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THE CIRCULARITY OF SOUTH AFRICAN CLOTHING AND TEXTILE SMMES: AN INVESTIGATION THROUGH THE LENS OF A CIRCULAR ECONOMY

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ABSTRACT

The Circular Economy has been widely asserted as a sustainable model to correct the current linear economic model that has resulted in unsustainable resource consumption with far reaching social and environmental consequences. This study investigated the environmentally sustainable practices of South African Clothing and Textile business models to determine what practices, synonymous with sustainable business for a circular economy, were occurring in this sector. It was found that the majority of interventions within these businesses targeted improving the lifespan of clothing products. Using a qualitative research design, the participants' product chains were investigated using the 9R Framework that was designed to investigate sustainable innovation in businesses functioning as part of a circular economy. The Circular Economy has been regarded as a sustainable development model towards improving South Africa's challenge of unemployment. As the clothing and textile sector is labour intensive, recommendations are proposed on how businesses within this sector can improve to better align to and address much needed job creation with more efficient resource use, while moving towards a more sustainable economy.

KEYWORDS

circular economy, South African clothing and textile sector, SMMEs, environmental sustainability, business model

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INTRODUCTION

The current economic model is linear and its success hinges on economic growth, which is dependent on a continuous output of finite resources which are extracted, processed, and disposed of in a 'take-make-waste' model (EU 2020; Morganti & Morganti 2021). In other words, finite resources are used to make products, usually not used to their optimum capacity, and then the products are removed from the economy and discarded. However, the current economic model has caused significant damage to the environment and the human population (WWF 2020). This is

because the current linear economic model is fuelled by a relentless demand for natural resources, which are extracted, traded, and processed into goods, and then merely disposed of as waste or emissions (IRP 2019).

In the same way, South Africa is also recognised as having a linear economy, in part, due to significant throughputs of resources that result in waste, with limited productive returns of resources into the economy (Naman *et al*. 2021). The current economic model is therefore wasteful, polluting, inefficient, and consumptive (Christie & Sonnenberg 2023; Naman *et al*. 2021; Piu & Rossetti 2021; WWF 2021). The demand for fibre for textile goods is also increasing, along with the burgeoning world population and greater economic availability (Piu & Rossetti 2021). A limiting factor of the current economic model is within the design thereof. This model is built to enable continuous profit through extracting resources, a trend that infiltrates manufacturing procedures and consumptive behaviour. It continues with how goods, rich with resources, are disposed of – in an incinerator, landfill, or the ocean (WEF 2022).

The current economic model is, therefore, too dependent on finite resources (Nahman *et al*. 2021). Developing economies like South Africa face the same problem as countries of the developed world, whereby environmental and social sustainability must be improved to alleviate the economic and social costs of further environmental degradation, which could lock them even further into poverty (EU 2020). Fazluddin *et al*. (2021) call for a "systemic shift in production and consumption patterns to enable effective resource utilisation to achieve sustainable economic growth [and] preserve natural capital". This requires a reconfiguration of resources that flow through the economy to enable a circular (i.e the reuse and regeneration of materials in the economic model that promotes sustainability) rather than linear flow. This therefore requires a new national development model (Von Blottnitz *et al*. 2023). Von Blottnitz *et al*. (2021) report that waste flows in South Africa are relatively high. This is, in part, due to large volumes of extractive waste associated with exports that remain in South Africa, but is also caused by high consumer consumption rates, encouraged to support the current economic model, and poor mechanisms for material cycling (Christie *et al*. 2016; Von Blottnitz *et al*. 2021). Green Cape (2023) states that textile waste contributes around 6% of the total waste produced by South Africa, which is landfilled (Green Cape as cited by Du Toit 2023). These waste flows present opportunities for resource preservation, but require a new economic model to enable a circular, rather than linear, flow of resources through the economy.

A circular economy has been positioned as an economic model to do just that. Beyond the benefits of circular resource flow, the benefits of a Circular Economy (CE) include job creation and improved competitiveness due to resource efficiencies and reduced manufacturing costs. South Africa's manufacturing sector, within which the clothing and textile sector is positioned, is centrally placed to unlock circular opportunities by designing and producing products that enable the circulation of resources, and by adopting circular business models that minimise resource consumption (Fazluddin *et al*. 2021). Transforming the South African economy into a circular economy provides opportunities for sustainable and resilient economic growth while addressing our challenges of inequality, poverty, and unemployment (Nahman et. al. 2021).

In support of CE for South Africa, the South African government has positioned a green recovery plan with the priorities of sustainability, resilience, and inclusion as the framework for rebuilding and growing the

economy (GRID-Arendal 2021; Richards 2020). This framework is aligned with the National Development Plan (2012) and the National Waste Management Strategy (Department of Environment, Forestry and Fisheries, Republic of South Africa 2020).

This study investigated the environmentally sustainable practices of SMMEs within the South African clothing and textile industry. If a circular model is positioned to be key to responding to current issues, investigations of factors (circularity) related to businesses within a CE, and product chains within the context of this study, contribute to the generation of data that deal with this concept. This study's investigation provided insight into current practices that can be better understood, and can be developed, contextualised, and most importantly, evolve towards improving the sustainability of the South African clothing and textile industry.

This study investigated a sample of mostly sustainable-born businesses, along with a national clothing retail brand, that gave insight into business types typical of retail brands in this sector. South African SMMEs contribute 34% to GDP and employ 50% to 60% of South Africa's labour force across all sectors (Kalidas *et al*. 2020; The Banking Association of South Africa (BASA), 2021). Moreover, South African SMEs are prioritising sustainability within their business models and product/service design in support of South Africa's aim to build a more sustainable economic model (Moorhouse & Moorshouse 2017). These South African SMEs have become pioneers in the local sustainable economy, often providing innovative solutions in response to the challenge of sustainability (Marks & Hidden 2017). Investigations into how sustainable practices are being realised shine a light on the much-called for sustainable transition of South Africa's economy.

