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## **Socio-environmentally sustainable framework to support South African fashion design entrepreneurs in producing sustainable clothes**

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**Abstract:** A sustainable supply chain can significantly reduce the textile industry's environmental impact. However, few South African fashion designers prioritize sustainability. This study proposes a framework to help entrepreneurs shift towards sustainable practices. It explores sustainability awareness and practices among entrepreneurs and consumer preferences for sustainable clothing. Using qualitative interviews with fashion designers and sustainability practitioners, and a quantitative survey of 305 customers, the study finds limited awareness of sustainable garment design methods among entrepreneurs. It advocates for an education-based framework, implemented through trade shows and fashion shows, to drive industry-wide sustainability and benefit education, consumers, and the industry.

**Keywords:** Clothing attributes, customer purchasing behaviour, fashion design entrepreneurs, sustainable clothes, sustainable supply chain.

## Introduction

There is widespread availability of low-cost Asian imports in South African retail stores (Smal, 2016) (Patel, 2016). Most fast-fashion clothes are produced using synthetic fibres that contain dangerous chemicals harmful to the wearer and the environment (Bick et al., 2018). South African fashion design entrepreneurs need to integrate sustainable practices in their supply chain operations to counter the widespread of fast fashion clothes and preserve the environment. Unfortunately, only a few fashion designers have implemented sustainable practices in South Africa (May, 2019). To increase the number of fashion design entrepreneurs who use sustainable practices, a socio-environmentally sustainable framework that inspires and promotes sustainable supply chain operations is required.

Like fashion design entrepreneurs, customers have the responsibility and power to make choices that will benefit the environment and people, as well as promote economic growth. One of the ways clothing customers can contribute to a sustainable fashion supply chain is by purchasing sustainable clothes. Sustainable clothes are clothes produced from textiles that are durable and recyclable and do minimum damage to society and the environment throughout their production and life cycle (Mollel-Matodzi et al., 2022). Physical attributes of clothes are of great value for all types of customers, including those who actively support socio-environmental values (Niinimäki, 2010). Problematically, customers find sustainable clothes unattractive and lacking in fashionable appeal (Lundblad & Davies, 2016). The fashion industry should respond by establishing customers' main needs regarding sustainable clothes and making necessary changes (Mandari et al., 2022). It is crucial to investigate South African customers' desired sustainable clothing attributes to encourage and improve their sustainable clothes consumption. Furthermore, South African fashion design entrepreneurs must know customers' desired clothing attributes before producing garments. A framework that includes customers' desired sustainable clothes attributes and sustainable supply chain methods is crucial in developing a sustainable textile and clothing industry in South Africa.

A sustainable fashion supply chain considers every stage's socio-environmental and economic impact and its impact on the next stage. The sustainable fabric sourcing, garment design, and garment manufacturing stages are interconnected. Fashion design entrepreneurs must carefully consider their practices and processes when sourcing fabric, designing, and manufacturing garments, as well as the after-effects of those choices. Engaging in sustainable sourcing, design, and manufacturing when designing sustainable garments based on customers' desired clothing attributes benefits both customers and fashion design entrepreneurs.

In 2016, an environmentally sustainable fashion-design-driven framework was developed for South Africa solely based on data collected from three types of participants (Smal, 2016). The three types of participants represent small-to-medium enterprises and specifically produce environmentally sustainable garments. Two participants have been operating for more than 20 years, while another two have received international recognition for their environmentally sustainable work. Furthermore, one of the sub-unit garments can be found in 43 retail stores in large shopping malls. The framework proposes "a holistic and integrated approach to design-driven environmental sustainability in the South African fashion industry" (Smal, 2016). The framework explains the fashion designer's responsibility for applying environmental sustainability in the fashion supply chain.

