major barrier in the pursuit of sustainability.

The root cause: In agreement with P1 and P2, **P4** indicated education as a missing factor in the Cape Town fashion industry.

4.2.4.4 Perceptions on drivers to the circular economy in fashion

P4 spoke enthusiastically regarding the existence of formal discussions towards sustainability in the company for the adoption of greener practices into their production:

> “I think the fact that they’ve now formed a committee and head office, so it’s being driven from uh...the decision makers, because, you know, we are that we take the action on the decision…I think there’s gonna be a much faster adaptation to it” (P4).

Similar to P1, P4 proposed that local clothing manufacturing be made compulsory in clothing companies and that restrictions on Chinese imports be implemented. P4 also pointed out that educating the youth regarding sustainability would be a major driver. Table 4.8 below presents the analysis of these drivers.

Table 4.9: A presentation of major drivers of sustainable manufacturing from Case 4

Factor	Code	Case 4: Outdoor & kiddies wear retailer& manufacturer
Institutional/ Regulatory	***D_Economic/social sustainability***	5
	D_Government support	4
	D_Legislation/obligation	3
	D_Formal sustainability discussions	4
Stakeholders	D_More aware consumers	2
	D_Conscious and more aware designer/ manufacturer	5

The analysis in Table 4.9 presents major drivers for the adoption of sustainable manufacturing from Case 4. *Economic/social sustainability* drivers were the major institutional/regulatory factors. Stakeholder factors identified are *conscious and more aware designers/manufacturers* as the main drivers. It is worth noting that the data results show that both drivers were assigned a rating of 5.

4.2.5 Case 5: Upcycler, designer

4.2.5.1 Background

Participant 5 (P5) is the owner and marketer of a small online company located in Cape Town, employing three women, where she works both from her private home space and rented storage space in Woodstock. P5 offers a service of online vintage and upcycled clothing retailing to the public. She subscribes to sustainable clothing manufacturing by reusing and repurposing second-hand clothing, giving it a better appeal. P5's target market is very wide, ranging generally from ladies' wear to men's wear. Her business model is designed for a niche market, as she does not mass produce. Sourcing second-hand clothing from local charity shops and adding value to them by upcycling is her form of sustainable practice.

4.2.5.2 Current sustainable practice

Table 4.10: Current sustainable practice of Case 5

Pillars of sustainability	Sustainable practice	Participant quotes
Environmental	Upcycling, mending, and repurposing discarded garments, recycling clothing, and not buying from fast fashion houses	*"So, I first started taking on the role where I didn't wanna buy any new clothes from any fast fashion places, and then I decided that the clothing that I don't wear anymore, I want to start selling them and putting them back into the system."*
Economic	Employment of local women	
Social	Consumer awareness of global warming and greenwashing	

P5 addresses environmental sustainability through her daily practices as she repurposes and reuses discarded garments in her business because she decided not to purchase new clothing from fast fashion houses anymore. She contributes to economic sustainability by employing other women who assist her in the company. She addresses the social pillar by creating awareness of the impact of fast fashion and greenwashing on the environment.

4.2.5.3 Perceptions on barriers to the circular economy in fashion

Figure 4.9 is the identification process of the UDEs from Case 5. The results from the list of undesirable effects revealed *knowledge sharing platforms* as a major barrier at a rating of 18,0%, which were applied to the CRT diagram to demonstrate the logic behind this outcome. *Greenwashing* was identified as the second major barrier at 16,0%.

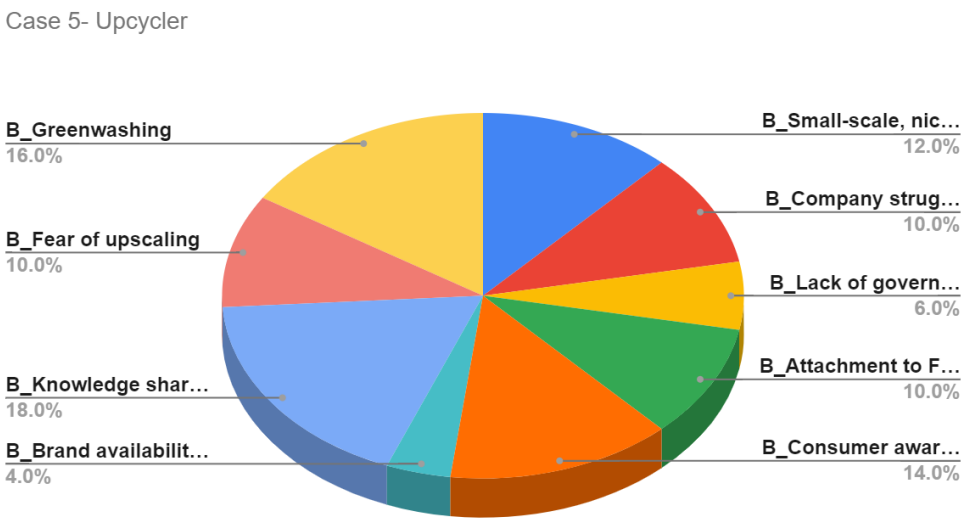


Figure 4.9: The main UDEs from Case 5

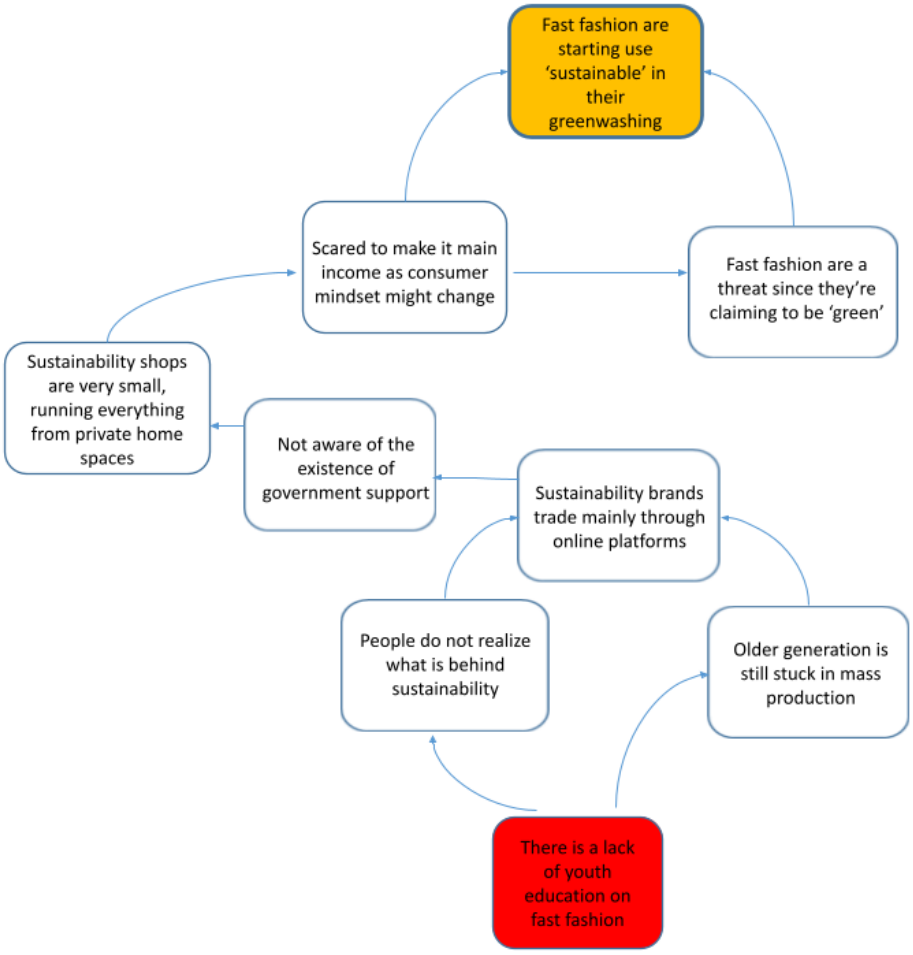


Figure 4.10: Case 5 Current reality tree

Immediate effects: *Greenwashing* is an issue that the participant identified as a threat to small niche-market businesses now that fast fashion uses catchphrases such as 'eco-friendly' in their marketing.

Intermediate effects: Sustainability shops are privately owned by an individual, often operating from home spaces on an online selling platform as their market is of a niche status. Therefore, P5 stated her fears about not upscaling her upcycling business due to the anticipated adoption of sustainable practices. She was of a similar opinion to P1 and P4, namely that the slow acceptance of sustainable practices as compared to Europe is a barrier in their pursuit of sustainability. Much like P1, P2 and P4, P5 was not aware of any existence of government support.

The root causes: P5 was of the opinion that the lack of education for the youth regarding sustainable practices is one of the major barriers.

4.2.5.4 Perceptions on drivers to the circular economy in fashion

P5 was clear that education is the key driver to more sustainable practices. She felt that this should be aimed specifically at the youth, as they are the ones constantly using social media, being overwhelmed by fast fashion commercials. P5 said: “Yeah, I think. Yeah, I think just educating and educating, especially the younger generation who has social media that’s being bombarded with advertisements of all these fast fashion houses”. Secondly, endorsing consumer awareness as a driver of sustainable practices, P5 made interesting points regarding conscious consumption of sustainable fashion. She has also observed a small increase in the interest in second-hand clothes as a driver toward sustainable practices.

Table 4.11 presents the analysis of these drivers.

Table 4.11: A presentation of major drivers of sustainable manufacturing from Case 5

Factor	Code	Case 5: Upcycler
Market/ Economic	***D_Potential growth***	5
	D_Decline in fast fashion	17
Stakeholders	D_More aware consumers	6
	D_Conscious and more aware designer/ manufacturer	17

Table 4.10 presents a *decline in fast fashion* as a major driver of sustainable manufacturing practices under market/economic factors, from Case 5. The analysis also found *conscious and more aware designers* as a major stakeholder driver of sustainable practices. Both identified drivers were rated as 17.

4.2.6 Case 6: Upcycler, designer

4.2.6.1 Background

Participant 6 (P6) is the founder, owner, and designer of her company. The idea of reuse and repurposing started back in 2011 when she was still a student in Germany doing her internship, where she was working with high quality second-hand garments and textiles. In 2016, P6 began the business still working with second-hand and vintage clothing and recycling bedding and curtains into new clothes. She currently owns a retail space in an upmarket shopping mall in Cape Town with four employees. Her company manufactures and provides a service of upcycling and repurposing garments from second-hand clothing, curtaining, and bedding into new garments. P6’s target market is all men’s and ladies’ wear, while her business model is of a niche status, producing once-off sustainably manufactured pieces. She repurposes anything from bedding and curtains to old clothes into new garments as a sustainable practice.

4.2.6.2 Current sustainable practices

Table 4.12: Current sustainable practice of Case 6

Pillars of sustainability	Sustainable practice	Participant quotes
Environmental	Upcycling, creating new garments from old bedding, curtains, and garments. Choosing second-hand clothing; paper, glass and plastics recycling	*Participant 6 16:18* *"The transport of animals. And, yeah, I just, I just started questioning a lot of things when I started being a vegetarian, and in the beginning, it was only the food, but then it spread like it started to obviously be the waste."* *Participant 6 16:18* *"Are we like, we are separating paper from glass, from plastics, from...So, uhm through dress, and all that kind of stuff."*
Economic	n/a	
Social	Converting to vegetarianism in consideration of animals and future	*Participant 6 16:18* *"I was young so, for me, it was definitely as well, thinking of the future."*

Environmental sustainability is addressed through making new garments from old bedding and curtains, personally subscribing to second-hand clothing, and general waste recycling. Although economic sustainability has not been addressed, the social factor is addressed through P6's diet, by choosing to be vegetarian in consideration of the ecosystem and future generations.

4.2.6.3 Perceptions on barriers to the circular economy in fashion

The pie chart in Figure 4.11 illustrates the UDEs of Case 6.

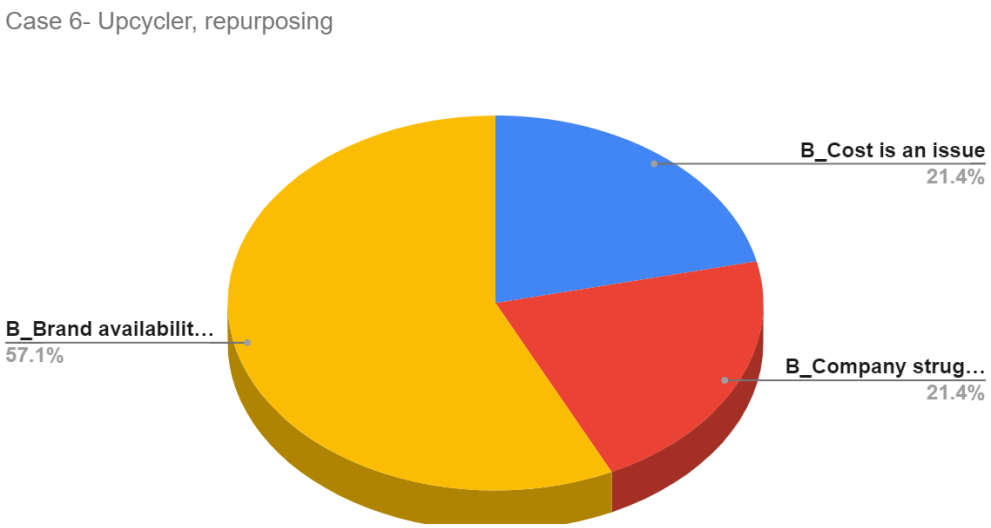


Figure 4.11: The main UDEs from Case 6

The analysis of the UDEs identified *brand availability* as the most pressing issue at a high 57,1%. *Cost is an issue*, and *company struggles* were both assigned 21,4%, as presented by the analysis of Case 6.

Figure 4.12: Case 6 Current reality tree

Immediate effects: The P6 mentioned the ongoing costs throughout the sustainability chain, which discourages many from the pursuit of adopting sustainable practices.

Intermediate effects: P6 stated that understanding of upcycling/remanufacturing practices is limited, as P4 has also affirmed. P6 added that in her attempts to mass produce repurposed and upcycled clothing, finances did not work well. She firmly concluded that the manufacturing process of upcycled or reused garments was unrealistic on a larger scale, which makes this a barrier to the adoption of sustainable practices.

The root causes: P6 made an interesting and very important point that sustainability shops are not accessible to the masses as they mostly operate online, which may serve as a major barrier.

4.2.6.4 Perceptions on drivers to the circular economy in fashion

P6 indicated that choosing second-hand clothing would be a good start. Secondly, upcycling brands need to be established in public places such as shopping malls to be accessible to people. Table 4.13 presents the analysis of these drivers.

Table 4.13: A presentation of major drivers of sustainable manufacturing from Case 6

Factor	Code	Case 6: Upcycler, repurposing
Market/ Economic	***D_Potential growth***	4
	D_Decline in fast fashion	6
Institutional/ Regulatory	***D_Economic/social sustainability***	3
Stakeholders	D_More aware consumers	3
	D_Conscious and more aware designer/ manufacturer	13

Table 4.13 presents the analysis results of drivers of sustainable manufacturing according to Case 6. Under market and economic factors, *decline in fast fashion* came as the main driver at 6. In contrast, economic/social sustainability held a major position as an institutional/ regulatory driver. The analysis also presented *conscious and more aware designers* as major stakeholder driver of sustainable practices, rated at 13.