LITERATURE REVIEW

Defining an SM(M)E

According to the South African Department of Small Business Development (2019), SMEs in South Africa are defined as "…*a separate and distinct business entity, together with its branches or subsidiaries, if any, including cooperative enterprises, managed by one owner or more predominantly carried on in any sector or subsector of the economy*". The South African Department of Small Business Development (2019) also uses full-time employment and annual turnover to segment micro, small, and medium business enterprises. For the manufacturing sector, which the South African clothing and textile sector forms part of, micro businesses are defined as having five or fewer employees with a turnover of R200 000, small businesses have 20 to 50 employees with a turnover of not more than R13 million, and medium enterprises have no more than 200 employees and generate no more than R51 million (National Small Business Amendment Act 2003). The current project focusses on SMEs but also includes micro enterprises, namely SMMEs. Moreover, South African SMMEs are classified into formal, informal, and survivalist ventures (Mokwana 2021).

The Small Business Institute (SBI) (n.d.) states that the formal SMME sector is made up of 250 000 firms in South Africa, which translates to 28% of employment of total formal jobs, or 3 863 104 people employed in this sector. Moreover, 5.1% of this formal employment occurs in micro firms, 11% in small firms, and 12% in medium enterprises (IFC 2018; SBI n.d.). SMMEs account for 25% of job growth in the private sector, making them a key contributor to the South African economy (Kalidas *et al*. 2020).

The circular economy

Geissdoerfer *et al*. (2017) define a circular economy as a type of economic model that strives at efficient resource use through the minimisation of waste, long-term resource value preservation, and reducing primary resources used in production. In addition, the authors assert that a circular economic model should occur within the parameters of environmental protection and socioeconomic benefits (Geissdoerfer *et al*. 2017). The African Circular Economy Network (ACEN) defines a Circular Economy as "*an alternative model that will allow African cities to pursue their development agenda along a pathway that ensures economic growth is decoupled from use of finite materials, enabling green growth and industrialization by closing the loop of resources and by developing regenerative and circular systems.*" (Local Governments for Sustainability Africa and ACEN as cited by GRID-Arendal 2021). This definition aligns with the South African government's buy-in of a circular model for South Africa's pathway to a more sustainable economic model, as referred to in the National Development Plan (2012).

Within a CE model, material resources are extracted from the earth's natural ecosystem and flow in a circular loop to be used repeatedly in products (Lemille 2021), ideally, without ever losing value or becoming waste. Material resources are viewed as either technical nutrients (resources), which are based on metals and non-metals, or biological nutrients (Lemille 2021). These constructs are illustrated in the diagram that follows (Ellen MacArthur Foundation (EMF) 2019).

The current study used the 9R Framework, as proposed by Potting *et al*. (2017), to investigate the environmentally-sustainable practices of SMMEs within the South African clothing and textile industry. Within the 9R

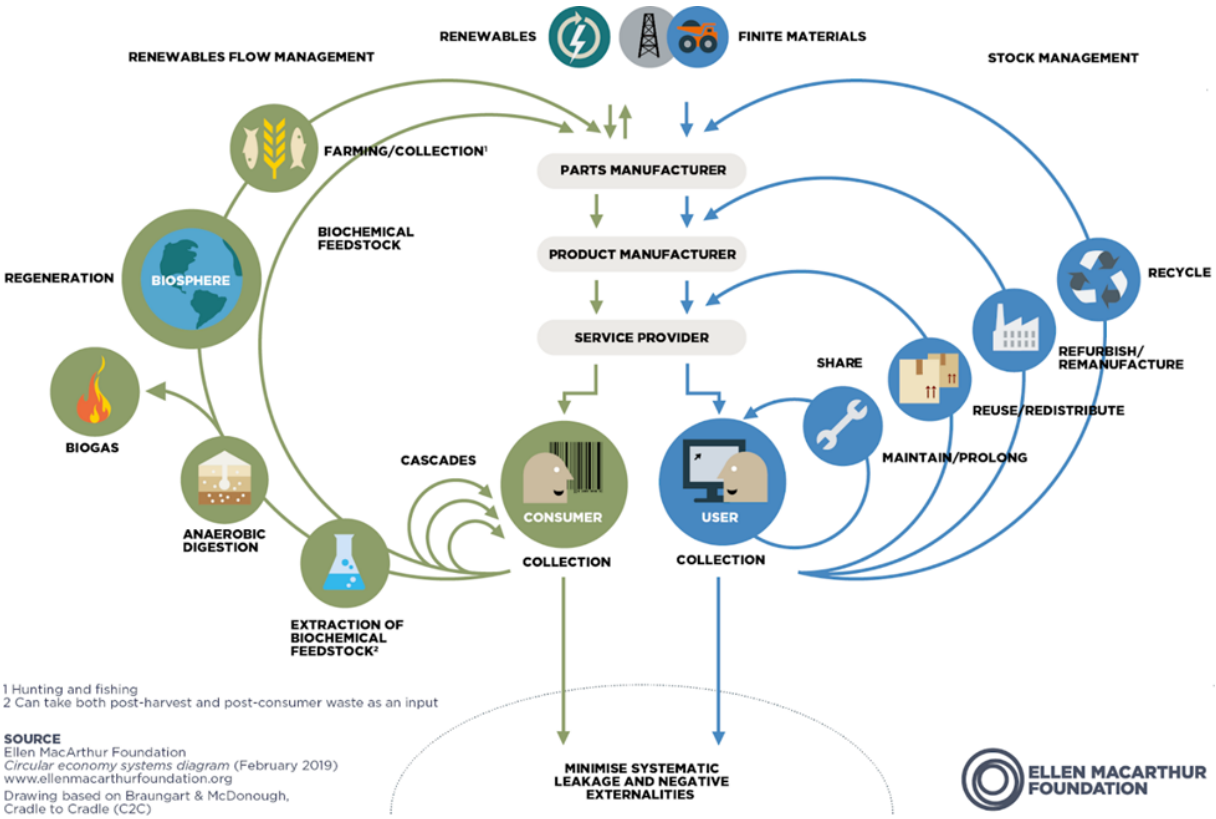

FIGURE 1: CIRCULAR ECONOMY SYSTEM DIAGRAM (EMF 2019, DEVELOPED FROM BRAUNGART & MCDONOUGH CRADLE TO CRADLE)

Framework, each strategy or practice speaks to preservation or circulation of resources, applied within the context of this study, to a product or service of the investigated businesses. The R-Strategy framework has been applied to investigate and gauge sustainability efforts (Östlund *et al*. 2020; Potting *et al*. 2017; Su *et al*. 2013), therefore, the use of the R Framework lends itself to investigate sustainability practices of a business or industry. Sustainable practices of Reuse, Recycle, and Reduce feature as part of South Africa's New Waste Management Strategy (NWMS) to transform South Africa's waste sector into a more circular model. For this reason, it can be justified that these Rs, which also form part of the 9R Framework, are suitable strategies to employ for investigation in this study due to their relevance to the NWMS. The R-Strategies from the 9R Framework are also referred to in the National Development Plan (NDP 2012). Geissdoerfer *et al*. (2018) motivate that the previously cited R Frameworks, of which the 9 R-Framework is considered, should be employed for investigating specific industries and products to deepen the understanding of product and industry innovation, as is the case of investigating the environmentally-sustainable practices of the South African clothing and textile industry, as this study did. Figure 2 shows the various strategies of the 9R Framework, along with their definitions, organised into hierarchical groups of sustainable intervention.