This study aimed to develop a framework based on the experiences of micro-to-small fashion design entrepreneurs who are not sustainable throughout their fashion supply chain operations. This framework incorporates customers' desired clothing attributes and the influence of sustainability literacy on their purchasing behaviour (Smal, 2016). Sustainable fabric sourcing, garment design, and manufacturing that considers customers' desired clothing attributes is vital in producing sustainable clothes. In addition, the framework amalgamates expertise from micro-to-small fashion design entrepreneurs and sustainable

fashion design entrepreneurs. Challenges encountered by micro-to-small mainstream fashion design entrepreneurs are different from those experienced by sustainable fashion design entrepreneurs. These challenges influence their approach to supply chain operations and may affect their perception and reception of sustainable practices and processes. The study's sub-aims are as follows:

- Investigate and describe fashion design entrepreneurs' knowledge of sustainable fabrics and clothing design methods,
- Explore and describe fashion design entrepreneurs' current methods while sourcing fabrics and manufacturing clothes,
- Investigate customers' preferred sustainable clothes attributes

## Methodology

This exploratory and descriptive study has two phases and employs mixed research methods. Mixed-method research provides a broad comprehension of the study's phenomenon due to the combination of qualitative and quantitative data (Leavy, 2017). The first phase involved fashion design entrepreneurs, and the second phase involved customers.

### *Phase 1: Focus on fashion design entrepreneurs*

Data collection began after obtaining ethical clearance (Ref #: FREC20180502) from Tshwane University of Technology's Faculty of Arts & Design Research Ethics Committee.

The first phase of the study involved data collection from participants' business websites by means of document analysis, social media records, and semi-structured interviews. Participants for the qualitative phase of the study were contacted via email and social media platforms, and semi-structured interviews were conducted by telephone. Six participants (Participants A – F) who have online and physical stores, have been in business for at least three years, and do not primarily produce sustainable clothes were selected purposively. During data collection, it became clear that it was necessary to gain insight from South African practitioners of their sustainable practices, as this will provide an understanding of the extent of sustainable practices in South Africa. The practitioners consisted of three entrepreneurs who practice sustainable fashion design (Participants G – I) and two individuals (Participants J and K) who are involved in promoting sustainable textiles and clothes in various companies. Table 1 presents the three types of participants used in the qualitative part of the study.

**Table 1**

*Three types of participants in the qualitative part of the study.*

<b>Fashion designers</b>	<b>Sustainable fashion design practitioners</b>	<b>Sustainable fashion promoters</b>
Participants A – F	Participants G – I	Participants J – K

Source: author's own development

Semi-structured interviews were also used to collect data from five sustainable fashion practitioners. The criteria employed to maintain the trustworthiness of the study were credibility, dependability, and confirmability. The qualitative data from the semi-structured interviews were recorded, transcribed, coded, categorised, and arranged for analysis (Babbie, 2016). The semi-structured interviews were recorded with permission from participants. The collected data was transcribed and subjected to scrutiny and data triangulation to maintain the credibility of the data set. Discussions were conducted with supervisors to evaluate the data, data analysis, and interpretation to establish dependability and confirmability.

## *Phase 2: Focus on customers.*

For the study's second phase, structured online questionnaires were employed to solicit information from customers. There were 305 purposively selected participants. The participants were selected through fashion and lifestyle bloggers and the primary researchers' social network. Stability reliability was employed by adopting some of the questions from former studies and pilot-testing the questionnaire before retesting it on the selected sample. Internal reliability was maintained using the Cronbach's alpha test. Hypotheses testing was done with a 5% level of significance. Representative reliability was maintained by administering the questionnaire to men and women customers from diverse ethnic backgrounds and ages. Representative and internal reliability were used to maintain the quantitative data quality. Furthermore, face validity, content validity, and criterion validity were used to maintain the validity of the study.