4.3 Comparisons between the cases

In the previous section, the list of UDEs was extracted and categorised according to each case under the specific relevant factor and code related to the UDEs. In this section, a cross-comparison is done to determine the correlations and differences between the cases and to address RSQ 3: How are the dynamics related across the cases? Furthermore, the analysis is made clear and concise according to each factor, using only the barriers from the data. It is worth noting that the cases are grouped and compared according to the similarities and their profiles. In this instance, cases 1, 5, and 6 are grouped under the criteria of SMEs owning and running niche-market businesses founded on a sustainable business model (Table 4.13).

All three cases are either upcycling or remanufacturing discarded garments as their key company practice. Although falling under SMEs, Case 2 requires a stand-alone table due to the business model and company profile, which is not based on sustainable manufacturing. Cases 3 and 4 also require individual tables that cannot not be grouped because of major differences: Case 3 provides information from a marketing consultant's experience and viewpoint and Case 4 brings the perspective of a major local retailer.

Table 4.13 presents evidence of the analysis process of commonalities and differences in the data, as communicated in the cases.

4.3.1 Barriers

Table 4.14 compares the major UDEs between the small niche-market cases. The findings from cases 1 and 5 reveal the company's struggles of being a niche and small-sized business in a major market/economic undesirable effects.

Table 4.14: Ccomparison of the major market/economic UDEs between the small niche-market cases

Factor	Category	Case 1: Remanufactu-rer, upcycler, designer, small shop	Case 5: Upcycler, designer, online shop	Case 6: Upcycler, designer, small retail shop	Comparisons/ Implications
Market/ Economic	*B_Company struggles*	N/A	Fast fashion is a threat since they claim to be 'green'	A sustainable manufacturing process is not easy	In this instance, cases 5 and 6 presented their own varied encounters about sustainability. These ranged from greenwashing of fast fashion in Case 5, to the overall complexity of the sustainable production process in Case 6. There was no evidence presented in Case 1.
	B_Small-scale, niche status businesses	N/A	Sustainability shops are very small, running everything from private home spaces	N/A	Due to niche market businesses being so small, Case 5 stated facts about these kinds of businesses and the scale/magnitude at which they thrive.

Table 4.15: Comparison of the major institutional/regulatory UDEs between the small niche-market cases

Table 4.15 compares the major UDEs between the small niche-market cases. The results of the analysis revealed that the *lack of governmental support* was a major institutional/ regulatory undesirable effect influencing the adoption of sustainable practices.

Factor	Category	Case 1: Remanufac-turer, upcycler, designer, small shop	Case 5: Upcycler, designer, online shop	Case 6: Upcycler, designer, small retail shop	Comparisons/ Implications
Institutional/ Regulatory	B_Lack of government support	N/A	Not aware of the existence of government support	N/A	From the data, all three cases 1, 5 and 6, did not access nor come across any government support in their quest to be sustainable. However, in Case 5 this seems to be a major issue.

Table 4.15 presents social/cultural UDEs from Cases 1, 5, and 6. The results identified local people's attachment to fast fashion as the major social and cultural impediment in their quest for sustainable fashion manufacturing.

Table 4.16: A comparison of the major social/cultural UDEs between the small niche-market cases

Factor	Category	Case 1: Remanufactu-rer, upcycler, designer, small shop	Case 5: Upcycler, designer, online shop	Case 6: Upcycler, designer, small retail shop	Comparisons/ Implications
Social/ Cultural	B_ Attachment to Fast Fashion	Ridiculous throw-away nation where people just buy and discard	Older generation is still stuck in mass production	N/A	The point of interest lies in the 2 cases' concern for high consumption that is perpetuated by the fashion industry.

Table 4.16 presents the technological findings from the analysis of cases 1, 5, and 6. The results indicate that no undesirable technological effects were identified across the niche market businesses.

Table 4.17: A comparison of the major technical UDEs between the small niche-market cases

Factor	Category	Case 1: Remanufacturer, upcycler, designer, small shop	Case 5: Upcycler, designer, online shop	Case 6: Upcycler, designer, small retail shop	Comparisons/ Implications
Technological	N/A	N/A	N/A	N/A	N/A

Table 4.17 presents the comparison of major UDEs between the small niche-market cases. The analysis results indicate that educating the youth and local people is a major stakeholder barrier to the adoption of sustainable practices among niche-market businesses.

Table 4.18: A comparison of the major stakeholders UDEs between the small niche-market cases

Factor	Category	Case 1: Remanufactu-rer, upcycler, designer, small shop	Case 5: Upcycler, designer, online shop	Case 6: Upcycler, designer, small retail shop	Comparisons/ Implications
Stakeholders	*B_ Knowledge sharing platforms*	Education on cheap, poorly manufactured fast fashion is missing	There is a lack of youth education on fast fashion	N/A	Across all cases, there was an emphasis on the need to educate the local people on upcycling and reuse and create awareness regarding the effects of fast fashion. However, cases 1 and 5 pointed out education on fast fashion as a significant gap.

Table 4.18 presents the analysis of major UDEs from Case 2 as an SME offering CMT and supplier services. The findings indicate that that *knowledge sharing platforms* are the main undesirable effect on stakeholders. *Perceptions influenced by background (educational/ generational/cultural/historical)* are identified as the main undesirable social/cultural undesirable effects.

Table 4.19: A presentation of major UDEs from Case 2

Factor	Category	Case 2: Small manufacturer, supplier	Comparisons/ Implications
Market/ Economic	*B_Company struggles & Covid-19*	Due to Covid, I had to retrench some workers	Evidence in Case 2 shows internal company struggles as one of the major barriers to the adoption of sustainable practices.
Institutional/ Regulatory	*B_Legalities*	Too much red tape and responsibility of UIF, union fees on SMEs	Case 2 presented important and overlooked complexities placed by authorities on small businesses, putting an additional barrier to the adoption of sustainable practices.
Social/ Cultural	*B_Perceptions influenced by background (educational/ denerational/ cultural/ historical)*	The perception that upcycling is for the rich market	According to Case 2, the cost of sustainability suggests that upcycling/remanufacturing practices would appeal more to the wealthy. Furthermore, concerns about quality and local consumers' perceptions of reused and repurposed clothing are the social/cultural barriers.
		Concern over acceptance and perception of upcycled garments	

Factor	Category	Case 2: Small manufacturer, supplier	Comparisons/ Implications
Technological	*B_Sustainability is for big companies*	Big companies stand better chances of being sustainable	Due to complexities experienced by SMEs, Case 2 has identified the technological barrier that only major companies stand to make it in sustainability.
Stakeholders	*B_Knowledge sharing platforms*	Large teaching platforms on upcycling are missing	Case 2 depicted the need for knowledge sharing platforms as a stakeholder barrier. The emphasis was that this should occur on a broader and bigger scale.

Table 4.19 presents the major UDEs from a retail perspective, evident in Case 4. The findings indicate that *cost is an issue* identified as a major Market/Economic undesirable effect. This was followed by *knowledge sharing platforms* being identified as the main undesirable effect on stakeholders.

Table 4.20: A presentation of major UDEs from Case 4

Factor	Category	Case 4: Leading Kiddies retailer & manufacturer	Comparisons/ Implications
Market/ Economic	***B_Cost is an issue***	Sustainability is extremely expensive	According to Case 4, the high cost of sustainability in addition to high labour costs in South Africa was the main market/economic barrier.
Institutional/ Regulatory	B_Lack of government support	Government needs to support companies with real issues.	Case 3 shows that the lack of government support for retail and SA manufacturing companies is an Institutional/regulatory barrier to the adoption of sustainable practices.
Social/ Cultural	***B_Perceptions influenced by background (educational/ generational/ cultural/historical)***	Factories closed down as the fashion industry shrunk massively.	Due to past events negatively affecting the current state of the local fashion industry, Case 4 reveals these factors to be a social/cultural barrier.
Technological	***None***	N/A	N/A
Stakeholders	***B_Knowledge sharing platforms***	Youth education about sustainability is missing.	The concern for the gap in youth education regarding sustainability as a significant stakeholder barrier to the adoption of sustainable practices emerged from Case 4.

Table 4.20 presents the major UDEs of a consultancy and marketing agent in Case 3. The findings demonstrate that *cost is an issue* that was identified as a major Market/Economic barrier. In the same position, *consumer demand* was identified as a significant stakeholder UDEs from Case 3.

Table 4.21: A presentation of major UDEs from Case 3

Factor	Category	Case 3: Marketing consultant to retailers & designers	Comparisons/ Implications
Market/ Economic	***B_Cost is an issue***	Buying more sustainable fabrics is very expensive	According to Case 3, the issue of cost stood as the main market/economic barrier, due the high expense of sustainable fabric options.
Institutional/ Regulatory	***B_Informal sustainability discussions***	No formal discussions & strategies are in place	Case 3 drew a lack of interest from the retailers and manufacturers, as there have been little to no discussions towards a sustainable future. This has been identified as the main institutional barrier to sustainable practices.
Social/ Cultural	***None***	N/A	N/A
Technological	***B_Sustainability is for big companies***	Only very big retailers can finance sustainability	A corporate and marketing background from Case 3 reveals the technological barrier that sustainability would only be achievable through very big companies due to financial issues involved.
Stakeholders	***B_Consumer demand***	Local customers are not prepared to pay more	From a retail perspective, Case 4 displayed the reality of small customer demand for these sustainable products as the reason why retailers are not interested in adopting a sustainable chain.

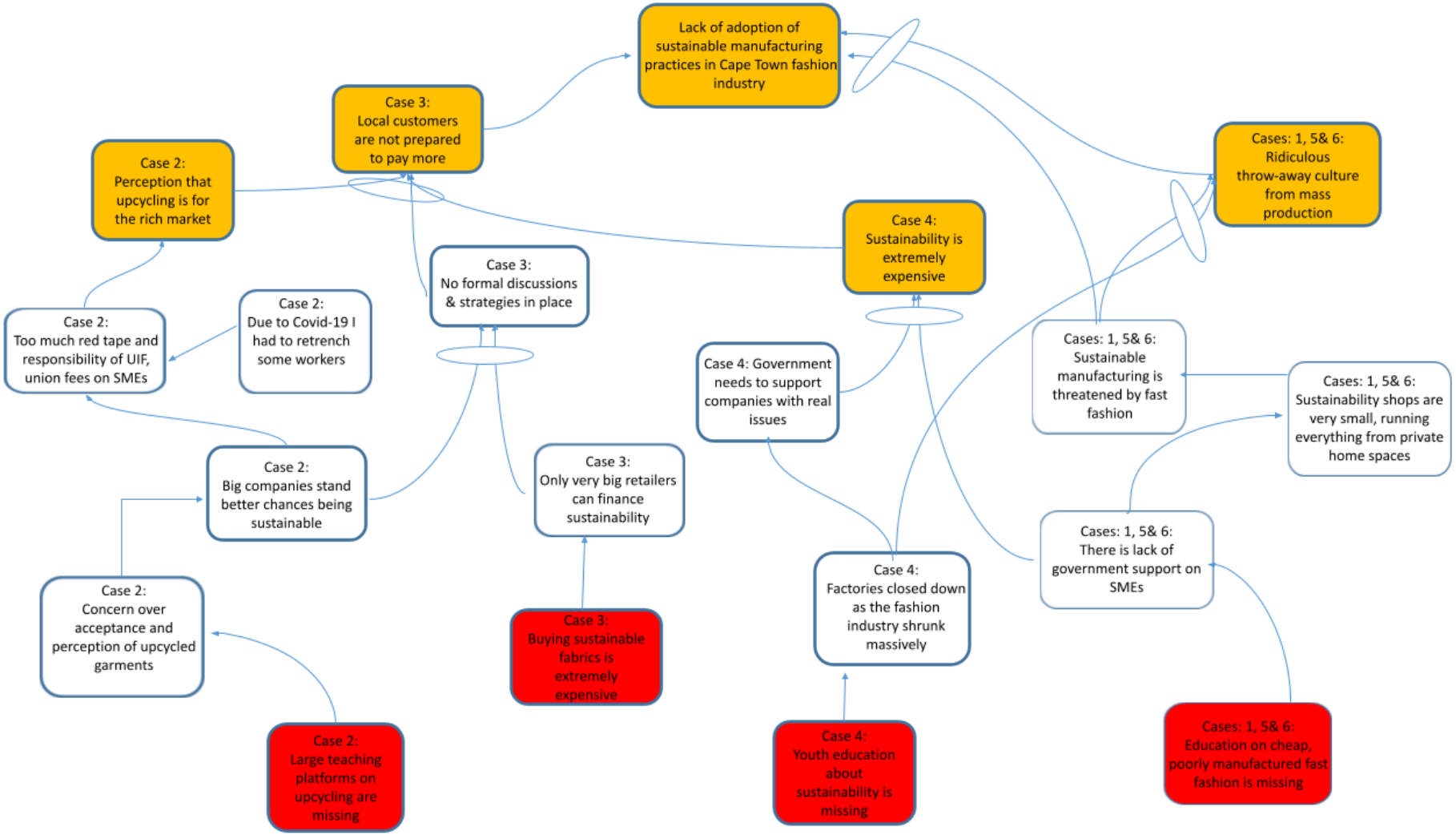


Figure 4.13: CRT diagram of barriers from all six cases

Immediate effects: This was centred around the problem of the research: the gap or the lack of adoption of sustainable manufacturing practices in the Cape Town fashion industry. These immediate effects were presented according to each case or the grouped cases, depending on their similarities. For instance, the analysis from cases 1, 5, and 6 identified the concerning throw-away nation that we live in, as a result of mass production of fast fashion. This shed light on the perspectives of the niche-market SMEs, who are sustainably manufacturing garments (remanufacturing and upcycling). In Case 2, there was a notion of perception that sustainability is for the rich, due to other pressing issues such as poverty and inequality in South Africa as a developing country. Case 3 presented the perspective of a retail marketing consultancy centred on the local consumers' lack of willingness to pay for additional costs for sustainable garments. Lastly, Case 4 brought the viewpoint of a major local retailer, identifying the cost of sustainability as a major immediate effect, influencing the adoption of sustainable practices. The point of interest here is the connection between cases 2, 3, and 4, centred on the affordability of sustainability as a whole.

Intermediate effects: Issues of major concern, such as the government's lack of support, surfaced from both niche-market SMEs (cases 1, 5, and 6) as well as the major local retailer (Case 3). In both cases 2 and 3, there was the perception that bigger companies could be more sustainable than SMEs. The data suggested that this was primarily due to finances. Case 2 was centred on perception and legalities, while Case 3 was focused on consumer/retailer finance issues. Case 4 was centred on the government's involvement in the fashion manufacturing industry, while cases 1, 5, and 6 focused on fast fashion's impact on small sustainable businesses. The analysis identified all the barriers mentioned above as the reasons behind the reluctance towards sustainability, according to the chosen cases.

The root causes: Across the cases, education seemed to be the root cause for the lack of adoption of sustainable manufacturing practices in the Cape Town fashion industry. However, it is interesting that Case 3 showed evidence of a different opinion, identifying the root cause or the main constraint to the adoption of sustainable practices as the expense of sustainability since the sustainably-sourced material is expensive and the consumers are not pleased with the prices of these sustainable goods.