The first tier of the framework allows for 'Smarter Product Use and Manufacture' and is comprised of 3 (three) Rs.

Refuse is to *"prevent the use of raw materials"* (van Buren *et al*. 2016), whereby the use of a certain product, or the product itself, is made redundant. To achieve this, the function of the product is abandoned, or the same function is offered by using another

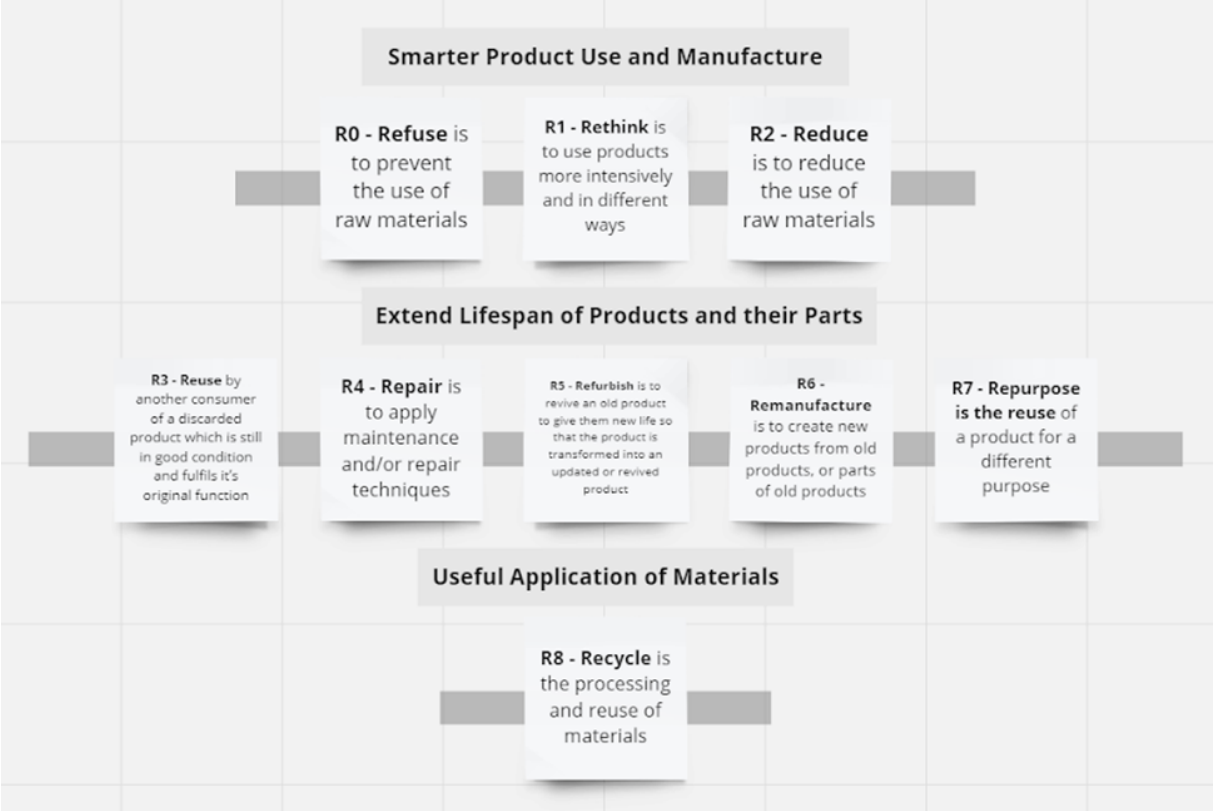

FIGURE 2: DEFINITIONS OF R PRACTICES OF THE 9R FRAMEWORK (ADAPTED FROM POTTING *ET AL*. 2017)

product (Kirchherr & Piscicelli 2019; Potting *et al*. 2017). In response to the extensive use of water in textile dyeing, waterless (or almost waterless) dyeing technologies have been developed that significantly limit the requirement of water, a key resource in textile dyeing, in textile production (Heida 2014).

Rethink is to use products more intensively and in different ways, such as product sharing (Kirchherr & Piscicelli 2019; Potting *et al*. 2017). South African businesses Style Rotate and NŌA Rental both offer a rental service where clothing is rented for a period, enabling an increased and shared product use (NŌA Rental 2022; Style Rotate 2023). Business models that resell extend the lifespan of clothing as these items have increased usage (Hugo *et al*. 2021). Further examples of this found in South Africa are Vintage Love, Vintage and the City, and Vintage Lover, which resell second-hand clothing items (Vintage and the City 2023; Vintage Lover n.d.; Vintage with Love n.d.).

Reduce is to reduce the use of raw materials by prolonging the lifespan of products (van Buren *et al*. 2016), resulting in a decreased need for products and the dependent production resources. Zero Waste Daniel uses textile waste to construct and add decorative details to the clothing produced by the brand, reducing the required resources for production (Zero Waste Daniel 2023). In the case of recycled fibre, there is a reduction of the use of virgin raw materials required to produce textiles as less virgin fibre is needed.

The second tier of the hierarchy allows for 'Extended Lifespan of Products and their Parts', and is comprised of 5 (five) Rs.