## *Findings from the qualitative data*

This section will present findings from qualitative data based on the supply chain operations stages, namely sourcing, design, and manufacturing. The findings were gathered in 2019 as part of a Doctoral Thesis. Discern: International Journal of Design for Social Change, Sustainable Innovation and Entrepreneurship in 2023 (Mollel-Matodzi et al., 2023) published extensive findings on fashion design entrepreneurs' sustainable knowledge, contribution, and practices.

### *Sourcing*

This study found that five of the participants demonstrated knowledge of sustainable fabrics. Participants B, D, and F showed advanced knowledge of sustainable fabrics, while Participants A and E showed a basic knowledge of the fabrics. The participants' knowledge was based on their research. Participant C was the only participant who was not knowledgeable about sustainable fabric. Participant C stated that "I think more work needs to be done with communication about sustainable fabrics". Participants A, B, D, E, and F revealed that they found sustainable fabrics more expensive than others. Participants G–I concurred with five participants regarding the high price of the fabrics. Participant G stated that increased demand for fabrics from fashion design entrepreneurs will decrease the price of the fabrics. In addition, Participant K confirmed that the fabrics are expensive because there is no demand for them from local fashion designers. Despite her knowledge of sustainable fabrics, Participant E pointed out that she has no information on where to source sustainable fabrics. The study found that the other participants sourced natural and synthetic fibres from local wholesalers who stock imported fabrics. Imported fabrics are widespread in South Africa and local textile manufacturers should increase their production capacity. These two factors make it reasonable that the participants often use imported fabrics. Participants A, C, and F source some of their conventional cotton from local textile manufacturers. Participants B, D, and F source sustainable fabrics on a small scale from local textile manufacturers. Participants G, H, I, and J indicated that although sourcing sustainable fabrics abroad is expensive, they do so due to the limited variety and availability of locally manufactured sustainable fabrics.

### *Design*

Regarding knowledge of sustainable design practices and processes, all the designer participants (Participants A–F) showed a minimal awareness of sustainable design practices and processes. Unknowingly, Participant A practices design for emotional durability. Participant A's customers' input at the design stage is motivated by boosting sales and not a desire to reduce customers' clothing consumption. Participant A revealed that "our previous customers are part of the design process, and some of them inspire some of our designs". Participant B uses draping because draping provides him with multiple design ideas and originality. There are a few sustainable fashion designers in South Africa

(May, 2019), which may explain why participants have minimal awareness of sustainable clothing design methods.

### *Manufacturing*

Regarding manufacturing, all participants manufacture their clothes in-house. Regarding manufacturing sustainable clothes, Participants B, D, and F manufacture sustainable clothes on a small scale for wealthier customers because most of their customers cannot afford the clothes. All the designer participants save their fabric off-cuts. By saving fabric off-cuts, participants are practicing the zero-waste design method (Rissanen, 2013). Participants A and C revealed that they save fabric off-cuts for monetary reasons. They use their fabric off-cuts to produce accessories. The remaining participants often donate their fabric off-cuts to their employees, local communities, charitable organisations, and businesses producing garments from fabric off-cuts. Reusing and donating fabric off-cuts are socio-environmentally and economically sustainable practices that benefit the participants, employees, and local communities. However, the participants reported that they are unable to donate all their fabric off-cuts, and the off-cuts end up in landfills. Participants D and F reiterated that there is a need for a system for collecting fabric off-cuts. Firstly, the findings regarding participants' current methods with fabric off-cuts indicate that participants are socio-environmentally and economically responsible for dealing with fabric off-cuts. Secondly, there must be a practical, readily visible fabric off-cut management system that is readily available to fashion design entrepreneurs.

### *Findings from the quantitative data*

This section will present findings from quantitative data based on customers' preferred sustainable clothing attributes. The findings were gathered in 2019 as part of a Doctoral Thesis. Extensive findings on consumers' preferences, purchasing behavior, and knowledge of sustainable clothes were published in the Journal of Consumer Sciences in 2022 (Mollel-Matodzi et al., 2022).