4.3.2 Drivers

The following tables are findings of the drivers of sustainable practices as analysed from the cases. Each table is presented according to its business model.

Table 4.21 presents the drivers of sustainable manufacturing practices. The findings indicate that across the niche-market businesses, *conscious and more aware designers/*

manufacturers as major stakeholder drivers. Furthermore, under market/economic factors, a decline in fast fashion was revealed as the main driver of sustainable practices.

Table 4.22: A comparison of the major drivers between the small niche-market cases

Factor	Category	Case 1: Remanufactu-rer, upcycler, designer, small shop	Case 5: Upcycler, designer, online shop	Case 6: Upcycler, designer, small retail shop
Market/ Economic	***D_Potential growth***	N/A	Popularity of sustainable practice is on the increase in SA	Popularity of upcycling practice is on the increase in SA
	D_Decline in fast fashion	N/A	It starts with not buying from fast fashion houses	It starts with choosing second-hand clothing Not feeling good with purchasing fast fashion
Institutional/ Regulatory	***D_Economic/ Social sustainability***	N/A	N/A	It starts with considering the future generations
Stakeholders	D_More aware consumers	N/A	Stay away from fast fashion	Being conscious of where my garments are manufactured
	D_Conscious & more aware designer/ manufacturer	The brand is about reusing and repurposing discarded clothing for a longer lifespan	To save planet earth, shop consciously	Upgrading a garment to something more than it was is what we do

Table 4.22 presents the drivers of sustainable manufacturing practices from Case 2. The findings demonstrate that *More aware consumers* are the key drivers under Stakeholder factors. Under the same factors, *unused skills and knowledge and conscious & more aware designers/manufacturers* were identified as the least drivers to the adoption of sustainable manufacturing practices.

Table 4.23: A presentation of the major drivers from Case 2

Factor	Category	Case 2: Children's wear designer, school & sleepwear manufacturer, supplier
Stakeholders	D_More aware consumers	Upcycling is the way forward
	D_Unused skills and knowledge	Lots of people with untapped/used skills and knowledge out there
	D_Conscious & more aware designer/ manufacturer	An upcycled garment lasts longer than a cheaply-manufactured one

Table 4.23 presents the drivers of sustainable manufacturing practices from Case 3. The findings identify *economic/social sustainability* and *government support* as the main institutional/regulatory drivers, holding the same position.

Table 4.24: A presentation of the major drivers from Case 3

Factor	Category	Case 3: Consultant to major retailers, manufacturers & local independent designers
Institutional/ Regulatory	***D_Economic/ Social sustainability***	We look at sustainability from a broader perspective
	D_Government support	Funding relating to sustainability of local manufacture has been released
Stakeholders	D_More aware consumers	There are consumer requests for sustainable garments
	D_Partnerships	The victor is manufacturer and retailer collaborations
	D_Conscious & more aware designer/ manufacturer	Working towards making factories more sustainable

Table 4.24 presents the drivers of sustainable manufacturing practices from Case 4. The findings reveal *economic/social sustainability* as the main institutional/regulatory driver. The findings further indicate that Conscious & more aware designer/manufacturer is the main Stakeholder driver of sustainable manufacturing.

Table 4.25: A presentation of the major drivers from Case 4

Factor	Category	Case 4: Leading Kiddies retailer & manufacturer
Institutional/ Regulatory	***D_Economic /social sustainability***	It's all about human development and job creation
	D_Government support	Being part of a government funded cluster
	D_Legislation/obligation	Sustainability should be a non-negotiable in SA manufacturing
	D_Formal sustainability discussions	There is a reformed sustainability committee
Stakeholders	D_More aware consumers	We need to change our behaviour to save planet earth
	D_Conscious & more aware designer/ manufacturer	All fashion retailers and manufacturers should mimic what SA needs

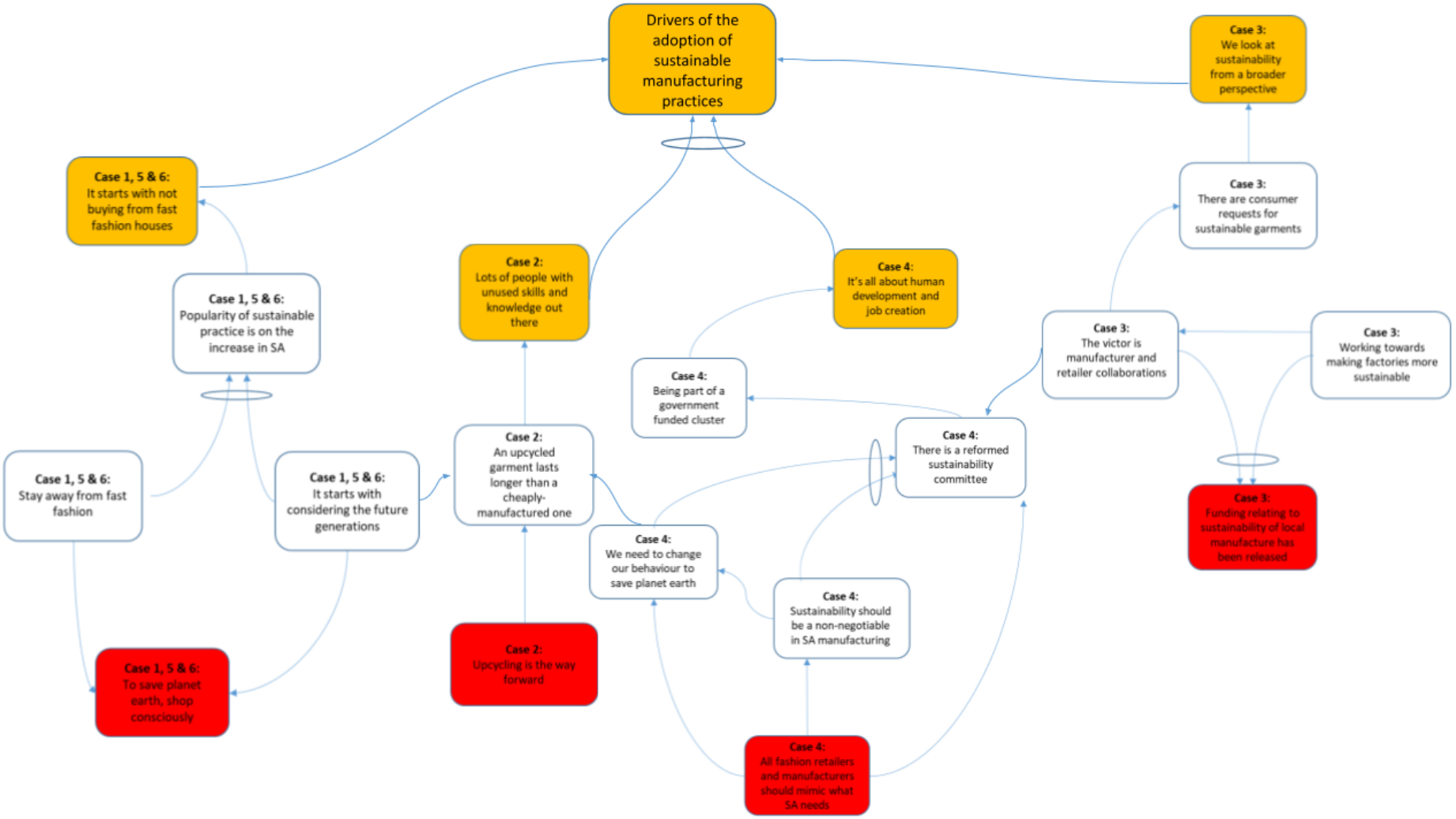


Figure 4.14: Adaptation of drivers of sustainable manufacturing practices to a CRT diagram

The CRT diagrams were constructed according to the similarities of the cases' business models. Therefore, cases 1, 5, and 6 were grouped due to their niche-market status. All three cases are repurposing and reusing discarded garments as their main company practice. The SME, Case 2, could not be grouped with these businesses as it is not based on sustainable manufacturing. Cases 3 and 4 were analysed individually due to key differences: one providing a marketing consultant's perspective and Case 4 providing experience from a major local retailer.

The major findings indicate commonalities between the grouped cases 1, 5 & 6; cases 2, and 4 based on the three pillars of sustainable development and concern for the environment. Cases 3 and 4 indicate correlations based on the discussions emerging from the formed relationships in the sustainable supply chain.

The key findings indicate various main drivers; however, each corresponds to the other. For example, cases 3 and 4 could be linked due to funding often accessible to the major retailers to forge a sustainable model. Secondly, cases 1, 5, and 6 could be linked with Case 2 as upcycling/ remanufacturing are major contributors to saving the planet and conscious fashion consumption.

4.4 The relation between the drivers and barriers/conclusion

Cases 1, 5 and 6: The first noticeable fact can be found in niche-market SMEs, where there is a deep concern for the environment and sustainability. In this instance, the barriers were centred on fast fashion's threat to emerging sustainable brands. The drivers identify a solution to this: to stay away or not buy from fast fashion houses.

Case 2: Although the barriers were centred on the perception of reused and repurposed clothing, the findings identified the lack of knowledge-sharing platforms as the root cause, whereas the drivers identified *unused knowledge and skills* as a possible answer to this.

Case 3: As mentioned in the previous section, Case 3 provides the perspective of a retail marketing consultancy centred on the local consumers' lack of willingness to pay for additional costs for sustainable garments. The findings on the drivers, on the other hand, suggest that it starts with the few customers making requests for sustainable garments to accelerate the adoption of sustainable manufacturing practices. According to Case 3, 'only big retailers can finance sustainability' was identified as a barrier. However, the drivers offered a solution of necessary collaborations or partnerships between the manufacturer and the retailer to form a successful sustainable fashion chain. The most interesting point here is that the most pressing issues correspond. The high expense of sustainability was identified as a major constraint or barrier to adopting sustainable practices in Cape Town. In contrast, the drivers identified funding

that has recently been released as a means to mitigate issues faced by local manufacturers as a direct solution to this.

Case 4: Representing SA's major retailers, Case 4 revealed issues of government involvement that are needed to assist with issues faced by local retailers and manufacturers. The drivers suggested being part of a government-funded cluster as the solution. Secondly, the massive closure and shrinkage of local factories due to fast fashion imports emerged as one of the major barriers. Therefore, the findings indicated that sustainability is made a non-negotiable in local manufacturing to combat this. Secondly, behavioural changes needed to save the planet were also identified as one of the countermeasures for this. The call to all retailers and manufacturers to imitate what other nations are doing concerning sustainability stood out as a major solution or driver to this shrinkage of the local fashion industry.

4.5. Methodological findings

4.5.1 Methodological reflections

To reduce the possibility of bias in the interview and analytic process (Smith & Noble, 2014, p. 17), I have designed and integrated methodological strategies to evaluate the validity and confirm the reliability of the research findings. This section reflects on the methodological strategies applied in the research, the scope of the study, as well as the constraints and strengths in the implementation of data collection methods.

4.5.1.1 Methodological strategies

These strategies included acknowledging sampling biases and continuously evaluating methods to verify that the data collection and analysis are of sufficient gravity and significance. The semi-structured interviews' audio recordings made it possible to repeatedly review the responses to look for emerging themes, which preserves the participants' genuine experiences with adopting sustainable production activities. While coding, this was utilised in a data spreadsheet. By illustrating how I developed the final themes that were presented and how they were labelled, I have demonstrated clarity in terms of the thought process throughout data analysis and subsequent interpretations. (Noble & Smith, 2015).

Since the information was taken from the original transcripts, I have confirmed its accuracy in terms of depiction and ongoing comparison to ensure that the interpretations of the gathered data are accurate as well as transparent (Hayashi et al., 2019:100). In order to reduce bias in the research throughout the interpretation process, the researcher's interpretations of the participants' replies ensured that the objectives of the study were addressed.

4.5.1.2 The scope of the study

- Although qualitative studies, in their nature do not require large samples, the sample size may have had an impact on the research results. The sample was selected based on pre-set criteria of the participants. Therefore, due to time constraints and the availability of the participants, the generalisability of the results was limited by the sample size of the research.

- The small size of the sample made it slightly tricky to identify significant relationships within the data set, therefore the interpretation of the research findings may not be representative of the entire clothing manufacturing population's perceptions. A larger sample size may have given a much broader and more specific view of the Cape Town fashion manufacturing population on what factors would accelerate the adoption of local sustainable manufacturing.

- Due to the lack of existing research on the remanufacturing and upcycling phenomena in the South African fashion industry, was a significant limiting factor to the study as the results cannot fully confirm the perceived barriers to the incorporation of sustainable practices from a manufacturing perspective from a South African context in particular, beyond reasonable doubt. However, it is important to state that based on the literature review, prior research focuses mainly on broad sustainability in the SA fashion.

- The scope of this study was limited to an investigation only in Cape Town, the chosen primary research site, due to its abundant history as a clothing production hub. Secondly, the scope of the study focused on remanufacturing and upcycling as opposed to recycling, which many may associate with the study.

- The analysis of the study was limited to only identifying CE barriers and drivers to the adoption of circular economy practices in fashion for fashion manufacturers in particular. The results of the research would only be reported from the researcher's understanding of behaviours and attitudes of manufacturers of sustainable manufacturing towards remanufacturing and upcycling phenomena within the Cape Town manufacturing population. Nonetheless, the results are valid for the purpose of answering the main research question: What are the dynamics which influence the adoption of sustainable manufacturing practices, such as remanufacturing and upcycling in selected apparel manufacturing companies in Cape Town?

Chapter 5: Conclusion and Recommendations

5.1 Introduction

With an emphasis on remanufacturing and upcycling, the preceding chapters of this study evaluated the factors that affect the adoption of sustainable manufacturing methods. This chapter's objective is to provide a research summary and discuss the results. The chapter ends with suggestions for additional study, policy development, and practice.

The significance of this study lies in the exploratory nature, centred on providing deeper insights into barriers and drivers influencing the implementation of sustainable manufacturing in Cape Town among clothing manufacturers. This was to obtain an understanding of manufacturers' perspectives on the matter. Once again, exploring current practices and existing perceptions towards sustainable manufacturing practices, with a focus on remanufacturing and upcycling in the Cape Town fashion area, was the aim of the research. The limitations are presented as transparency of the shortfalls and constraints of the study. Following this, the recommendations for further research are discussed and the implications conclude the chapter.

5.2 Summary of research

Chapter 1 provided an overview of the global concerns regarding unsustainability issues in the fashion industry. The chapter presented the underlying factors which included the penetration of cheap imports and fast fashion, the effects of cheap imports on local factories and the government's involvement in sustainability issues (Business Partners (ZA), 2014; Edwards & Jenkins, 2015:447, 456). As one of the most environmentally hazardous industries, the fashion industry has undergone continuous scrutiny for its lack of accountability as the second biggest polluter in the world (Niinimaki et al., 2020). In Africa, for instance, there is a pattern of existing ignorance regarding the consumption practices perpetuated by the dumping of second-hand clothing (SHC) in these African countries by the Global North nations, giving birth to waste pollution (disposal of clothing) and landfilling issues (Brooks & Simon, 2012:1266; Poerner, 2021). Although South Africa may not be dealing with issues of second-hand clothing, the penetration of cheap imported products from China, known for low labour costs and having the latest technologies caused a major deterioration in SA clothing production output (Edwards & Jenkins, 2015:447, 456). From the research problem and background, the following research questions were the guiding principles of this study:

PRQ: What are the dynamics which influence the adoption of sustainable manufacturing practices, such as remanufacturing and upcycling, in selected apparel manufacturing companies in Cape Town?