Reuse is the reuse of a product that is still in good condition and fulfils its original function by another consumer (Van Buren *et al*. 2016; Potting *et al*. 2017). Van Buren *et al*. (2016) describe product reuse as being a second-hand or a shared product. **Repair** is to apply maintenance and/or repair techniques to deficient or damaged products and their components to achieve increased longevity (Kirchherr & Piscicelli 2019; Potting *et al*. 2017; Van Buren *et al*. 2016). Stahel (2010) includes that repairs are to correct minor defects and wear and tear, so these interventions are not significant. As applied to clothing, repairing or mending clothes is a way to extend the lifespan of clothing (Hugo *et al*. 2021). Repair methods fix worn, damaged, or not-for-purpose (size, fit, style) clothing, whereby items are returned to a usable or presentable condition.

Refurbish is to revive an old product to give it new life so that the product is transformed into an updated or revived product (Kirchherr & Piscicelli 2019; Potting *et al*. 2017; Van Buren *et al*. 2016). Refurbishing is equivalent to reconditioning, which means that an old product is restored. This strategy addresses modernising or upgrading the product's function (Geissdoerfer *et al*. 2018). As found within the clothing industry, Levi's offers customers the opportunity to customise and personalise their purchased denim wear, producing an upgraded product (Levi's 2019).

Remanufacture is to create new products from old products, or parts of old products (Van Buren *et al*., 2016). This can be achieved through using second-hand or discarded products with their former attributes (Kirchherr & Piscicelli 2019; Potting *et al*. 2017). Atasu *et al*. (2008) describe remanufacturing processes where components of used products are replaced to bring the product to a like-new condition. Geyer *et al*. (2007) describe Remanufacture as a strategy to recover value from end-of-use products where their durable components are utilised for the remanufacturing of a product with the same functionality.

Repurpose is the reuse of a product for a different purpose or parts of a product for a different function (Geissdoerfer *et al*. 2018;

van Buren *et al*. 2016). Therefore, within this strategy original products or parts acquire different identities and functions (Geissdoerfer *et al*. 2018). In South Africa, a business called Wastecrete has partnered with local national clothing retailer Ackermans to utilise fabric waste in the production of concrete construction blocks. The company uses fabric strips, off-cuts, zips, buttons, and other trims produced by the retailer in an innovative production process to create fire-retardant and water-resistant bricks (Ackermans 2022).

The final tier represents 'Useful Application of Materials' and consists of only recycling.

Recycle is the processing and reuse of materials. Recycling is based on converting materials from existing products to create a new raw material, or a different product (Todeschini *et al*. 2017). This is the least efficient practice for resource conservation within the 9R Framework. Clothing brands Nike and Patagonia include fabrics that have recycled fibres (Nike 2023; Patagonia 2023). In South Africa, Connacher is a textile recycler of a wide variety of textiles that create reusable fibre for different applications (Connacher 2019).

Within the R-Strategy framework, each strategy speaks to a circulation of resources with the focus on the product, excluding the social aspect of CE (Geissdoerfer *et al*. 2018; Potting *et al*. 2017). A global trend within the movement towards a global circular model is the trend to measure the 'circularity' of a business, or an industry. Applying the said framework in the context of the South African clothing and textile industry aids in determining what practices are occurring, should 'circularity' want to be measured in the long term. In addition, the Potting *et al*. (2017) framework would expand upon current knowledge as it has not been applied within a developing economy within the context that this study focused on. Moreover, Hugo *et al*. (2021) found that CE initiatives occurring in the fashion industry were commonly found in production chain stages or product development, which supports the investigation of product chains within the context of this study.

RESEARCH METHODOLOGY

Research design

This study followed a qualitative research design, using an inductive approach to generate an in-depth understanding of the circular practices occurring within South African clothing and textile SMME business models. The investigated businesses had a product or service that was either clothing or textiles and undertook at least one of the Rs from the 9R Framework within the product chain. The research strategy involved a single episode of fieldwork (cross sectional in nature) (Lewis 2003) to investigate the current setting of SMME practices that were synonymous with CE, as proposed in the 9R Framework (i.e the work was cross-sectional in time). The inclusion criteria were therefore participants in the clothing and textile sector, which were the (adult) owners of SMME businesses within South Africa that practiced at least one of the R strategies.

The sample consisted of 9 (nine) participants who volunteered to take part in the study (as data saturation was reached), as invitations to do so were sent out on social media platforms, and potential participants contacted the researcher with their interest to be interviewed. Semi-structured interviews were used as a means of data collection, where interviews were recorded and transcribed verbatim to start with the data analysis of the project. Research findings identified by the researcher were derived from significant themes inherent in the raw data (Thomas 2003) through a process of analysis and

reflection on the identified themes (Braun & Clarke 2006; Saunders *et al*. 2009).

Data collection and analysis

The qualitative research approach for this study utilised non-probability sampling for selecting the research population consisting of 9 (nine) SMMEs (Ritchie *et al*. 2003). A diverse sample selection of clothing and textile SMMEs had different clothing and/or textile products/services. Only textile-related businesses that included clothing or apparel within their product chains were included, excluding household and industrial textiles. Variations of similar product and service propositions were included in the research sample to provide insight into how different businesses are practising sustainability when confronted with similar challenges within the South African context. In addition, diversity was achieved by including businesses with different business model structures when considering processes and product chains. The investigated businesses had a B2B (business to business) or B2C (business to consumer) orientation, or both. Semi-structured interviewing was used for the investigation, as Guest at al. (2013) allude that this is suitable for a qualitative interview methodology.

In this study, an inductive approach guided the analysis of complex data whereby raw data was condensed into key themes and processes (Braun & Clarke 2006; Thomas 2003). Data analysis began with the formulation of predetermined provisional codes of attribute and descriptive codes that were based on the anticipated categories gleaned from the literature review, 9R Framework, research objectives, and research questions from the interview guide (Saldana 2016). Transcribed interviews were coded (first cycle coding) while data collection took place in order to determine when data saturation was reached. Second-cycle coding utilised attribute, descriptive, simultaneous, in vivo, holistic, and process coding methods (Saldana 2016). Networks and matrices were used to organise and display data (Miles *et al*. 2014). Second cycle coding entailed reviewing the codes, creating additional codes, deleting codes that did not speak to the research objectives, refining the meanings of the codes, re-ordering the codes, and reviewing the data assigned to each code. This stage also yielded more observations of emerging patterns. Coding concluded with interpreting the structure and content of the emerged themes, and links between categories were established to state various relationships of network, relationships, similarities, and sequences (Braun & Clarke 2006; Cropley 2021; Thomas 2003).