Regarding the quantitative findings, 47% were between 18 and 31, 32% were between 32 and 38, and 21% were between 39 and above. Most (85%) participants were women, and a few (15%) were men. Durability was ranked the highest (75%), look was the second highest rank (71%), feel was third-ranked (67%), and price was the lowest (53%). Some South African customers are unhappy with non-durable fast-fashion clothes (Naicker, 2017). This lack of satisfaction with fast fashion may explain the high (75%) rating of the importance of the durability attribute. Just under half (46%) of the participants strongly agreed that they purchase sustainable clothes due to durability. 56% of participants prefer sustainable clothes during sales or special offers, and 61% prefer them if their look and feel match mainstream clothes, suggesting customers require sustainable clothing to have multiple attributes.

### *Insights from two existing sustainability frameworks*

Two existing frameworks guided the structure of the proposed socio-environmentally sustainable framework. The first framework is the quintuple helix innovation model (Carayannis et al., 2012). The quintuple helix innovation model guided the second framework, environmentally sustainable fashion design praxis (Smal, 2016). Both frameworks emphasise the interconnectedness of various systems influencing sustainable fashion. It suggests that education, economic factors, the natural environment, consumer behaviour, and existing support systems are not isolated and are instead intertwined and mutually influential in shaping the fashion industry's environmental impact. The quintuple helix model can aid fashion design entrepreneurs in attaining sustainability in the textile and clothing industry.

### *Unified framework*

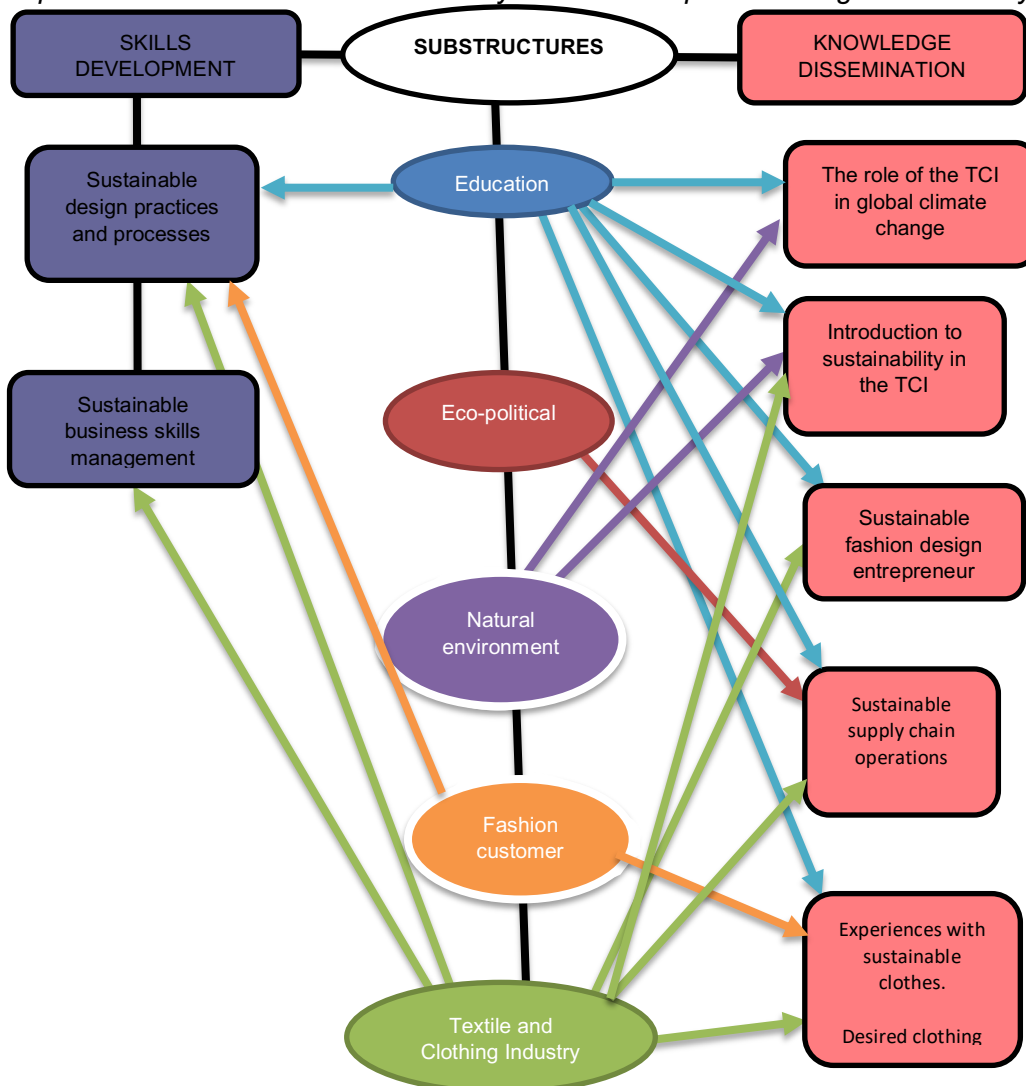
Based on the quintuple helix model, an intertwined system is suggested between “education, economy, the natural environment, the fashion consumer, and support structures [such as] industry organisations