RSQ 1: What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry?

RSQ 2: What are the factors influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry, with a focus on remanufacturing and upcycling?

RSQ 3: How are the identified factors related across the cases?

The objectives of this research were:

- To ascertain current practice of sustainable manufacturing in the fashion industry locally.
- To determine the perceived barriers and drivers to the incorporation/adoption of sustainable practices from a manufacturing perspective.
- To understand the dynamics between factors that might influence the adoption of sustainable manufacturing practices.

Chapter 2 reviewed seminal and current literature and served the following purpose:

- To contextualise and define Sustainable design and to provide an understanding of its relevance within fashion design.
- To introduce Circular fashion systems as an alternative to the traditional linear fashion system.
- To locate this study within current circular fashion models.
- To provide evidence of Circular Fashion systems in Africa, through the lens of the second-hand clothing trade.
- To explore remanufacturing as a sustainable strategy, to introduce and define remanufacturing as an alternative form of sustainable manufacturing as well as reviewing the literature on the application of remanufacturing practices in Africa.
- To explore upcycling as a sustainable strategy to present and define upcycling as sustainable manufacturing similar to remanufacturing in its purpose, as well as to discuss its advantages and the factors that influence its uptake. The section also investigates the existence of upcycling techniques in Africa.
- To introduce the circular economy as part of the conceptual framework.
- To introduce a conceptual framework from de Jesus and Medonca (2018) and Hugo et al. (2021) that was used as part of the data analysis strategy
- To introduce the theory of constraint aimed at identifying the bottlenecks or constraints to the adoption of remanufacturing and upcycling practices to better or improve the existing system for the uptake of sustainable manufacturing by the SA fashion industry.

Chapter 3 explained the methodology of data collection and analysis techniques, and presented how the conceptual framework was used as a data analysis strategy. The cases included three small niche-market companies, a SME manufacturer and supplier of school wear and baby wear, a kid's wear product development team leader, under a major outdoor wear retailer. The cases also included a marketing consultant to major local retailers and independent designers.

The data were collected by means of semi-structured interviews as the primary data and the literature as the secondary data as confirmation of the topic issues. The qualitative data were analysed through the content analysis approach, and coded using an adopted framework to establish dynamics that influence the adoption of sustainable manufacturing.

Chapter 4 presented the findings from the qualitative case study data, gathered through semi-structured interviews within the fashion manufacturing population sample.

The overall findings addressing RSQ 1 highly indicate an existence of a broad understanding of sustainable practices. Waste recycling and the creation of employment and saving energy, for example, there is evidence of current practices in the local fashion industry which are aligned to the three pillars of sustainable development.

As a means to address RSQ 2, the findings indicated Stakeholders as the main factor influencing the adoption of sustainable manufacturing practices in Cape Town. As the objective of this question was to determine the perceived barriers, the results of the analysis identified knowledge-sharing platforms and brand availability as major barriers to the incorporation of sustainable practices from a manufacturing perspective. Secondly, the findings indicated that the Market/Economic factors had an effect or influence on the adoption of sustainable manufacturing practices, as the results highly revealed Cost as a major perceived barrier to the adoption of sustainable production practices.

For RSQ 3, the findings in the study identified a correlation between the cases relating to a lack of education in remanufacturing and upcycling as the main barrier to the adoption of sustainable clothing manufacturing practices in South Africa. Thus, stressing the urgent need for knowledge-sharing platforms, which would drive or accelerate the implementation of local sustainable manufacturing as per the objective of this question.

These findings support Hugo et al.'s study (2021:13), which concluded that there is a lack of education regarding the application of CE in developing countries such as SA and India since they have major unsustainable practices, the majority of studies in circular fashion are centred on the Global North.

5.3. Discussion of findings

5.3.1. Constraints in the implementation of data collection methods

Possible constraints in the implementation of data collection methods can be noted. These are summarised below:

- The nature of in-depth, semi-structured interview process tended to be time-intensive. The interview sessions may have also been a long and tedious process for some participants.
- Due to English being a second language to one of the participants, there were instances where she required repetition of questions and may have been guessing what the questions mean. Therefore, possibly creating false responses that may have not reflected her true perceptions or the perceptions of the population.
- Technical problems such as bad connectivity of the telephone lines put a halt to the progression of the interview process.
- The telephonic interviews may have given less transparency in terms of responses, whereas if the interviews had taken place face-to-face, there would be more of a researcher/participant relationship which would put the participant at ease and possibly offer a more detailed insight into the phenomena of investigation.
- The physical distance between the researcher and the participant during the data collection process in this regard, had a slight impact on the results as the explorative nature of the study is to gain an insight into the remanufacturing and upcycling phenomena in reality, through lived their experiences and behaviour required close connection to the respondents.

5.3.2. Strengths in the implementation of data collection methods

- Semi-structured interviews facilitated a conversation between the participant and me that was supported by follow-up questions, probes, and was guided by a flexible interview guide. This technique enabled me to gather open-ended information, investigate participants' thoughts, feelings, and beliefs regarding adopting remanufacturing and upcycling, and delve deeply into delicate and sometimes intimate matters.
- Qualitative research study allowed for a detailed and in-depth investigation of the issue of the adoption of sustainable manufacturing practices from manufacturers' perspectives (remanufacturing and upcycling). The direction of the research can be adjusted as new data emerges.
- Case studies provided the researcher with background information on the participants. Case research design offered me a way to explore intricate situations, which the adoption of unfamiliar territory of remanufacturing and upcycling under analysis. The

case study was appealing for expanding the body of knowledge in the sustainable fashion industry.

- An explorative study gave me the opportunity to decide early on whether the subject was worthwhile of the time and money and worth pursuing. It is usually low-cost and it assisted in laying the foundation for further research.
- It increased my overall knowledge regarding sustainable manufacturing. It helped me to assess existing knowledge on remanufacturing and upcycling practices in the South African fashion industry and assess the research's advantages and disadvantages.
- Content analysis assisted to identify the intentions, revealing patterns as well as differences in communication content. Additionally, it helped to determine the emerging attitudes and behaviours in the participants' responses to determine their emotional state regarding the current situation of the local fashion industry and the adoption of sustainable manufacturing.

5.3.3. Substantive reflection

5.3.3.1. Sustainable practices in the Cape Town fashion manufacturing industry

to explore current practices and existing perceptions towards sustainable manufacturing practices (RSQ 1) it was necessary to first investigate and obtain an insight into the understanding of sustainability itself and what it means to the SA manufacturer. As sustainable development is centred on economic (profit), social (people), and environmental (planet) factors (WCED, 1987), it was crucial to determine if and how each case incorporated sustainable choices into daily company practices.

i) Integration of environmental sustainability

In half of the cases (cases 2, 3, 4) sustainability choices are limited to broad environmental practices such as through the reduction and recycling of paper and general waste, saving energy through solar panelling for lights in factories and choosing sustainable fabrics and textile recycling.

ii) Niche market companies embed sustainability as a business model and note personal concern as a motivating factor

Under the influence of foreign imports, local clothing production has continuously suffered, thus there is a definite need for a sustainable fashion industry from both an economic and environmental perspective. The findings illustrate that across the niche-market businesses (Cases 1, 5, 6), the main avenue of sustainability is in the business model itself. By creating new garments out of unwanted clothes through repurposing/remanufacturing and upcycling, these businesses illustrate how a circular economy business model might support entrepreneurship. Small niche companies that specialise in remanufacturing are more likely

than larger ones to seize commercial opportunities when it comes to making use of disposed materials (Gallo et al., 2012:221) and most remanufacturers are small to medium size firms with 0 to 249 employees (Liberto, 2022).

It is interesting to note that these participants also embed sustainable practices in their personal lives by opposing fast fashion consumption and choosing to wear second-hand clothing themselves. They noted concern for the current unsustainable practices in Cape Town. This concern is mainly for the level of fashion consumption perpetuated by fast fashion leading to the throw-away culture and landfilling. Although Schröder (2019:13) amongst other researchers (Mastamet, 2017; Hira et al., 2021) have observed that circular fashion is not much of a need in the Global South nations. Among the small, niche-market cases, there was a sense of urgency and eagerness to become more sustainable than some of the bigger companies. Further research is needed to determine to what degree this sentiment is shared by other small, niche fashion companies.

It is also worth adding that, although the cases may not speak for the entire Cape Town or South African fashion designer population, the findings are indicative of less interest among SA retailers and businesses to adopt sustainable practices. For instance, cases 2 and 3 mentioned that the market size is too small. Secondly, the cases have observed that only established and major retailers would be able to handle the responsibilities attached to going the sustainability route. Most importantly, many of the cases did mention that they did not know of any other companies that focused specifically on sustainable clothing manufacturing in Cape Town. This confirms May's (2019) report that circular fashion was endorsed by a very tiny proportion of South African designers that were listed in the South Africa Fashion Week (SAFW) database.

iii) Social sustainability in the form of fair wages

In most of the cases (cases 2, 3, 4, 5), the findings reveal a pattern of creation of employment for local women, paying them fair wages, and good working conditions as part of efforts to become more sustainable. There is definite empathy through the empowerment of local women by means of employment and the willingness to impart knowledge to others. The Global Fashion Agenda (2021) did indicate that despite the negative image, the clothing industry employs millions of people are employed in the apparel sector, and women make up 80% of those workers. This indicates that there these cases are giving weight to the importance of the well-being of society as a concern in their business practices. This is noted as an important sustainable development goal (WCED, 1987:8; Solino et al., 2020:166).

iv) Social sustainability in the form of education

Most (Cases 1, 2, 4, 5, 6) of the 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 and advocating against the compulsive consumption of fast fashion. This can be linked to Mittal & Sangwan's claims in 2014, that there is a lack of awareness locally, regarding recycling practices and sustainable manufacturing processes and how these can empower businesses to become more mindful of their part in protecting the environment by restructuring their operation methods to abide by the environmental sustainability protocols. A more recent study by Hira et al. (2022:323) found that major issues such as the lack of awareness among manufacturers, suppliers and consumers in the Global South, have to be overcome to create circular supply chains.

In response to the research question (What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry?), it is clear that each of the pillars of sustainable development (economic, social and environmental) (Connell & Kozar, 2017:2) is evident across the selection of cases. On the other hand, there is a seemly blurred line between the economic and social implementation of sustainability as it involves the employment of the female gender. As the findings in Case 4 indicate the employment of 90% of women in their company, Stevens (2010:2) and Domańska et al. (2019:130) have argued about economic sustainability has been affected by gender inequality. Therefore, from the analysis, it cannot be entirely concluded that there is one single case that fully abides by the three pillars of sustainable development. This also points back to Jestratijevic and Rudd's concern (2018:220) regarding the misunderstandings of what sustainability is, resulting from the various available definitions.

5.3.3.2. The factors that influence the adoption of sustainable manufacturing

To address the aim of the study, it was important to obtain insight from manufacturers' perspectives. Existing research suggests that there have been numerous contributing factors towards the collapse of the South African clothing sector to what is evident currently (Business Partners (ZA), 2014; Edwards & Jenkins, 2015:447, 456; Umezurike et al., 2017:124). The authorisation of liberalisation of trade between South Africa and international markets in the early 1990s was the very beginning of this crisis, as SA was now competing with low-cost imported products from China, known for cheap labour costs and the latest technologies. In their quest for commercial competitiveness, local manufacturers gave in to a vicious trap of fast fashion production (Cuc et al., 2015:157). This led to major and rapid factory closures and massive unemployment in the local fashion industry (Edwards & Jenkins, 2015:447, 456). Although there are traces of government interventions, these efforts were not enough against

giant fast fashion houses. The findings have identified these factors as part of the barriers however, the research sought to identify both the barriers and the drivers to the adoption of sustainable manufacturing practices according to each case.

To address the drivers, this study has acknowledged the circular economy as a possible solution to the linear model of fast fashion and throw-away culture, by putting emphasis on the end use of garments through recovering and reusing materials as recognised by Michelinia et al. (2017:5) and Niniimaki (2013:15), and promoted by The Ellen MacArthur Foundation. Therefore, the study has adopted the CE framework as well as the Theory of constraints as a theoretical framework upon which to identify these barriers and drivers. Although the TOC framework was designed as a tool to identify the barriers, it was used to identify the major drivers of sustainable manufacturing practises within the cases. The next section presents the main findings that emerged from data analysis in detail.

Essentially, across the cases, the findings identified a few patterns namely: the lack of education; the high cost of sustainability; the lack of government support; and fears and concerns around the scale at which sustainability would thrive.

i) The lack of education on sustainable manufacturing practices is seen as a significant barrier to the adoption of sustainable manufacturing practices

The lack of education on sustainable manufacturing practices has been well documented across the data set (all cases). The majority of the cases clearly spoke of the gap in education, the need to educate and the youth the South African consumer to be aware of the need for sustainable practices. There were even suggestions for teaching platforms such as workshops in schools and community projects from Case 2. Fletcher (2013) identified the misrepresentation of sustainability, suggesting a lack of understanding of what sustainability is. Essoussi and Linton (2010:460), Mastamet (2017:4) and Hira et al. (2022:323) noted the lack of education and awareness amongst South African local consumers regarding environmental concerns resulting from unsustainable fashion practices.

Both Guldmann (2016) and Hugo et al.'s research (2021:13) simply identified the lack of education regarding the applications of CE practices in developing countries, while Guldman (2016), stated that the lack of awareness and interest among consumers in developing countries this was due to less or no availability of used clothing collection programs in the Global South.