Credibility, transferability and ethics

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

To ensure credibility, trustworthiness, dependability, and confirmability in the study of sustainability practices among South African clothing and textile SMEs, several methodological strategies were utilised. Data triangulation involved comparing interview data with online sources to prevent misinterpretation (Cutcliffe & McKenna, 1999; Hales 2010). Investigator triangulation was employed by involving a second researcher to reduce bias (Hales 2010; Nowell *et al*. 2017). Prolonged engagement with the data, member validation, and detailed documentation of the research process further supported credibility and trustworthiness (Jackson *et al*. 2007; Nowell *et al*. 2017). To demonstrate transferability, the study provided rich descriptions and a thorough account of the data analysis, enabling comparison with other research (Nowell *et al*. 2017). Dependability

and confirmability were ensured through an audit trail, which documented the research process and justified methodological choices (Lincoln & Guba 1982; Nowell *et al*. 2017). Lastly, confirmability was reinforced by showing clear links between the research objectives and findings, supported by consistent data across coding methods (Cutcliffe & McKenna 1999; Thomas 2003).

The project was beholden to ethical standards of research. The project included only participants who were willing to partake in the study, provided written informed consent, and whose anonymity and confidentiality was guaranteed. The participants could withdraw from the project at any given point without penalty and/or reason (but none chose to do so), while no leading and/or sensitive information was asked. No reciprocity was given to partake in the project, and the results were used merely for academic purposes.

FINDINGS AND DISCUSSION

Practices of the 9R Framework of Refuse, Rethink, and Reduce relate to smarter product use and manufacture, and these practices inform design decisions prior to production taking place (Geissdoerfer *et al*. 2018). This group of practices precedes strategies to extend the lifespan of products or their parts, such as strategies of Reuse, Repair, Refurbish, Remanufacture, and Repurpose, which retain finished goods and their parts while maintaining or improving their value (Geissdoerfer *et al*. 2018; Potting *et al*. 2017).

The final category of practices for useful application of materials entails recycling materials (Potting *et al*. 2017). The practices identified in the participants that relate to smarter product use and manufacture were often found to link to a practice, or practices, in the group of R-Strategies that extend the lifespan of products and their parts. This

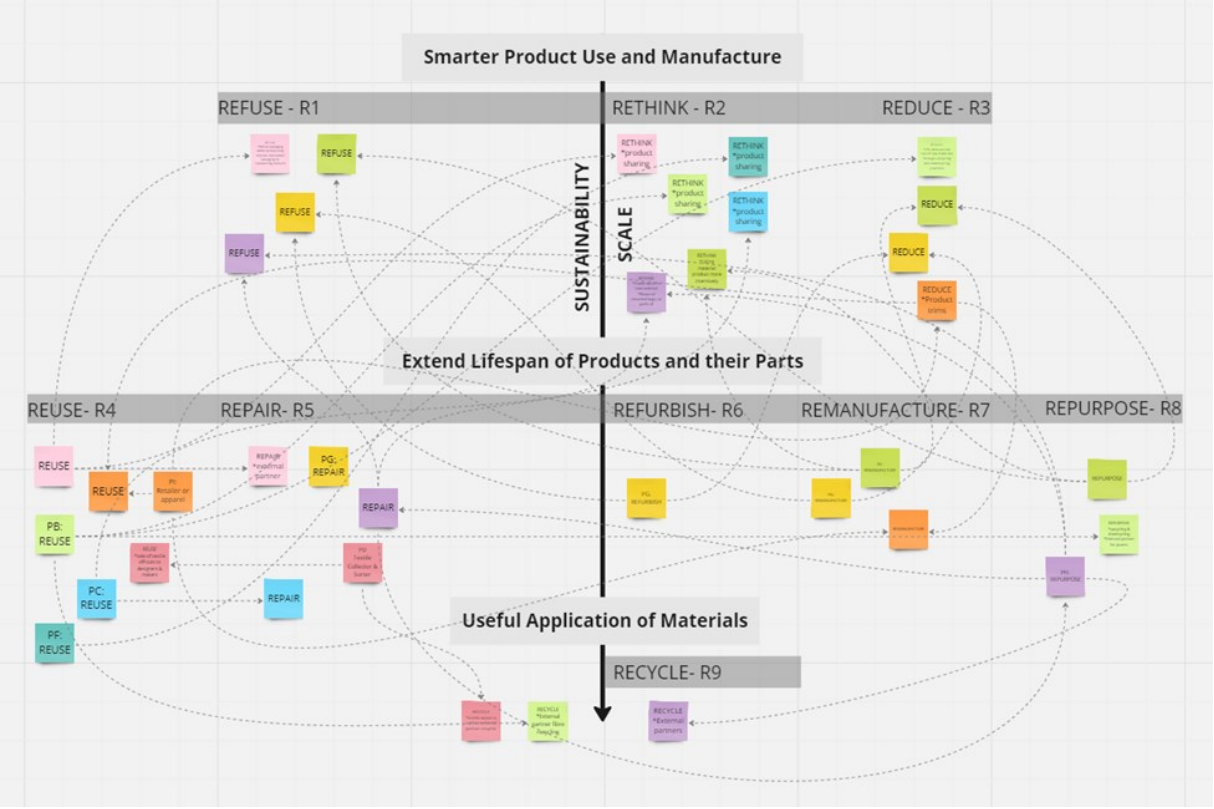

FIGURE 3: CIRCULAR PRACTICES ON SUSTAINABILITY RATING SCALE, ADAPTED FROM THE 9 R-FRAMEWORK (POTTING *ET AL*. 2017)

relationship between the categories can be seen in the display that follows. Each participant is represented as a different colour square, and the businesses' practices for environmental sustainability are plotted on the hierarchy of the 9R Framework.