[like] South African Sustainable Textile and Apparel Cluster (SASTAC)” (Smal, 2016). An intertwined and unified framework may aid and promote the advancement of “design-driven environmental sustainability” in the South African fashion industry (Smal, 2016). Furthermore, increased knowledge and “know-how” transference require individuals to communicate because communication using design praxis can offer expert knowledge necessary for the application of environmental sustainability by developing a definite method of designing fashion in a way that encourages ecological awareness and ecological consciousness (Smal, 2016). Consequently, environmentally sustainable fashion design praxis stimulates and instils a modification attitude.

This study’s unified socio-environmentally sustainable framework consists of five substructures: education, eco-political, natural environment, fashion consumer, and textile and clothing industry (Figure 1). The first substructure for this framework is an education substructure and consists of organisations that offer fashion-design and consumer-science-related courses. This substructure is important in promoting sustainability due to its investment in research and continual knowledge generation. The second substructure is an eco-political substructure, consisting of the economic and political substructure (Carayannis et al., 2012). For sustainable operations to be efficient, both the economic and political sectors must work together to implement necessary laws and guidelines and offer funding to empower the textile and clothing industry towards achieving a sustainable textile and clothing industry.

**Figure 1**

*Proposed framework based on a survey of scholarship and findings of this study.*



Source: author’s own development

The third substructure is a natural environment substructure, which is important because it is centred on sustaining and promoting the well-being of the natural environment through research and projects. The substructure is also important because it provides resources for the textile and clothing industry that enable the industry to meet the needs of the other substructures (education, eco-political, and fashion customers). In South Africa, organisations that form part of this substructure include the South African Council for Natural Scientific Profession (SACNASP), which consists of disciplines such as agricultural science, atmospheric science, biological science, conservation science, environmental science, soil science, toxicological science, and water resources science (SANCNASP, n.d.) (Figure 1).). The fourth substructure is a fashion customer substructure, like the fashion consumer substructure in the environmentally sustainable fashion design praxis framework (Smal, 2016). Fashion customers play an important role in sustainability. Customers' participation or lack thereof has the potential to promote or hinder sustainability efforts made by the other substructures.