More specific to this study were Mittal and Sangwan (2014), Mastamet (2017:4) and Hira et al.'s studies (2022:323) suggesting that the Global South must overcome issues such as the lack of awareness regarding government policies and protocols which are less focused on protecting

the environment, especially within the apparel and textile sector. Note how the lack of education exists across various dimensions: from the fashion media, consumers, and local manufacturers.

ii) The perceived high cost of sustainability

The cases mentioned that although they support the idea of sustainability within local manufacturing companies, their high expense emerged very strongly as they found it disheartening to fully adopt. Cases 3 and 4 for instance, mentioned that South African retailers are not willing to invest in sustainability as the consumer demand is low, and the industry is purely cost-driven. In support of the findings, the literature contains evidence that identifies manufacturers' concerns about the profitability of previously used or upcycled garments and the risks attached to remanufactured and upcycled garments as these garments need to uphold the same standard as new products (Wang et al., 2014:7292; Pandit et al., 2017). This pressure is because the remanufacturing and upcycling process may demand much labour and specialised machinery, putting added financial pressure on the manufacturer. Numerous studies in the literature (Su et al., 2013; Kirchherr et al., 2018; Hira et al., 2022:323) have pointed fingers at the lack of access to technology, attached to high costs as the main issue/barrier to the implementation of CE practices. In opposition to these findings, Pandit et al. (2017) and Wang et al. (2014:7292) claim that remanufactured and upcycled garments cost less than new garments to produce as they require less use of raw materials by prolonging the life of used materials and reducing production energy use. In confirmation of the data findings, more recent studies (Cao et al., 2017; Mafini & Loury-Okoumba, 2018:1; May, 2019) concluded that in developing countries such as South Africa, the application of green manufacturing practices as a business model remains foreign to most small to medium enterprises (SMEs), despite the fact that it is a growing trend in most developing nations.

iii) The lack of government support

Across the cases, lack of access to government support was mentioned. Others (cases 1, 2, 5 and 6) even expressed their disappointment and distrust in the government, regarding the lack of fast fashion regulations and sustainable protocols. The findings further indicated that in an economy such as SA, sustainability is a matter that is less urgent, as it is still an emerging focus in SA as a developing economy, dealing with issues such as poverty, unemployment and electricity/power issues. This suggests a call for more government efforts in advocating for sustainable development, as sustainability inevitably addresses all these other issues in its purpose. Cao et al. (2017), Mafini and Loury-Okoumba (2018:1) and May (2019) have labelled circular production practices and environmental concerns as matters of less urgency in developing countries like South Africa. Mastamet (2017: 4) and Kirchherr et al. (2018) and Hira et al. (2022:323) identified the lack of government support in terms of proper policy implementation as an impediment in emerging economies, as the government might be crucial

in accelerating the transition to circular fashion practices. However, the opposite is evident in developed countries such as the US, UK, Germany, and China where the remanufacturing practice is and has been a great supporter of sustainable development in communities and the economy. This can be seen in the massive creation of jobs and the government support in those nations has been implemented through policies and subsidies (Wang et al., 2014:7295; Sihna et al., 2016:2). The literature, in relation to the findings, suggests that unsustainable practices in developing countries such as SA are inevitable in situations where the government has less contribution in terms of supporting environmental protocols and incentives towards sustainable businesses.

iv) Fears and concerns around the scale at which sustainability would thrive

The findings indicate a theme of fears and concerns around the scale at which sustainability would thrive in SA. Half the cases (2, 5, 6) raised concerns regarding scaling up their sustainable businesses and what the future holds for niche-market businesses, as Case 5 attempts to mass produce remanufactured/upcycled failed. Case 5 even added the future possibility that the consumer might be awakened to sustainable practices and their businesses may no longer be needed. Several studies in the literature (Gallo et al., 2012:221; Shaw, 2013; Sung, 2015:32; St. John James & Kent, 2019:7) are fully supportive of these findings and have all clearly indicated that the processes such as the deconstruction of used garments in remanufacturing and upcycling tend to be complex and would, therefore, thrive on a niche small scale. From a broader perspective, the literature (Cao et al., 2017; Mafini & Loury-Okoumba, 2018:1; May, 2019; Longden, 2020) support the findings as a barrier, claiming that although the circular fashion model, is an increasing trend in developed countries, it is still a niche idea in developing economies such as South Africa, especially to many SMEs and really exists on a small scale.

The drivers identified were:

i) To stay away or not buy from fast fashion houses

Across the niche-market cases (1, 5, 6), the findings identified a pattern of awareness against high fashion consumption resulting from low cost fast fashion as all these cases indicated that not buying from fast fashion houses and conscious shopping would be the drivers of sustainable practises. However, there is a lack data in the literature to substantiate these findings. These findings are aligned to Atalay's (2020) suggestion of creating education and awareness against high fashion, which might strongly influence the move towards circularity.

ii) Identified unused knowledge and skills

Case 2 mentioned concern regarding the amount of retired people with vast knowledge that is unused, and the skills that these people would offer the South African fashion industry. Note how this relates to education. Although there is no sufficient data in the literature to verify unused knowledge as a driver, the literature provides evidence that in the United Kingdom, in particular, upcycling provides skills development within businesses. Upcycling also assists in monetary localisation through the use of local resources, workforce, and experience, as well as the upliftment of neighbouring societies teaching (Han et al., 2017:92).

iii) Funding that has recently been released

In validation of Sung et al. (2017a, 2017b), case 3 stated the availability of funding that has been recently released from various government initiatives was identified as a direct driver of the adoption of sustainable fashion manufacturing locally. In 2019, Galatti & Baruque-Ramos gave further confirmation of these findings. It is interesting that despite the government being the main source of funding as a driver of sustainability, there was no mention of government support as a driver.

iv) Compulsory local manufacturing

Case 4 bluntly concluded that local production should be made compulsory to drive sustainable manufacturing in South Africa and that the fashion industry needs to follow in the footsteps of other nations who embrace and support their own skills and resources. Disappointment and frustration at the government's need to support in curbing fast fashion imports emerged very strongly in support of Jia et al.'s (2020) findings to enforce government restrictions for circularity.

The results of the analysis identified reluctance and discouragement towards the adoption of sustainable practices due to a number of challenges. Firstly, the government's lack of support in putting restrictions against fast fashion imports in place to curb further closing down of local clothing manufacturing factories, the issue of power cuts as well as funding. Signs of frustration emerged in the findings, as a result of the penetration of fast fashion and its effects on local businesses and the massive negative impact it had on the Cape Town fashion industry as a whole. Furthermore, the disinterest in sustainable practices due to the high expense both from the consumer perspective and the retailer/manufacturer perspective emerged as part of the barriers. An activist spirit against fast fashion greenwashing and advocacies for the missing education on these factors. Lastly, the findings suggested that the scale at which sustainable manufacturing would thrive varies across the cases as a barrier. Conscious shopping, unused knowledge and skill, compulsory local manufacturing were one of the identified drivers from the respective cases. Funding was presented as the key defining factor in undertaking sustainable clothing manufacturing.

5.3.3.3. The relation of the identified dynamics/factors across the cases

i) The lack of education

The majority of the cases clearly spoke of the gap in education, the need to educate and the youth the South African consumer to be aware of the need for sustainable practices. There were even suggestions for teaching platforms such as workshops in schools and community projects from Case 2.

ii) The high cost of sustainability

Most of the cases acknowledged the cost of sustainability as a hindrance. Case 3 shared that the local consumers' lack of willingness to pay for additional costs for sustainable garments is the reasoning behind the retailers and manufacturers' reluctance to adopt sustainable manufacturing practices.

iii) The lack of government support

The findings across the cases suggest the common factors that are a significant barrier to the adoption of sustainable practices are stakeholders. The interesting part is that as different as they are, both the major retailers, Case 4 and niche-market SMEs: half of the cases (cases 1, 2, 5, 6) have made claims regarding insufficient support in the government, resulting in a sense of distrust.

Another point worth noting is that in comparison to local government, these findings oppose or contradict the theory that the EU government's high acknowledgement of sustainable production, the EU is identified as the emerging centre of remanufacturing (Wang et al., 2014:7295). Second to this is Case 2: an SME in manufacturing and supplying and Case 3: a marketing consultant to major retailers where the findings identify a common perception that only bigger companies or retailers stand to be sustainable as they are believed to be more financially fit for such.

iv) Fears and concerns around the scale at which sustainability would thrive

However, one cannot overlook the theory that exists in the literature in full opposition to these findings. First, Gallo et al. (2012:221) suggested that in the case of discarded items, small niche businesses in remanufacturing are quicker to grasp trade opportunities, rather than bigger ones. In 2015, Sung indicated that upcycling would only work well on a small scale and focused on products, but unrealistic on a large scale. In 2020, Longden of Sitting Pretty concluded that circular fashion is truly evident in South Africa, "but only on a small scale".

v) Conclusion

The findings from the analysis presented a pattern centred on the affordability or the high cost of sustainability in half the cases (2, 3, 4). The findings support this in two parts: from the

manufacturers' perspective as well as the consumers'. The first is that the main reason behind this reluctance is that the majority of clothing manufacturers are concerned about the profitability of previously used or upcycled garments (Wang et al., 2014:7292). This is partly because eco manufacturers intend on abiding by the living wage rules for production ("fair trade"), stated Bennett (2018). Secondly, the majority of consumers have the assumption of ethical or eco purchases as being costlier than usual merchandise (Sihna et al., 2016).

The interpretation of the analysis across the cases identifies a gap in education regarding upcycling/remanufacturing and the overall urgency for sustainable practices in the Cape Town fashion industry, especially among the key stakeholders who are the manufacturers and the consumers. Therefore, this lack of education has inevitably influenced consumer demand or market size for sustainable products.

Therefore, this lack of education has inevitably influenced consumer demand or market size for sustainable products. Interpretation of the findings suggests the need for education on repurposing activities as well as education on sustainability as a whole amongst the youth in particular. Educating the youth in schools and the unemployed in local communities through large-scale workshops and upcycling/remanufacturing community projects would stimulate awareness of the environmental consequences of fast fashion on the environment. Furthermore, this would create an understanding and urgency of sustainability.

5.3.4. The contributions of the study

Identified the bottle neck (education) reveals a gap in existing academic research as well as among manufacturers and the consumers regarding remanufacturing and upcycling practises in fashion. The CE frameworks from de Jesus Medonca (2018) and Hugo et al. (2021) was adopted and further-developed into a new framework which was applied within a Global South context to determine the dynamics influencing the adoption sustainable manufacturing in developing countries such as SA. The study adopted the Theory of Constraints as a theoretical framework and illustrated how it could be adapted within the fashion manufacturing context to identify barriers as well as drivers of the adoption of sustainable manufacturing practices in SA. This research demonstrated the relation of the major drivers and barriers of sustainable manufacturing across the various companies.

The study suggested the government as an additional stakeholder to developed framework due to its importance in a country's move towards circularity.

5.3.4.1 Practical contribution

This study provides significant contributions by attempting to fill a number of gaps.

The existing research on the Global South mainly concerns the second-hand clothing trade, which in turn perpetuates accessive amounts of textile waste in Africa. Therefore, collaborations with major retailers alongside community projects, where unwanted clothing would be dropped off at retail stores and later gathered to be reused/repurposed by women in these community projects in order to make profit. Thus, creating employment. Secondly, the literature identifies different definitions of circularities due to life priorities between the Global South and the Global North. Therefore, a circular business model designed specifically for sustainable manufacturing in the Cape Town fashion industry, which may potentially stimulate the adoption of circular practices in developing countries.

The identified gaps in the research problem statement as well as literature review indicated a lack of education. Therefore, the study filled that gap suggests further research on the adoption of sustainable manufacturing practices. This further indicates a need for the facilitation of workshops and awareness platforms where education on circular practices especially remanufacturing and upcycling would be prioritised.

The study contributes to existing knowledge through the identified barrier which is the lack of education regarding sustainable manufacturing practises. The study laid the foundation for the application of Circular Economy to the fashion field and it was used to determine and establish the drivers and barriers of sustainable or circular fashion framework. It presented the collective of various factors such as technology and funding, that prioritise longer use of clothing through reuse, which ultimately lead to the shift away from the linear model. The TOC assisted in establishing the symptoms within the Cape Town apparel industry, presenting evidence that the existing production practices are negatively affecting the ecosystem, people, and profitability. Therefore, the CRT tool contributed to identifying the root cause of problem and the drivers to mitigate this root cause.

The identified government support as a stakeholder suggests the importance of necessary partnerships and collaborations among retailers, manufacturers, consumers as well as the government. Government support will enable the facilitation of the of appropriate applications of policies, and possibly open avenues for subsidies to SMEs as well as support more environmental alternatives as a move towards sustainability. The study sheds light on how to forge necessary relationships among the retailers and production companies to form a successful circular fashion system, given the cost that has been identified as a major barrier that can only be sustained by big retailers. The research provided evidence of the need for government to financially support South African businesses in order for them to implement the adoption of a more circular model in the SA clothing manufacturing chain through funding and

subsidies, as well as enforcing local manufacturing in the process, mitigating the issues of fast fashion imports.

5.4. Recommendations

As complex as it is to attain a circular fashion system, there is increasing pressure from the Global North placed on the Global South to detach from the conventional linear models, which cause harm to the environment. This pressure may be applied to the government, and the public as well as environmental consequences.

This study contributes both to academia and to innovative fashion possibilities that promise sustainable futures. In addition, it sheds light on major hurdles to be overcome and changes to be made, to attain CE in the fashion industry. The study was limited to the analysis aimed at only identifying CE barriers and drivers to the adoption of circular economy practices in fashion for fashion manufacturers in particular. Further studies seek to verify whether the circular fashion chain has been able to mitigate these difficulties and achieve recognition as a productive, profitable, and sustainable process.

Through this study, the research identifies stakeholders' active part or role players in the shift towards circularity in fashion as well as various entities that may benefit from the study.

The following recommendations are made for policy and practice:

The government may need to strengthen policies that support fashion manufacturers to adopt circular fashion alternatives. Practical avenues for retailers and manufacturers to forge necessary collaborations towards more circular models in the SA clothing manufacturing chain, thus enforcing local manufacturing in the process. The implementation of tighter regulations against fast fashion imports to also mitigate the previously-mentioned environmental issues is needed. South Africa may need to mimic countries like Turkey, where the government support is incredible as far as skills training for factory workers. The government needs to recognise the contribution of sustainability to the economy as a creator of jobs. The government may need to answer the call to manage cheap fast fashion imports by putting stringent restrictions in place to stimulate more local jobs and support local businesses. Providing financial backing or funding to SMEs from government sources to niche-market SMEs and making it more accessible to them may have alleviated the distrust the SMEs have in the government.

Educating the youth in schools and the unemployed in local communities through large-scale workshops and upcycling/remanufacturing community projects would greatly contribute towards the understanding and the need for sustainability amongst local companies. Awareness of the

poor quality of fast fashion and its effects on the environment would encourage conscious consumption among consumers.

Making sustainable fabrics such as hemp and bamboo available at a cost affordable to Africa should be prioritised. Getting retailer leadership to understand the value and urgency of being sustainable in material choices and manufacturing processes in the fashion industry. Local factories are already struggling financially, therefore reducing the high expense of sustainability and sustainable alternatives would stimulate more adoption.

Exploring avenues of providing retail spaces for entrepreneurs that is affordable and accessible. In addition, establishing necessary collaborations between the stakeholders will enable niche-market businesses (upcyclers/remanufacturers) to sell their garments through a major retailer, exposing the garments to the masses.

Further research should be conducted:

Since the research was conducted on a variety of business profiles, further studies on one specific business profiles is recommended to allow for more generalisation. Broader scope in terms of the dynamics influencing the adoption of sustainable manufacturing practices. Future studies should consider more studies on the application of CE fashion systems through exploring the possibilities of reuse and repurposing practices into SHC in Africa. Local (South African) fashion industry. The findings identified disinterest in sustainable practices due to the high expense both from the consumer perspective and the retailer/manufacturer perspective emerged as part of the barriers. Further studies may seek to investigate the profitability and more benefits of adopting a circular fashion system through remanufacturing and upcycling processes in particular. The results indicated a lack of studies/ education regarding the application of circular economy in fashion in the Global South or developing countries.

References

Aakko, M. & Koskennurmi-Sivonen, R. 2013. Designing sustainable fashion: Possibilities and challenges. *Research Journal of Textile and Apparel,* 17(1):13-23. doi:10.1108/RJTA-17-01-2013-B002.

African Development Bank Group. 2020. *African Development Bank, Collaborators launch first Fashionomics Africa Online Contest for Sustainable and Innovative Circular Fashion.* https://www.afdb.org/en/news-and-events/press-releases/african-development-bank-collaborators-launch-first-fashionomics-africa-online-contest-sustainable-and-innovative-circular-fashion-39895 [7 July 2021].