It was found that there was always more than a single R practice occurring within each business product or service chain, and that these multiple occurring practices dealt with different levels of sustainability (R0-R8) (Potting *et al*. 2017). Many of the strategies found to be practised by participants facilitate other environmentally-sustainable practices found within the business' product chains. It can also be said that a connection was always found to be occurring between at least two (2) of the three (3) groups of the R-Strategies. It was found that most of the environmentally-sustainable practices were occurring within the 'Strategies to Extend the Lifespan of Products and their Parts' tier, meaning that most participants were engaging in strategies to retain finished goods and their parts while maintaining or improving their value (Geissdoerfer *et al*. 2018). These practices aimed to reverse or postpone obsolescence of a clothing product (Geissdoerfer *et al*. 2018).

Practices of **Refuse** were found occurring in businesses as refusing the use of virgin packaging and by participants who used a textile for the second time as the products' raw material. These practices are evidenced in the following quotations: "*we only use recycled, repurposed packaging and try sort of reuse it as much as possible"* and *"all of our bags are made using waste material, which is essentially what we would call our raw material".* Activities by the businesses that enabled, or were, product sharing, an intervention to **Rethink** by preventing the use of raw materials, were found in 6 (six) of the 9 (nine) participants. This was explained by Participant E as "*I recreate new textiles from factory scraps that I get from designers and other factories in South Africa. So it's a rethinking what a new virgin material, or resource could look like".* Practices of **Reduce**, which is to reduce the use of raw materials, were found in participants as the result of upcycling and downcycling materials used to produce products, and limiting product development samples. These practices are explained in a quotation by Participant B: "*With reduce, we're making all the way to paving blocks and tiles"* and *"We were shredding them into fibre and it's going into those pavers.".* Participant G stated: *"we are basically reducing fast fashion, we are basically reducing clothes ending up in landfill".* Most of the participant businesses were found to be practising **Reuse** in some way. A notable proportion of the businesses sold second-hand goods and one participant enabled the reuse of textile waste that was collected as part of the business' raw material intake and then sold for use as is. Participant A stated: "*we do pre-loved, so second-hand luxury and premium branded clothing, accessories, shoes for men, women and children"*. Similarly, Participant C explained: *"We sell only second-hand women's, men's and kids clothing, shoes and accessories".*

Repair was found to be practised among four (4) of the nine (9) participants. Practices of repair often occurred as a business practice or was enabled through a business partner, who was a key partner in making and delivering the business' product or service. These practices were commonly found in businesses whose product chain centred around reuse. As explained by Participant C: "*items that come in will need to be fixed, um, that might have holes in, um, that need to be cleaned, um, that need to be, ya, mended."*, and Participant H: *"the repair and sort of everlasting of our bag. We have an evergreen guarantee, so if there's ever an issue with the bag, ah, we will repair it."*. The least found practice occurring among the participants was the practice of **Refurbish**, found occurring in only one participant. Practices of refurbish were realised as part of services offered by

the business. This business only offered services of colour restoration (overdyeing), clothing alterations, and upcycling to end customers, but did not sell products. This participant operated out of a workshop setting and as the business exclusively offered services, did not require a retail setting to present products for sale, like the other businesses who sold products. The said participant, Participant G, stated: "*Mostly the refurbish side is colour restoration because that's the major issue when it comes to clothing.*".

Remanufacture was found to be occurring in four (4) of the business participants, and all had differing product chains and products. Three (3) participants had practices occurring as part of their product chain, whereas one participant sent on part of the waste generated through production for upcycling and use for clothing and textile application. Their practice is illustrated in this quotation: *"at the end of the season, the designer will end up having like a huge file like this with all the prints that she signed off and um, prints, buttons, trims everything… I'll donate it to [name of local university]… they literally cut it up and then make stuff from it, they use it to design.*". Two (2) of these participants did not have a set product outcome as the result of practices of remanufacture, whereas one (1) participant had an established product range that any product component could be reused within, contributing to the ease of remanufacturing. The latter approach is explained as follows: "*If we can't repair it, we will replace it and then if it is replaced and the bag comes back to us, we'll either strip it and use components onto a different bag, um, or go through like a sort of a larger repair.*".

Practices of **Repurpose** were found to be occurring within three participants whereby