The fifth and final substructure is the textile and clothing industry and is inspired by the support substructure from the environmentally sustainable fashion design praxis framework (Smal, 2016). The support substructure in the environmentally sustainable fashion design praxis framework is limited to organisations such as the Southern African Sustainable Textile and Apparel Cluster (SASTAC) (Smal, 2016). This study acknowledges two groupings under the fifth substructure. The first grouping under the fifth substructure is mainstream professionals and professionals using sustainable practices in the textile and clothing industry, such as fashion design entrepreneurs, trend forecasters, merchandisers, and journalists. The second grouping under the fifth substructure are organisations involved with the textile and clothing industry, such as Sustainable Cotton Cluster, fabric suppliers, textile manufacturers, and textile recycling companies. All textile and clothing industry members are essential in building a sustainable textile and clothing industry, as both large organisations and small businesses have a wealth of unique experiences that, when combined, can enrich and empower micro-to-small fashion design entrepreneurs towards socio-environmentally sustainable supply chain operations. This substructure is monumental in implementing the other substructures' theory and decisions.

#### *Skills development hub*

Based on qualitative and quantitative data findings, this study suggests an in-depth knowledge and skills development hub that uses a socio-environmentally sustainable framework for South African fashion design entrepreneurs. The five substructures of the unified framework will take the role of communicator depending on the various topics presented by the hub. The framework's content will be based on the study's findings and scholarship survey.

The study emphasizes the importance of disseminating knowledge and developing skills across various themes to empower fashion design entrepreneurs in implementing socio-environmentally sustainable supply chain operations (Figure 1). Based on a survey of scholarship and data from three sustainable sub-units (Smal, 2016), the proposed framework integrates findings from customers and entrepreneurs (both mainstream and those using sustainable practices) to support sustainability in the fashion industry. Addressing these themes will aid entrepreneurs in achieving successful sustainable business practices.

Under knowledge dissemination, customers' experiences with sustainable clothes and their desired clothing attributes will be presented. Additional insight from customers outside this study and from various socio-economic statuses will further aid fashion design entrepreneurs when manufacturing saleable, sustainable clothes. The two substructures communicated in this section are fashion customers and education. Figure 1 illustrates other topics that will be covered and the various substructures that will serve as communicators at the in-depth knowledge and skills development hub.

Equipping fashion design entrepreneurs with theoretical knowledge is insufficient for addressing the industry's climate impact. The study highlights the need for skills development, noting that participants mainly saved and donated fabric off-cuts. One sustainable design method, subtraction pattern cutting, was developed by fashion designer Julian Roberts, who teaches this technique to students and professionals. This demonstrates the importance of ongoing collaboration between the textile and clothing industry substructure and education substructure.

The framework focuses on providing knowledge and skills for environmental sustainability (Smal, 2016) alongside developing profitable fashion businesses. Equipping fashion design entrepreneurs with environmental and skills training alone is insufficient without essential business skills. Although not the study's primary aim, the pilot and data collection highlighted the crucial need for business skills in the fashion industry, which often receives minimal focus during training. Participants noted inadequate preparation for running profitable businesses. They emphasized that business management skills are vital for creating sustainable businesses that contribute socio-environmentally and economically to the local textile and clothing industry.

The hub requires platforms like fashion shows, trade shows, and exhibitions (e.g., South African Fashion Week, AFI, Source Africa) for its seminars and workshops. Increased participation from leading industry organizations in these events will promote a socio-environmentally sustainable supply chain culture among South African fashion design entrepreneurs.

## Conclusion

In conclusion, the findings of this study revealed the necessity of a socio-environmentally sustainable framework that provides in-depth knowledge and skills training for fashion design entrepreneurs. The sustainability of the textile and clothing industry requires collaboration and empowerment from internal and external members, including higher education institutions and various public and private sectors. Fashion design entrepreneurs cannot fully integrate sustainable practices and processes into their supply chain without adequate knowledge, skills training, and interventions from various stakeholders. It is important to note that integrating sustainable practices and processes into a business is a gradual process that requires innovation and refinement to adapt to each business' identity. This study found that participants valued durability in sustainable clothes. However, customers preferred the look and feel of mainstream clothes. Therefore, sustainable clothes would exceed mainstream clothes' look and feel attributes and are manufactured under sustainable supply chain operations.

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