Allwood, J.M., Ashbya, M.F., Gutowski, T.G. & Worell, E. 2011. Material Efficiency: A White Paper. *Journal of Resources, Conservation and Recycling,* 55(3):366-367. doi:10.1016/j.resconrec.2010.11.002.

Anon. 2021. *15 Sustainable clothing facts for 2021.* https://shopsitesee.com/blogs/news/sustainable-clothing-facts [27 August 2021].

Anon. 2021. *Consumption.* https://www.dictionary.com/browse/consumption [March 2021].

Armstrong, C.M.J., Connell, K.Y.H., Lang, C., Ruppert-Stroescu, M. & LeHew, M.L.A. 2016. Educating for sustainable fashion: Using clothing acquisition abstinence to explore sustainable consumption and life beyond growth. *Journal of Consumer Policy,* 39(4):417-439.

Arnette, A.N., Brewer, B.L. & Choal, T. 2014. Design for Sustainability (DFS): The intersection of supply chain and environment. *Journal of Cleaner Production,* 83:375. doi:10.1016/j.jclepro.2014.07.021.

Barrow, M. 2011. *Britain since the 1930s.* https://www.history.org.uk/primary/categories/britain-since-1930 [March 2020].

Bartlett, C., McGill, I. & Peter, W. 2013. *Textiles flow and market development opportunities in the UK..* s.l.: WRAP.

Blissick, M., Dickson, M.A., Silverman, J. & Cao, H. 2017. Retailers' extent of involvement in sustainability and role in creating sustainable apparel and textiles from South Africa. *International Journal of Fashion Design, Technology and Education,* 10(3):265-275. doi.org/10.1080/17543266.2017.1298160.

Borel-Saladin, J. M. & Turok, I.N. 2013. The impact of the green economy on jobs in South Africa. *South African Journal of Science,* 109(9/10):1-4.

Borusiak, B., Szymkowiak, A., Horska, E. & Raszka, N. 2020. Towards building sustainable consumption: A study of second-hand buying intentions. *Sustainability,* 12(3):875. doi:10.3390/su12030875.

Boscia, T. 2014. Sustainable chic: College designers and scientists fashion a second life for textile waste. *Human Ecology,* 42(1):10-11.

Boucher, Q. 2019. *Manufacturing: Winners and losers of 2018.* http://www.statssa.gov.za/?p=11890 [2 March 2021].

Brooks, A. 2015. *Clothing poverty: The hidden world of fast fashion and second-hand clothes.* London: ResearchGate.

Brooks, A. & Simon, D. 2012. Unravelling the relationships between used clothing imports and the decline of African clothing industries. *Development and Change;* 43(6):1265-1290. doi:10.1111/j.1467-7660.2012.01797.x.

Business Partners (ZA). 2014. *Business Partners (ZA).* https://www.businesspartners.co.za/en-za/entrepreneurs-growth-centre/useful-articles/manufacturing/the-south-african-textile-and-clothing-industry-%E2%80%93-an-overview [11 December 2020].

Cape Town Fashion Council. 2020a. *Home page*. https://ctfcdigital.co.za/ [9 December 2020].

Cape Town Fashion Council. 2020b. *Fashion Revolution.* https://ctfcdigital.co.za/revolution/ [9 December 2020].

Castellani, V., Sala, S. & Mirabellay, N. 2015. Beyond the throwaway society: A life-cycle-based management. *Integrated Environmental Assessment and management*, 11(3):373. doi:10.1002/ieam.1614.

Castleberry, A. & Nolen, A. 2018. Thematic analysis of qualitative research data: Is it as easy as it sounds? *Currents in Pharmacy Teaching and Learning,* 10(6):807-815. doi:10.1016/j.cptl.2018.03.019.

Ceschin, F. & Gaziulusoy, I. 2016. Evolution of design for sustainability: From product design to design for system. *Design Studies,* 47:118-163. doi.org/10.1016/j.destud.2016.09.002.

Ceschin, F. & Gaziulusoy, I. 2020. Addressing sustainability by design. In *Design for sustainability: A multi-level framework from products to socio-technical systems.* New York: Newgen, 9.

Charter, M. & Grey, C. 2015. Remanufacturing and product design. *International Journal of Product Design,* 6(34) doi:10.1504/IJPD.2008.020406.

Choi, M.T. 2017. Pricing and branding for remanufactured fashion products. *Journal of Cleaner Production,* 165:1385-1394.

Cimattia, B., Campanab, G. & Carluccio, L. 2017. *Eco-design and sustainable manufacturing in fashion: A case study in the luxury personal accessories industry.* s.l., Elsevier, 397.

Claudio, L. 2007. Waste couture: Environmental impact of the clothing industry. *Environmental Health Perspectives,* 115(9):115,448. doi:10.1289/ehp.115-a449.

Collins. 2021. *Manufacturer.* https://www.collinsdictionary.com/dictionary/english/manufacturer [12 March 2021].

Connell, K.Y.H. & Kozar, J.M. 2017. Introduction to special issue on sustainability and the triple bottom line within the global clothing and textiles industry. *Fashion and Textiles,* 4(16):2. doi.org/10.1186/s40691-017-0100-6.

Cooper, T., Claxtron, S., Hill, H., Holbrook, K., Hughes, M., Knox, A. & Oxborrow, L. 2014. *Development of an industry protocol on clothing longevity.* Nottingham: Researchgate.

Cruzes, D.S. & Dybå, T. 2011. *Recommended steps for thematic synthesis in software engineering.* Trondheim: IEEE Computer Society.

Clothing and Textile Competitiveness Programme (CTCP). 2020. *Weaving growth into the economy.* http://www.ctcp.co.za/ [10 December 2020].

Cuc, S., Girneata, A., Iordanescu, M. & Irinel, M. 2015. Environmental and socioeconomic sustainability through textile recycling. *Industria Textila,* 66(3):157.

De Abreu, M.C. 2015. The case of China. In Muthu, S.S. (ed.), *Roadmap to sustainable textiles and clothing: Regulatory aspects and sustainability standards of textiles and clothing supply chain.* Hong Kong: Springer, 9-10.

De Aguiar Hugo, A., De Nadae, J. & Da Silva Lima, R. 2021. Can fashion be circular? A literature review on circular economy barriers, drivers, and practices in the fashion industry's productive chain. *Sustainability,* 13(21). doi.org/10.3390/su132112246.

De Jesus, A. & Mendonça, S. 2018. Lost in transition? Drivers and barriers in the eco-innovation road to the circular economy. *Ecological Economics,* 145:75-89. doi.org/10.1016/j.ecolecon.2017.08.001.

Department of Environment, Forestry & Fisheries R. 2020. *National Waste Management Strategy 2020*. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwi3meOChM_7AhXholwKHUsQCUcQFnoECBoQAQ&url=https%3A%2F%2Fwww.dffe.gov.za%2Fsites%2Fdefault%2Ffiles%2Fdocs%2F2020nationalwaste_managementstrategy1.pdf&usg=AOvVaw2wU61OXVnvmPkrb7rSHtFp [15 June 2022].

Department of Trade, Industry and Competitiveness: Republic of South Africa. 2020. *About us.* http://www.ctcp.co.za/about-us/ [December 2020].

Dhurup, M. 2014. Impulsive fashion apparel consumption: The role of hedonism, fashion involvement and emotional gratification in fashion apparel impulsive buying behaviour in a developing country. *Mediterranean Journal of Social Sciences,* 5(8):168-177. doi.org/10.5901/mjss.2014.v5n8p168.

Dickson, M.A., Loker, S. & Eckman, M. 2009. *Social responsibility in the global apparel industry.* s.l.:Bloomsbury Academic.

Dissanayake, G. & Sihna: 2010. *Remanufactured fashions: A pathway to sustainability.* Delft, s.n., 5.

Dissanayake, G. & Sihna, P. 2015. An examination of the product development process for fashion remanufacturing. *Resources, Conservation and Recycling,* 104:94-102. doi.org/10.1016/j.resconrec.2015.09.008.

Department: Trade Industry and Competition (DTIC). 2020. *Briefing on the retail-clothing, textile, footwear & leather master plan.* DTIC.

Eco-Friendly Habits. 2021. *Fast fashion industry facts: Fashion industry statistics you should know.* https://www.ecofriendlyhabits.com/fashion-industry-facts/ [16 August 2021].

Edwards, L. & Jenkins, R. 2013. The impact of Chinese import penetration on the South African manufacturing sector. Southern Africa Labour and Development Research Unit. *The Journal of Development Studies,* 51(4):447-463*.* doi.org/10.1080/00220388.2014.983912.

Erlingsson, C. & Brysiewics, P. 2017. A hands-on guide to doing content analysis. *African Journal of Emergency Medicine,* 7(3):94. doi:10.1016/j.afjem.2017.08.001.

Eryuruk, H.S. 2012. Greening of the textile and clothing industry*. Fibres & Textiles in Eastern Europe,* 95:22-27.

Essoussi, H.L. & Linton, J.D. 2010. New or recycling products: How much are consumers willing to pay? *Journal of Consumer Marketing,* 27(5):460. doi.org/10.1108/07363761011063358.

Farrer, J. 2011. Shaping sustainable fashion: Changing the way we make and use clothes. In Gwilt, A. & Rissanen, T. (eds.), *Remediation: Discussing fashion textiles sustainability.* London: Earthscan, 20.

Fletcher, K. 2008. Sustainable fashion and textiles: Design journeys. *The Journal of Design, Creative Process & the Fashion Industry,* 1(2):271-274. doi:10.4324/9781849772778.

Fletcher, K. & Williams, D. 2013. Fashion education in sustainability in practic*e. Research Journal of Textile and Apparel,* 17(2):81-88. doi.org/10.1108/RJTA-17-02-2013-B011.

Fraser, K. 2009. *Redress: Refashion as a solution for (un)sustainability.* s.l.: s.n.

Fuller, R.B. 1969. *Operating Manual for Spaceship Earth.* Carbondale: Illinois University Press.

Gallo, M., Romano, E. & Santillo, L.C. 2012. A Perspective on remanufacturing business: Issues and opportunities. In *International trade from economic and policy perspective.* s.l.:Intercopen, 218, 221. doi:10.5772/48103.

Global Fashion Agenda. 2021. *Design for Longevity – Kasibuka Chola.* https://designforlongevity.com/slides/kasubika-chola [11 May 2021].

Government, S.A. 2021. *Copyright Act 98 of 1978.* https://www.gov.za/documents/intellectual-property-laws-amendment-act-0 [13 April 2021].

Haas, D. 2020. *World Report 2020 – Events of 2019.* s.l.: s.n.

Han, S.L.C., Chan, P.Y.L., Venkatraman, P., Apeagyei, P., Cassidy, T. & Tyler, D.J. 2017. Standard vs. upcycled fashion design and production. *The Journal of Design, Creative Process & the Fashion Industry,* 9(1):69-94. doi.org/10.1080/17569370.2016.1227146.

Henninger, C.E., Alevizou, P.J., Oates, C.J. & Cheng, R. 2016. Communicating sustainability: The case of slow-fashion micro-organisations. In Genius, A. (ed.), *Chapter 6: Sustainable consumption: Design, innovation and practice.* s.l.: Springer, 84.

Henninger, C.E., Ryding, D. & Alevizou, P.J. 2017. *Sustainability in fashion: A cradle to upcycle approach.* Springer.

Hoskins, T. 2015. *Ethical fashion: Saving South Africa's clothing industry.* https://www.theguardian.com/sustainable-business/sustainable-fashion-blog/2015/feb/02/ethical-fashion-rebuild-south-africa-garment-industry [28 July 2021].

Hur, E. & Cassidy, T. 2019. Perceptions and attitudes towards sustainable fashion design: Challenges and opportunities for implementing sustainability in fashion. *International Journal of Fashion Design,Technology and Education,* 12(2):208-217. doi.org/10.1080/17543266.2019.1572789.

Ijomah, W. 2010. The application of remanufacturing in sustainable manufacturing. *Waste and Resource Management,* 163(WR4):157-164. doi.org/10.1680/warm.2010.163.4.157.

Imo, B.E. & Maiyo, R.C. 2012. Lessons from thriving second-hand clothing businesses for kenya's fashion industry. *Journal of Emerging Trends in Economics and Management Sciences,* 3:32-37.

Iordanescu, M., Cuc, S., Dima, A. & Irinel, M. 2015. Environmental and socioeconomic sustainability through textile recycling. *Industria Textil,* 66:156-163.

James, A.M. & Montgomery, B. 2017. Changes in purchasing behaviour. In Muthu, S.S. (ed.), *Textiles and clothing sustainability: Sustainable fashion and consumption.* Hong Kong: Springer, 17-18.

Javadi, M. & Zarea, K. 2016. Understanding thematic analysis and its pitfalls. *Pars Research Journal,* 1(1):33-39. doi:10.15412/J.JCC.02010107.

Jenkins, C. 2015. *Refashion: Extending the life cycle of clothing and revaluing waste.* s.l.: Metamorphosis.

Jestratijevic, I. & Rudd, N.A. 2018. Six forms of sustainable fashion. *Latest Trends in Textile and Fashion Designing,* 2(4). doi.org/10.32474/lttfd.2018.02.000145.

Jordeva, S., Tomovska, E., Trajkovic, D. & Zafirova, K. 2015. Current state of pre-consume apparel waste management in Macedonia. *Fibres and Textiles in Eastern Europe,* 23(109):13-16.

Jordeva, S., Tomovska, E., Mojsov, K., Golomeova-Longurova, S. & Maksimov, S. 2018. Sustainability of the textile waste stream in Macedonia. *Advanced Technologies,* 7(1):74-78. doi.org/10.5937/savteh1801074j.

Jung, S. & Jin, B. 2014. A theoretical investigation of slow fashion: Sustainable future of the apparel industry. *The Internation Journal of Consumer Studies,* 38(5):510-519. doi.org/10.1111/ijcs.12127.

Karaosman, H. 2016. *Sustainability in fashion: The factbook.* s.l.: s.n.

Khandual, A. & Pradhan, S. 2019. Fast fashion, fashion brands and sustainable consumption. In Muthu, S.S. (ed.), *fashion brands and consumers approach towards sustainable fashion.* s.l.:Springer Nature Singapore, 38.

Khurana, K. & Tadesse, R. 2019. A study on relevance of second hand clothing retailing in Ethiopia. *Research Journal of Textile and Apparel,* 23(4):323-339. doi.org/10.1108/RJTA-12-2018-0063.

King, M.A., Burgess, S.C., Ijomah, W. & McMahon, C.A. 2005. Reducing waste: Repair, reconditioning, remanufacture and recycle? *Sustainable Development,* 14(4):261. doi:10.1002/sd.271.

Koch, K.M. 2021. *Clothing upcycling in Otago (Otakou) and the problem of fast fashion,* University of Otago.

Kumar, R. 2011. *Research methodology: A step-by-step guide for beginners.* 3rd ed. New Dehli: Sage.

Kumar, R. 2014. *Research methodology: A step-by-step guide for beginners.* 4th ed. London: Sage.

Kurilova-Palisaitiene, J., Poksinska, B.B. & Sundin, E. 2017. Remanufacturing challenges and possible lean improvements. *Journal of Cleaner Production,* 172:3225-3236. doi:10.1016/j.jclepro.2017.11.023.