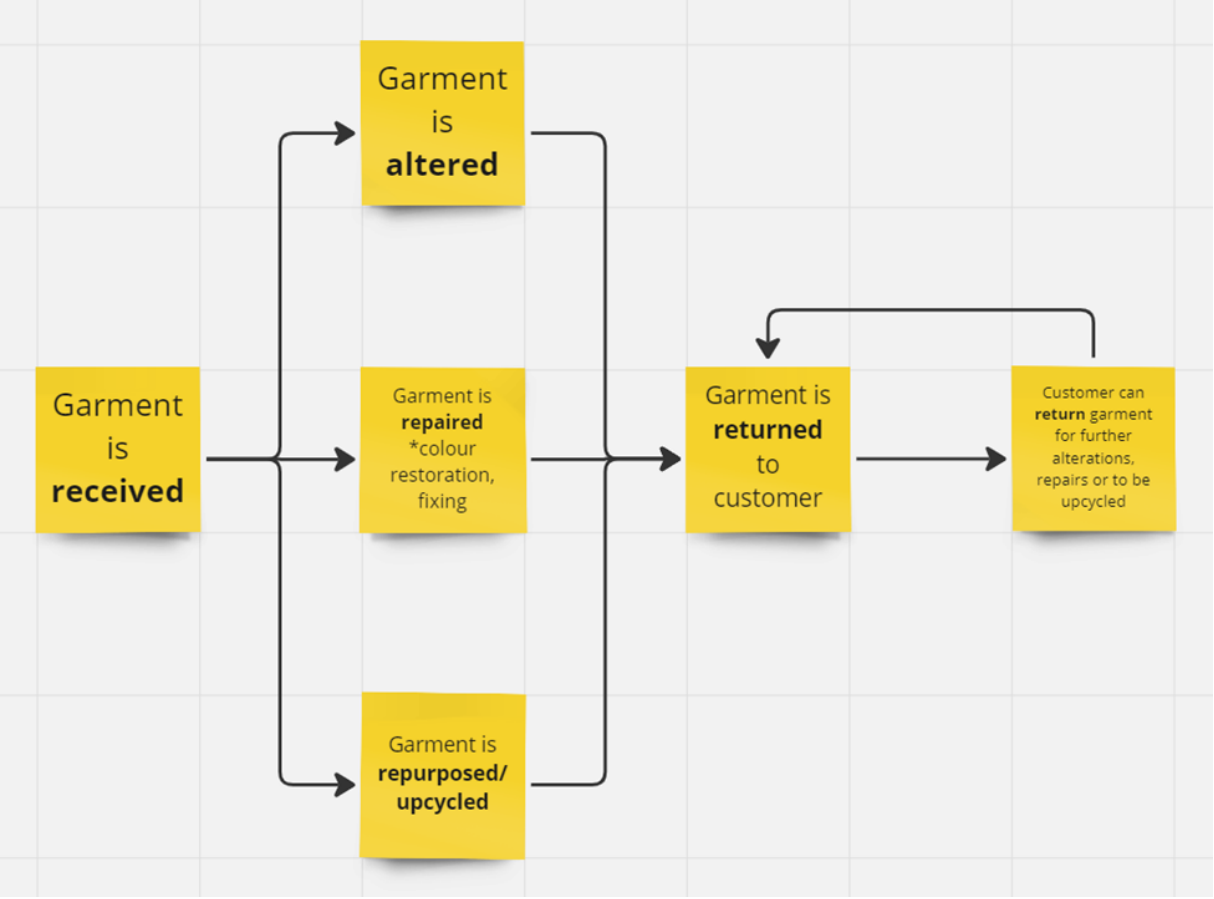

FIGURE 4: RESOURCE FLOW OF PARTICIPANT G'S PRODUCT CHAIN

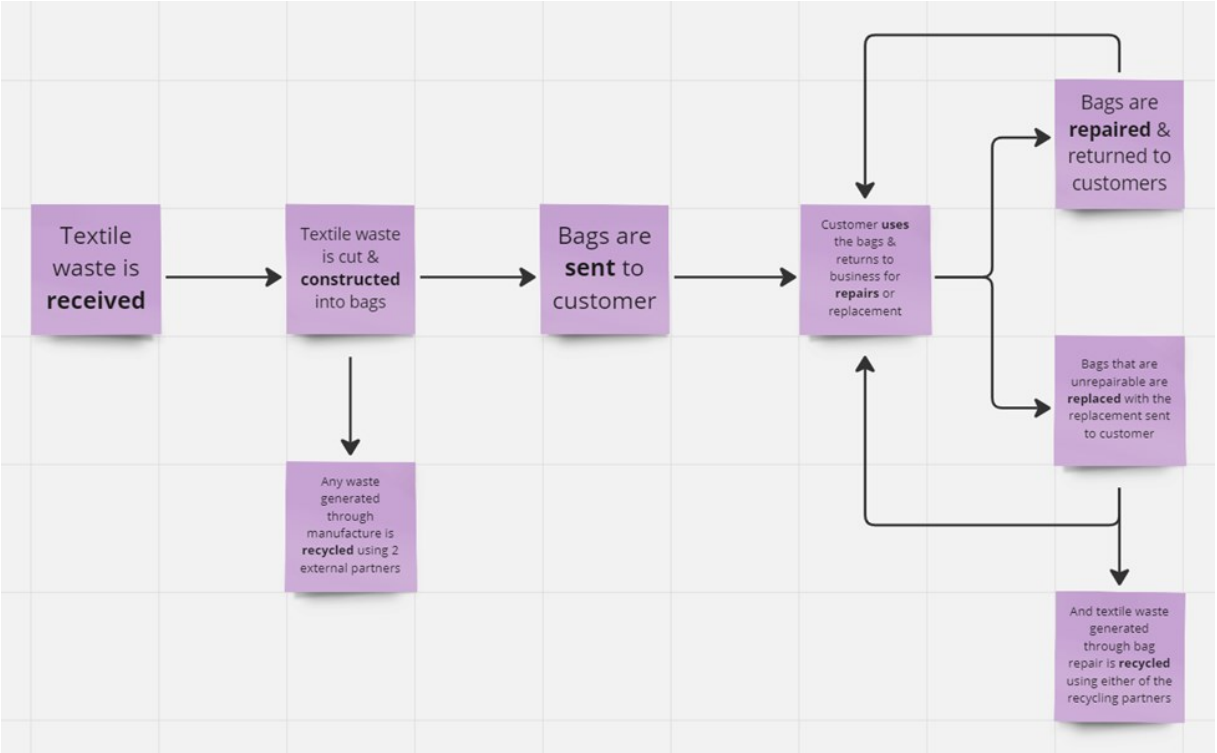

FIGURE 5: RESOURCE FLOW OF PARTICIPANT H'S PRODUCT CHAIN

textile was used as a raw material in product production. Within these different practices, innovation in the design/product was found as the application or use of the raw materials was unconventional. An example of an unconventional application of fibre is described by Participant B: *"We were shredding them into fibre and it's going into those pavers."*.

Practices of **Recycle** were found to be a part of three participants' product chains. None of the businesses practised recycling as part of business practice, but the participants engaged with business partners who actioned the practices of textile recycling, which were part of the participants' product or service chains. These interactions are evidenced in these quotes: "*We then sell the textile waste to other companies that use the textile waste as an input."* and *"we use a regenerated nylon material."*.

Although the participant businesses were considered for the circularity of resource flows within the businesses' product and service chains in the selection criteria, it was found that most businesses, seven (7) out of (9) nine participants, had linear resource flows with only two of the participants having circular resource flows occurring. This circularity was due to the practices of refurbish, where a product could be altered or repaired more than once as in the case of one participant, and through interventions of repair, which occurred as part of another participant's take-back system as part of their product's lifetime guarantee. In both cases of circular resource flow, it is important to note that the end user of the product enabled the circularity, due to their participation in returning the product to the businesses. Within both cases, once the product had been returned to the business, the circular flow was actioned by the business as an internal process, without the input of a business partner. Therefore, the consumer is an enabler and actor participating in the circular resource flow. The circular resource flow of the two (2) participants is displayed in the diagrams that follow.

CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

In the dynamic landscape of global commerce, the circular economy emerges as a beacon of sustainability, particularly within the intricate web of the clothing and textile sector, and specifically in the context of emerging economies. As elucidated by Potting *et al*. (2017), the essence of sustainability in this realm transcends mere production methodologies; it fundamentally reshapes the narrative around resource utilisation and product longevity. Within the SMMEs in the clothing and textile sector in South Africa, the ethos of sustainability reverberates through innovative practices that repurpose existing textiles deemed as waste, which can be regarded as a paradigm shift. This shift extends beyond the mere creation of goods, fostering a culture of product durability and repairability, encapsulated within the ethos of circularity. Yet, sustainable manufacturing remains an underutilised resource, fraught with challenges ranging from heightened costs to unsure production paths. A challenge does remain to transform a linear business model into a circular production process. Unlike sustainable-born enterprises, Participant I grapples with a fragmented impact, confined to the initial stages of their product chain, emblematic of the challenges inherent in reconciling sustainability with pre-existing linear models. In order to promote CE, an innovative, interdisciplinary process is therefore warranted.

As found within the participants, sustainability practices dealt with what raw materials were used in production and the way the product or service was manufactured, impacting the creation of products, or services, around the product. Businesses were found to use existing textiles, often considered waste, as the primary material, which did yield products that sometimes veered from the commercially-known equivalent. Participant H strategically designed their products to have components that could be reused to remanufacture or repair products within their product range – a thoughtful consideration to product durability. Most of the participant businesses were engaging in practices that dealt with extending the lifespan of a product, or its parts (Potting *et al*. 2017). This means that sustainable intervention was mostly occurring within the middle category of the 9R framework, meaning that the South African SMMEs mostly had interventions to further the lifespan of existing products, with some practices addressing the design and conceptualisation phase of the product or service, with the fewest practices occurring as a useful application of materials. There should be more consideration to choosing better (more sustainable) raw materials and choosing to produce through methods that are less costly to the environment. However, sustainable manufacturing within the South African context is often limited, more costly, and results in a production path that is uncommon, uncharted, and one that has to be forged. This is hardly attractive and frequently accompanied with a strong personal passion for environmental preservation and local production, as found within the participant businesses.

There is a notable difference of sustainable impact on the product chains of sustainable-born business, in comparison to the business that was a national retailer, with stores spanning across South Africa (Participant I). Participant I had limited sustainable impact, only to the initial part of their product chain. Whereas most of the other businesses, which could be considered sustainable-born with sustainability conceived at the businesses design stage, had sustainable impact throughout their product chain, or with the product chain enabling sustainability as its primary outcome (as in cases of reuse, refurbish and reduce). This finding illustrates the challenges and limitations of implementing

sustainability into a linearly-modelled product chain, in a retrofit fashion, where previously established key activities are supplemented with a sustainable alternative. The said challenges facing clothing and textile businesses with linear supply chains, conceptualised and modelled without consideration for sustainability, is a well-known challenge impeding circular transition (Ekins *et al*. 2020; Govindan & Hasanagic 2018; Todeschini *et al*. 2017). From this finding, it can be deduced that business models that take the approach of retrofitting will usually have a treacherous and costly transition, often with limited sustainable impact. Whereas business models that are conceived with sustainability in mind may have a greater sustainable impact, but face other issues of longevity, limited raw materials, increased cost of sustainable alternatives for product components and services, and a lack of skilled labour to guide and action environmentally-sustainable practices, as found in this study.

A known component of sustainability is the participation of the user, or consumer in the case of this study. Where sustainable intervention was limited to a certain part of the product chain, as in the case of the clothing retailer, consumer input was not required. Whereas in all of the remaining businesses, the consumer was paramount to enabling the sustainable efforts of the participant businesses. As reported many times, the consumer is a critical component to achieving sustainability (Ceschin & Gaziulusoy 2016), and the limited input in the case of the clothing retailer mirrors the limited sustainable impact to their product chain. This finding bolsters the importance of consumer adoption and support, therefore more consideration should be given to these two factors, towards improving environmental sustainability of clothing and textile products.

To conclude, if most of the found interventions are to address extending the longevity of products and their components, this presents employment opportunities due to the labour-intensive nature of apparel production. The burgeoning trend of resale supports reusing products and there are untapped and lucrative opportunities in various market segments, like babies and childrenswear for reuse (Jonsson & Liddell 2022). The strategies of repair, refurbish, remanufacture, and repurpose come with knowledge and skills gaps when considered in the context of current production knowledge and the skillsets of the labour force, with an added innovative attribute for clothing and textile products, as found with practices of repurpose. These are challenges that will need to be addressed for endeavours based on these practices.

In order for clothing and textile products and services to be better designed, environmentally-sustainable supplies need to be cheaper and more easily accessible. Where textiles considered waste are repurposed for a different apparel function, there is often an unconventional use that can produce outcomes that are not always palatable to the average South African consumer, meaning challenges in conversion and adoption. In order to mediate such a concern regarding the adoption of a circular product by the consumer, social marketers need to promote such products in a way in which the consumer not only understands the importance thereof, but also buys into the end products (Christie & Venter de Villiers 2023). For now, it would be wise for businesses to focus efforts on the middle category that addresses strategies to extend the lifespans of products and their parts. This considers that South Africa is not primarily a producer of clothing products, and much of our clothing is imported, leaving our hands tied, so to speak, on how to produce better.

Practices of reuse extend the lifespan of clothing but this practice is contingent on the quality of the product being sufficient to warrant reuse. Reuse eliminates the impact

that a new garment would have, and it is a much needed and valuable lesson for the consumer. The remaining strategies of repair, refurbish, remanufacture, and repurpose would easily create employment opportunities, as all these practices require hands and often creativity to produce the outcome. These products can be of high quality and aimed at the luxury product tier, as the first step in the transition to commonplace adoption. Herein may even lie the opportunity for export. These SMMEs can be small, agile, and flexible. Product creation and development would hinge on creativity and innovation, a known complement when options are limited. This is what we can start to do tomorrow.

A limitation of this study was that a variety of SMME businesses were investigated, which offered different types of clothing and textile products and services, so there were few businesses that had commonalities in the way of products and product chains. This provided a general view on what environmentally-sustainable practices were occurring. Another factor is that most of the sample consisted of sustainable-born businesses, due to the sample requirement of one of the R-practices needing to be occurring within the businesses' product chain. This eliminated most traditional clothing output-based businesses, including commonly known clothing retailers, usually modelled on a linear-type business model. Further research could focus on businesses with a uniform product or service type, like reuse business models, textile collection processing for downcycling or recycling, or specific sectors like the retail clothing sector, or the designer sector.

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