Larney, M. & Van Aardt, A.M. 2010. Case study: Apparel industry waste management: A focus on recycling in South Africa. *Waste Management and Research,* 28:(1):36-43. doi.org/10.1177/0734242X09338729.

Longden, E. 2020. *#BizTrendz2020: Fashion won't be sustainable until consumers are educated.* https://www.bizcommunity.com/Article/196/731/199671.html [30 July 2021].

Lowitt, S. 2007. *The employment creation potential of recycling in South Africa.* s.l.: s.n.

Lund, R.T. 1984. Remanufacturing. *Technology Revolution,* 87(2):19-29.

Liu, Y. 2017. *Environmental issues related to fashion industry – Ethical and sustainable fashion*. https://yuyingliublog.wordpress.com/2017/04/30/environmental-issues-related-to-fashion-industry/ [15 June 2022].

Mabin, V. 2015. *Goldratt's "Theory of Constraint" thinking processes: A systems methodology linking soft with hard.* https://proceedings.systemdynamics.org/1999/PAPERS/PARA104.PDF [22 July 2022].

Madsen, C.Ø. & Kræmmergaard, 2015. Channel choice: A literature review. *IFIP International Federation for Information Processing,* 2015:1.

Mafini, C. & Loury-Okoumba, W.V. 2018. Extending green supply chain management activities to manufacturing small and medium enterprises in a developing economy. *South African Journal of Economic and Management Sciences,* 21(1). doi.org/10.4102/sajems.v21i1.1996.

Magoum, I. 2021. *When Africa goes green.* https://www.afrik21.africa/en/africa-when-fashion-goes-green/ [7 July 2021].

Mason, A.M., Mashinini-Langwenya, P. & Yu, W. 2018. Chapter 9: Consumer behaviour towards sustainable clothing in south africa. In *The strategic repositioning of the arts, culture, heritage in the 21st Century.* s.l.:Cambridge Scholars.

May, J. 2019. *Nipped in the waste: Why sustainable fashion is a big ask for local designers.* https://www.timeslive.co.za/sunday-times/lifestyle/fashion-and-beauty/2019-04-21-nipped-in-the-waste-why-sustainable-fashion-is-a-big-ask-for-local-designers/ [1 May 2022].

Melnkova, A. 2018. Towards an explicit research methodology: Adapting research onion model for future studies. *Journal of Future Studies,* 23(2):29-44.

Michelini, G., Moraes, R.N., Cunha, R.N., Costa, J.M.H. & Ometto, A.R. 2017. From linear to circular economy: PSS conducting the transition. *Procedia CIRP,* 64*:*2-6. doi.org/10.1016/j.procir.2017.03.012.

Mishra, S., Jain, S. & Malhotra, G. 2020. The anatomy of circular economy transition in the fashion industry. *Social Responsibility Journal*, 17(4):524-542. doi.org/10.1108/SRJ-06-2019-0216.

Mittal, V.K. & Sangwan, K.S. 2014. *Prioritising drivers for green manufacturing: Environmental, social and economic perspectives.* Trondheim, Norway: Elsevier.

Moreno-Gavara, C. & Isabel Jiménez -Zarco, A. 2019. *Sustainable fashion: Empowering African women entrepreneurs in the fashion industry.* s.l.: Palgrave MacMillan.

Morris, M. & Barnes, J. 2014. *The challenges to reversing the decline of the apparel sector in South Africa.* Johannesburg, the University of Cape Town and University of Kwa-Zulu Natal, 2.

Morris, M. & Einhorn, G. 2008. Globalisation, welfare and competitiveness: The impacts of Chinese imports on the South African clothing and textile industry. *Competition & Change* 12(4):4. doi:10.1179/102452908X357301.

Msweli, P. 2011. *Writing a research proposal: Practical guidelines for business students.* Cape Town: Juta.

Muthu, S.S. & Dissanayake, G. 2016. *Environmental footprints and eco-design of products and processes*. http://www.springer.com/series/13340.

Myers, G.J. 2014. *Designing and selling recycled fashion. Acceptance of upcycled secondhand clothes by female consumers, age 25 to 65.* North Dakota state university of agricultural and applied sciences. s.l.: s.n.

Nagel, A. 2020. *Seven local brands leading the way in sustainable, ethical fashion design.* https://www.timeslive.co.za/sunday-times/lifestyle/fashion-and-beauty/2020-11-29-seven-local-brands-leading-the-way-in-sustainable-ethical-fashion-design/ [24 July 2021].

Nahman, A.,Godfrey, L, Oelofse, S. & Trotter, D. 2021. Driving economic growth in South Africa through low carbon, sustainable and inclusive circular economy. CSIR. *Circular Economy Briefing Note*, 1(8).

Narsar, N. & Thurston, M. 2006. *Remanufacturing: A key enabler to sustainable product systems.* New York, s.n., 16-17.

National Economic Development and Labour Council. 1995. *Home Page.* http://nedlac.org.za/ [24 September 2019].

Niniimaki, K. 2011. *From disposable to Sustainable: The complex interplay between design and consumption of textiles and clothing.* Helsinki: Aalto University.

Niniimaki, K. 2013. *Sustainable Fashion: New Approaches.* Tuusula: Aalto University.

Niinimaki, K. 2018. *Sustainable Fashion in a Circular Economy.* Espoo: Alto Arts Books.

Niinimäki, K., Peters, G., Dahlbo, H., Perry, P., Rissanen, T. & Gwilt, A. 2020. The environmental price of fast fashion. *Nature Reviews Earth and Environment,* 1(4):189-200. doi.org/10.1038/s43017-020-0039-9.

O'Leary, Z. 2010. *The essential guide to doing your research project.* London: Sage.

Orouji, M. 2016. Theory of constraints: A state-of-art review. *Accounting,* 45-52. doi.org/10.5267/j.ac.2015.12.004.

Palagi, E., Gandon, F., Troncy, R. & Giboin, A. 2017. A survey of definitions and models of exploratory search. *Proceedings.* ESIDA 17 – ACM Workshop on Exploratory Search and Interactive Data Analytics, Limassol, Cyprus, 3-8. doi:10.1145/3038462.3038465.

Papachroni, A. & Lochrie, S. 2014. Case studies and data. In O'Gorman, D. & MacIntosh, R. (eds.), *Research methods for business and management: A guide to writing your dissertation.* Oxford: Goodfellow.

Papanek, V.J. 1985. *Design for the real world: Human ecology and social change.* New York: Van Nostrand Reinhold.

Parker, D. 2004. *Remanufacturing in the UK: A significant contributor to sustainable development?* s.l.: s.n.

Paterson, D.A.P., Ijomah, W.L. & Windmill, J.F.C. 2017. End-of-life decision tool with emphasis on remanufacturing. *Journal of Cleaner Production,* 148:653-664. doi.org/10.1016/j.jclepro.2017.02.011.

Payne, A. 2011. The Life-cycle of the fashion garment and the role of Australian mass market designers. *The International Journal of Environmental, Cultural, Economic and Social Sustainability,* 7(3):246. doi:10.18848/1832-2077/CGP/v07i03/54938.

Petrow, M. & Leemann, L. 2018. *Sustainable Fashion Blueprint 2018.* s.l.: Mamoq.

Pires, A. & Martinho, G. 2019. Waste Hierarchy Index for Circular Economy in Waste Management. *Waste Management,* 95:298-305. doi:10.1016/j.wasman.2019.06.014.

Puche, J., Ponte, B., Costas, J., Pino, R. & De La Fuente, D. 2016. Systemic approach to supply chain management through the viable system model and the theory of constraints. *Production Planning and Control,* 27(5):421-430. doi.org/10.1080/09537287.2015.1132349.

Radhakrishnan, S. 2015. Environmental impact of products. In Muthu, S.S. (ed.), *Roadmap to sustainable textiles and clothing: Regulatory aspects and sustainability standards of textiles and the clothing supply chain.* Hong Kong: Springer, 28.

Ratcliff, D. 2004. *15 Methods of data analysis in qualitative research.* https://www.academia.edu/9894440/5_Methods_of_Data_Analysis_in_Qualitative_Research [3 December 2022].

Reiter, B. 2013. *The epistemology and methodology of exploratory social science research: Crossing Popper with Marcusse.* Government and International Affairs Faculty Publication, 1.

Remy, N., Speelman, E. & Swartz, S. 2016. *Sustainable style: A new fast-fashion formula.* https://www.mckinsey.com/business-functions/sustainability/our-insights/style-thats-sustainable-a-new-fast-fashion-formula# [December 2020].

Resnik, B.D. 2016. Employees as research participants: Ethical and policy issues. *IRB Ethics and Human Research,* 38(4):11-16.

Resnik, D.B. 2016. Employees as research participants: Ethical and policy issues. *Ethics and Human Research,* 38(4):15.

RSA, The Great Recovery. 2013. *Investigating the role of design in the circular economy.* London: Thomas Matthews.

RSA, The Great Recovery, 2016. *Four design models for circular economy.* http://www.greatrecovery.org.uk/resources/four-design-models-for-circular-economy/ [6 December 2020].

Sahay, A. 2016. *Peeling the Saunder's research onion.* https://www.researchgate.net/profile/Arunaditya-Sahay/publication/309488459_Peeling_Saunder's_Research_Onion/links/5813283508aedc7d89609ea8/Peeling-Saunders-Research-Onion.pdf [15 June 2022].

Sandin, G. & Peters, G.M. 2018. *Environmental impact of textile reuse and recycling – A review.* Science Direct. doi.org/10.1016/j.jclepro.2018.02.266.

Saunders, M.N.K., Lewis, P. & Thornhill, A. 2009. *Understanding research approaches and philosophies to theory development.* Prentice Hall.

Saunders, M., Thornhill, A. & Lewis, P. 2007. Exploratory research design. In *Research methods for business students.* 4th ed. Harlow: FT Prentice Hall, 32.

Saunders, M. & Tosey, P. 2013. *The layers of research design.* s.l.: s.n.

Schoebachler, D.D. & Gordon, G.L. 2002. Multi-channel shopping: Understanding what drives channel choice. *Journal of Consumer Marketing,* 19(1):42. doi:10.1108/07363760210414943.

Schröder, P., Anantharaman, M., Anggraeni, K. & Foxon, T.J. 2019. *The circular economy and the Global South: Sustainable lifestyles and green industrial development*. Routledge.

Shaw, J. 2013. *Fashion made in Malawi.* https://www.africafashionguide.com/fashion-made-inmalawi-mia-by-mia-nisbet-ss14-collection-designer/ [10 May 2021].

Signé, L. 2018. *The potential of manufacturing and industrialisation in Africa: Trends, opportunities, and strategies*. Africa Growth Initiative at Bookings, New York.

Sihna, P., Dissanayake, D.G., Kanchana, M.D. & Kahabi, C. 2010. Creating a global vision for sustainable fashion. *Proceedings.* 87th Textile Institute World Conference 2010, Textiles Institute, Manchester, UK, 247-275.

Sihna, P., Muthu, S.S. & Dissanayake, G. 2016. *Environmental footprints and ecodesign of products and processes.* Hong Kong: SGS Hong Kong.

Smal, D. 2019. A case for design-led environmentally sustainable fashion design praxis in South Africa. In Gwilt, A., Payne, E. & Ruthschilling, E.A. (eds.), *Global perspectives on sustainable fashion.* s.l.: Bloomsbury, 230.

South African Government. 2020. *Clothing and Textile Competitiveness Programme (CTCP).* https://www.gov.za/services/business-incentives/clothing-and-textile-competitiveness-programme-ctcp [10 December 2020].

Spangenberg, J.H., Fuad-Luke, A. & Blincoe, K. 2010. Design for sustainability (DfS): The interface of sustainable production. *Journal of Cleaner Production,* 18(15):1485-1493. doi:10.1016/j.clepro.2010.06.002.

Speer, J. 2014. *Opportunities and challenges in Asia's apparel and textile sector.* https://risnews.com/opportunities-and-challenges-asias-apparel-and-textile-sector [11 May 2021].

St. John James, A. & Kent, A. 2019. Clothing Sustainability and Upcycling in Ghana. London: Nottingham Trent University, 4, 5, 8.

Stahel, W.R. 2016. *The circular economy.* s.l.:Macmillan, 435, 438.

Sung, K. 2015. *A review on upcycling: Current body of literature, knowledge gaps and a way forward.* Nottingham: s.n.

Sung, K., Cooper, T. & Kettley, S. 2019. Factors influencing upcycling for UK makers. *Sustainability,* 11(870):1-26. doi.org/10.3390/su11030870.

Sung, K., Ramathan, U., Cooper, T. & Singh, J. 2017. *Challenges and support for scaling up cycling businesses in the UK: Insights for small-business entrepreneurs.* London: Delft University of Technology of Technology, 397-401.

Sustainable Cotton Cluster. 2015. *Home Page.* http://cottonsa.org.za/staging/sustainable-cotton-cluster/ [July 2021].

Synzenbe,.2020. *The growth of sustainable fashion in Africa.* https://www.fibre2fashion.com/industry-article/8568/the-growth-of-sustainable-fashion-in-africa [7 July 2021].

Szaky, T. 2014. *The modern idea of garbage and how to think our way out of it.* San Francisco: Berrett- Koehler.

The Ellen MacArthur Foundation. 2013. *Towards the circular economy.* https://ellenmacarthurfoundation.org/towards-the-circular-economy-vol-3-accelerating-the-scale-up-across-global [3 December 2022].

The Ellen McArthur Foundation. 2015. *Circularity indicators: An approach to measuring circularity.* https://ellenmacarthurfoundation.org/material-circularity-indicator [3 December 2022].

The Ellen McArthur Foundation. 2017. *A new textiles economy: Redesigning fashion's future.* s.l.: Conker House.

Thorisdottir, T. & Johannsdottir, L. 2019. Sustainability within fashion business models: A systematic literature review. *Sustainability,* 11(8):2233. doi.org/10.3390/su11082233.

Topalova, P. & Khandelwal, A. 2011. Trade liberalisation and firm productivity: The case of India. *The Review of Economics And Statistics,* 93(3):995-1005.

Umezurike, S.A., Iwu, C.G., Obokoh, L.O. & Umezurike, C.A. 2017. Neo-liberalisation: The impact of Chinese exports on South Africa's sociopolitical economy. *Problems and Perspectives in Management,* 15(1):124-131. doi.org/10.21511/ppm.15(1).2017.13.

United States Interntional Trade Comission (USITC). 2013. *United States international trade commission operation of the trade agreements program 64th report*. www.usitc.gov. [February 2020].

United States Environmental Protection Agency. 2017. *Home Pag*e. https://www.epa.gov/. [February 2020].

United States Environmental Protection Agency. 2020. *Sustainable manufacturing.* https://www.epa.gov/sustainability/sustainable-manufacturing. [27 September 2021].

USITC, 2012. *Remanufactured goods: An overview of the United States and globaliIndustries, markets, and trade.* Washington, D C.: USITC.

Vadicherla, T., Saravanan, D., Muthu Ram, M. & Suganya, K. 2017. Fashion renovation via upcycling. In *Textiles and clothing sustainability.* Singapore: Springer, 1-54.

Vaismoradi, M., Jones, J., Turunen, H. & Snelgrove, S. 2015. Theme development in qualitative content analysis and thematic analysis. *Journal of Nursing Education and Practice,* 6(5):100-110. doi:10.5430/jnep.v6n5p100.

Wang, K., Zhao, Y., Cheng, Y. & Choi, T.M. 2014. Cooperation or competition? Channel choice for a remanufacturing fashion supply chain with government subsidy. *Sustainability,* 6(10):7292-7310. doi:10.3390/su6107292.

Welman, C., Kruger, S.J. & Mitchell, B. 2005. *Research methodology.* Cape Town: Oxford University Press Southern Africa.

Williams, C. 2007. Research methods. *Journal of Business and Economics Research,* 5(3):65-72. doi,org/10.19030/jber.v5i3.2532.

Winans, K., Kendall, A. & Deng, H. 2017. The history and current applications of the circular economy concept. *Renewable and Sustainable Energy Reviews,* 68(1):825-833. doi.org/10.1016/j.rser.2016.09.123.

Yuyingliu, 2017. *Environmental issues related to the fashion Industry.* https://yuyingliublog.wordpress.com/2017/04/30/environmental-issues-related-to-fashion-industry/ [27 November 2020].

Appendix A: Ethics Certificate

Cape Peninsula University of Technology
creating futures

PO Box 1906, Bellville, 7535 Symphony Way, Bellville, Cape Town, South Africa
+ 27 (0)21 959 6767 www.facebook.com/cput.ac.za info@cput.ac.za www.cput.ac.za

Office of the Research Ethics Committee
Faculty of Informatics and Design
Room 2.09
80 Roeland Street
Cape Town
Tel: 021-469 1012
Email: ndedem@cput.ac.za
Secretary: Mziyanda Ndede

22 April 2021

Nthabeleng Monyaki
c/o Department of Applied Design
CPUT

Reference no: 206020813/2021/9

Project title: The exploration of remanufacturing and upcycling in the Cape Town Fashion manufacturing industry

Approval period: 22 April 2021 – 31 December 2022

This is to certify that the Faculty of Informatics and Design Research Ethics Committee of the Cape Peninsula University of Technology approved the methodology and ethics of Nthabeleng Monyaki (206020813) for the MTech Applied Design.

Any amendments, extension or other modifications to the protocol must be submitted to the Research Ethics Committee for approval.

The Committee must be informed of any serious adverse event and/or termination of the study.

A/Prof I van Zyl
Chair: Research Ethics Committee
Faculty of Informatics and Design
Cape Peninsula University of Technology

Appendix B: Consent in prinicple

Agreement to Take Part in Research Activities

Full Name: _

Name of organisation: _
(if applicable)
Position in organisation: _
(if applicable)

I give consent, in principle, to allow Ms N, Monyaki a student at the Cape Peninsula University of Technology, to collect data from research interactions with me (or individuals in my organization) for her MTech (Design) project. The student has explained to me the nature of her research and the nature of the data to be collected.

This consent in no way commits any individual to participate in the research, and it is expected that the student will get explicit consent from any participant prior to each research activity. I reserve the right to withdraw my permission at some future time.

In addition, the organisation's name/ my name may or may not be used in academic dissemination as indicated below (Tick as appropriate.)

	Thesis	**Conference paper**	**Journal article**	**Research poster**
Yes				
No				

Date:

Signature: _____

_____

Appendix C: Interview guide

Title: ***The exploration of remanufacturing and upcycling in the Cape Town Fashion manufacturing industry***

Main or primary research question:

PRQ: What are the dynamics that influence the adoption of sustainable manufacturing practices, such as remanufacturing and upcycling in selected apparel manufacturing companies in Cape Town?

Secondary research questions:

SRQ 1: What evidence is there of sustainable practices in the Cape Town fashion manufacturing industry?

SRQ 2: What are the factors influencing the adoption of practices of sustainable manufacturing within the Cape Town apparel manufacturing industry?

SRQ 3: How are the identified factors related across the cases?

INTERVIEW SCRIPT

Good morning Sir/Madam, how are you? I am very well, thanks.

Is now a convenient time to ask you some questions?

This interview should take about ten (10) minutes.

-Do I have your permission to make an audio recording of this conversation/interview to ensure that I accurately recall the data you provide?

-Any personal, business information you provide remains strictly confidential and you will be anonymous in any publication of the results. If you agree, I would also like to quote some of your responses. This will be done in a way that ensures you are unidentifiable and all names will be replaced with pseudonyms.

-The questions I will ask are not of a sensitive nature, rather they are general, aiming to enable you to enhance my knowledge of current practice and existing perception towards sustainable clothing manufacturing practices, with a focus on remanufacturing and upcycling in Cape Town.

-Upon agreeing to participate in this study, you still hold the right to withdraw at any given time.

-Data from the study is part of my master's thesis which I expect to complete in April 2022.

-The data collected will be used for academic purposes only in the form journals and at conference presentations. The data from the study will be kept for a minimum of five years at the Cape Peninsula University of Technology. After five years it will be destroyed.

-This study has been approved by CPUT's FID Office of the Ethics Committee.

-Are you clear on the intent of the study and therefore give consent to participate in the study?

-Should you have further queries or feel any discomfort from this activity, I will gladly provide the relevant contact details at the end of the interview.

Before I get started with the interview, do you perhaps have any questions in relation to the study?

1. What is the **nature of your company**?
2. Please describe your **key role in the company** where you are working.
3. How does your **company relate** to the urgency and ideal of sustainability and sustainable fashion?
4. How would you describe your personal **objective on "being sustainable**" in your industry?
5. In your daily activities of directing/managing your company, **what steps do you implement to work towards sustainability**?
6. Is **remanufacturing and upcycling** part of your pursuit of sustainability, and could please elaborate?
7. **Barriers**: Do you think sustainable manufacturing practices are as recognized here in SA as in developed countries? If yes/no, why?
8. Have there been formal **discussions with the staff and stakeholders** at your company regarding practical steps toward environmental-friendly or sustainable production and management?
9. What do you perceive as **key supporting factors** in your effort to become sustainable in your industry?
10. **Incentives**: Are there perhaps any incentives/programmes offered by the government in support of the local clothing manufacturing companies in this (sustainability) regard? Have you benefitted from this?
11. From your years of experience, what are **the main barriers or threats** in your efforts to practice sustainable production?
12. With the crises of global warming, what type of **company opportunities** would **accelerate the adoption of sustainable production practices** in Cape Town?
13. Are you aware of companies that participate in **remanufacturing and upcycling** in Cape Town?

That brings us to the end of our interview. Thank you so much for your time, I highly appreciate your contribution to this study.

Appendix D: Content analysis

Dynamic / Factor	Code	Short Description	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Total
Market/Economic	B_Globalisation and cheap Chinese fast fashion imports	Barrier_Organizational - Due to globalisation and many partners in the fashion industry, it is more difficult to create a completely circular/sustainable chain. In addition to this, as China became a major exporter of manufactured products into South Africa, so did the displacement in local manufacturing and	4	1	1	1	0	0	**10**
	B_Conscientious fashion designers	Barrier_Product - Much of the fashion industry has not yet realized that everything starts with products designs that are less harmful to the environment, and there is a lack of conscientious fashion design professionals	1	4	0	0	0	1	**6**
	B_Small-scale, niche-status businesses	Barrier_The small, privately owned sustainable businesses, operating from their home spaces do face some difficulties in upcaling in the market.	0	0	2	0	6	1	**9**
	B_Small market size	Barrier_Small market: There is not enough consumer demand, thus retailers are not under pressure.	0	1	2	0	0	0	**3**
	B_Cost is an issue	Large capital requirements needed towards sustainability will also influence price of products and retailer knows consumer won't want to pay more	0	2	7	7	1	3	**19**
	B_Company struggles.	Local businesses struggling to survive because of economic feasibility will not consider adopting sustainable manufacturing as they see it as too expensive	1	3	2	3	5	3	**17**
	B_ Impact of Covid 19	Barrier_The pandemic has had a significantly negative impact on local businesses.	0	3	1	3	1	0	**8**
	B_Investment & Funding	If the clothing industry is to grow, investment needs to be implemented.	0	2	3	3	0	0	**7**
Institutional/Regulatory	B_Lack of government support	Barrier_Governmental—Lack of support from governments to create openness, guide efforts, and reduce costs, to implement more ecological solutions	1	2	0	4	3	1	**11**
	B_Legalities	The red tape and the documentation that comes with running a formal business with employees in SA makes it even more unattractive to adopt a sustainable model	0	4	0	1	0	0	**5**
	B_Informal sustainability discussions	Consumers, retailers, manufacturers and other stakeholders are definitely having talks towards being sustainable, however no strategies have been put in place	0	0	4	0	0	1	**3**
Social/Cultural	B_Attachment to Fast Fashion	Barrier_Consumer culture—Consumers are still very attached to fast fashion consumption and do not see the negative consequences associated with high levels of consumerism. Slow fashion has not yet conquered market space because of this	3	2	0	0	5	0	**10**
	B_Appeal and perception of reused clothing	Barrier_Consumer culture—Ideas such as second hand clothing and rental stores are not widely used by consumers to reduce high consumption and textile waste generation due to several factors, such as clothing appearance and hygiene issues	1	3	0	0	0	0	**4**
	B_Perceptions influenced bybackground (Educational/Generational/Cultural/historical)	The dynamics in education and generational mindset has had an effect on the current state of the Cape Town fashion industry. The way in which people have done things has an effect on how they perceive new things such as discarded clothes, which have been reused into new garments. The history of South Africa as well as the rich history of the Cape Town clothing industry as the hub of manufacturing does have an effect on the current state/mindset towards the adoption of	2	10	0	3	0	0	**15**
	B_Sorting issues and expensive disassembly tools	Barrier_Difficulties range from technical challenges, such as separating fabric mixtures, to high costs for recycling because of expensive technology	0	0	0	0	0	0	**0**
Technological	***B_Sustainability is for big companies***	The infrastructure needed for initiating and maintaining sustainable manufacturing can only be handled by big companies. The specialised machinery, labour and time put into sustainable manufacturing often puts financial pressure on the SMEs	0	2	4	0	0	0	**6**
	B_Consumer awareness	Barrier_Knowledge—Consumers are not aware of the consequences of traditional fashion models ..	3	1	1	2	7	0	**14**

Stakeholders	B_Brand availability & credibility	There is a lack of accessibility of local sustainable brands, and the few sustainable fashion brands that exist and those that do, do not convey credibility to consumers	0	0	5	2	2	8	**17**
	B_Marketing gap	Sustainable products require a significant level of marketing, as these products tend to be novel amongst South Africans.	0	2	0	0	0	0	**2**
	B_Knowledge sharing platforms	B_The lack of knowledge concerning upcycled/remanufactured and overall sustainable fashion in SA suggests a need for teaching platforms	3	12	0	6	9	1	**31**
	B_Skills gap	B_The gap in skills needed for running a niche market business such as the use of disassembly tools serves as a barrier in the adoption of sustainable manufacturing	0	1	0	1	1	0	**3**
	B_Retailer Demands	The manufacturer is likely to adhere to the demands of the retailer as well the consumer.	0	0	2	0	0	0	**2**
	B_Consumer demands	Consumers are not willing to pay more for sustainable garments.	0	0	7	0	0	0	**7**
	B_Fear of upscaling	Barrier_With the increase in environmental consciousness in SA, more consumers, particularly the youth are starting to buy into second-hand shopping and thrifting. This puts added fears and skeptisism on the manufacturer and the designer on whether to make this a sole	0	0	0	0	5	0	**5**
	B_Greenwashing	Barrier_With the popularity of false representation of many brands and retailers claiming to be using sustainable materials and practices to gain favour of the environmentally-coscious consumers, sustainability efforts remain difficult for authentic designers, manufacturers and many stakeholders.	0	0	0	1	8	0	**9**

Appendix E: Data Management Plan

Addendum

Nthabeleng's Plan - Created using Data Management Planning tool (DMP tool). Last modified 29 November 2022

DATA DESCRIPTION

The type of data collected will be primary with the help of secondary data to confirm all findings, as the research involves uncovering and understanding more about an area or phenomenon that is poorly- known or under-researched, with the help of participants. The tools/instruments required for this research are semi-structured interviews. The preliminary literature review reveals that there little existing research regarding remanufacturing and upcycling within the South African fashion manufacturing industry. Therefore, the data collected will be beneficial to (1) Policymakers and practice- in terms of government, (2) Further research, (3) Further development work.

The research may require ample storage space since there will be a series of audio recordings, transcripts and data analysis images. Identifying themes and recording them also requires sufficient storage. This may be a 100 Gigabyte.

DATA ORGANIZSTION AND DOCUMENTATION

The documentation for this research data will be PDF files that are password-protected. These shall be stored in a folder followed by two copies stored as different names. These folders will include the researcher's name, time and date of research activity etc.

ETHICS AND LEGAL COMPLIANCE

The data from the manufacturing companies may not and will not be used in a manner that will upset or affect them in any form or shape. All data from recordings are the intellectual property of the companies, strictly not to be broadcast for viewing other than the researcher and are therefore subject to copyright protection. All researched manufacturers' identities will remain unknown. Manufacturers that do not make use of sustainable practices in business will remain strictly anonymous, therefore protecting their identity is of high priority. The information provided by the individuals in the study population (Cape Town manufacturers) is crucial to the study and is not intended to expose or devalue their contribution in the South African fashion industry as a whole.

This confidentiality will be achieved by either numbering the manufacturers numerically, for example, participant “1” and case "2". Therefore, any use of the data in a manner that will directly or indirectly disturb the participants will not qualify the research as ethical.

After all the data have been gathered from the manufacturing companies, the source will not be identified and will remain strictly with the researcher for safe storage.

DATA STORAGE, BACKUP AND SECURITY

During the period of the research, the researcher will create a file document for each day spent on all research activities and movements of that particular day as they take place. Data instruments such as recorded interviews require repeated reviews by the researcher, therefore it is crucial to store data on a Google drive, where only the researcher will be able to access it, without any risk of losing content. External storage devices will also be made use of as backups. Additionally, each documentation should be accompanied by two copies in different storages.

DATA SELECTION AND PRESERVATION

In the long-term, the overall data is intended to contribute to the existing body of knowledge, pertaining to the adoption of remanufacturing and upcycling practices in the SA fashion industry. Secondly, the data collected will be used for recommendations for future research. This information may be published on-line as an academic paper as the researcher’s contribution to the academics in fashion as well as the public at large. An example of this is the CPUT’s thesis archives.

DATA SHARING

The data will be made primarily available to all tertiary level students. The researcher foresees the data also being made available on platforms such as Google scholar, which is easily available for all to access.

Appendix F: Editing Certificate

5 December 2022

NTHABELENG MONYAKI
Faculty of Informatics and Design
Cape Peninsula University of Technology
Cape Town

RE: CERTIFICATE - EDITING OF MASTER'S THESIS

I, the undersigned, herewith confirm that the editing of the Master's thesis of Nthabeleng Monyaki *"THE EXPLORATION OF REMANUFACTURING AND UPCYCLING IN THE CAPE TOWN FASHION MANUFACTURING INDUSTRY"* has been conducted and concluded.

The finalised thesis was submitted to Ms Ryna Cilliers on 5 December 2022.

Sincerely

Professor Annelie Jordaan
DTech: Information Technology
Ph: 065 990 3713

Member: SATI 1003347

South African Translators' Institute (SATI)