

# **Are sustainable fashion brands ready for circularity?**

The current state and vision of sustainable SMEs in the fashion system

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“This ethical fashion, this sustainable fashion, that complies to what fashion really is, that is borne out of passion, skills, heritage, artistry and bravery, is fashion.

It’s everything else that isn’t.”

*Orsola de Castro*

“Never doubt that a small group of thoughtful committed citizens can change the world.

Indeed, it’s the only thing that ever has.”

*Margaret Mead*

“Green economics needs to be an authentic green. It cannot be the brown of desertification and deforestation. It cannot be the red of violence against nature and people, or the unnecessary conflicts over land, water, seeds and food. When economics works against the science of ecology, it results in the mismanagement of earth, our home. The climate crisis, the water crisis, the biodiversity crisis, the food crisis are different symptoms of this crisis of mismanagement of the earth’s resources.”

*Vandana Shiva*

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## Abstract

The fashion industry is a significant contributor to global environmental and social issues. But as a system, it is composed of different stakeholders that can work together to make a change. One of those actors involved are small fashion labels, which according to the European Commission, account for more than 90% of the workforce and produce almost 60% of the value within the textile industry (2017). Small firms cannot be treated just as smaller versions of their larger counterparts. Thus, tailored policies addressing their specific needs and the specific sector in which they operate, should be implemented in order to facilitate their shift towards more sustainable and circular business models.

The aim of this thesis is to improve our understanding on issues related to the current and potential practices of small enterprises to close their material loop. Through the analysis of 60 websites, which sustainable design strategies SMEs are implementing in the EU-28 are investigated. The results showed that nowadays sustainable labels are still focusing on eco-efficient principles, mainly materials selection, and are not considering all the phases of the lifecycle of their products. In accordance with this finding, the coding of 18 interviews with European-based brands revealed that the main challenges that these enterprises face when implementing sustainability innovation, are related to availability of sustainable materials, high minimum orders quantities, commercial relationships with suppliers, and consumers yet not properly-aware. Moreover, due to the industry in which they operate, when adopting green practices, they cannot compromise on style or aesthetic qualities of their products. Whereas the main driver mentioned by all the interviewees seem to be personal commitment.

Moreover, because the current discussion in Europe focuses on circular economy, it is essential to investigate the perception of sustainable labels on this topic, because it should not be taken for granted that they will automatically move towards circularity. Indeed, this research revealed that they perceive circularity as a concept not yet applicable for their businesses, and this is justifiable by the fact that currently there is not a circular fashion system in place and recycling technologies are not industrially developed yet.

**Keywords:** SMEs, sustainable design strategies, sustainable fashion, circularity, product lifecycle, barriers and drivers

# Executive Summary

## Background and problem definition

The world's population is expected to increase and by 2030 and reach 8.5 billion people (United Nations, 2015): as the population grows, so does the associated consumption and consequent environmental impacts. Our current economic model is linear: we take-make-dispose, and this system is responsible for the increase in waste production, pollution and depletion of natural resources, and volatile prices. The current fashion system seems to fit perfectly into this paradigm, considered to be the second most polluting industry in the world after the oil industry.

The scientific community declared that four of nine planetary boundaries have now been crossed as a result of human activity (Steffen et al., 2015), so considering the important impacts of the fashion industry on our Earth, it is logical to start addressing how to enhance the implementation of sustainable practices within fashion businesses. According to Paola Deda, Chief of the UNECE/FAO Forestry and Timber Section, changing the way in which we produce and consume goods would have a domino effect in the achievement of the 2030 Agenda for Sustainable Development (2016). One possible solution of change is offered by the concept of circularity, whose main goal is to retain materials in the 'circular economy loop' and preserve their value for as long as possible (Rizos et al., 2016).

So far, research focused mainly on larger organizations, but SMEs should not be considered as entities that simply mimic bigger companies. Tailored policies addressing their specific needs should be implemented if the goal is to effectively facilitate the transformation towards more sustainable and circular systems. Especially if we consider the European market, where small businesses with less than 50 employees account for more than 90% of the workforce and produce almost 60% of the value in the textile industry (European Commission, 2017).

For small companies, most of the time is difficult to take into consideration all the stages of the life of a product because of the different trade-offs that they must make in relation to the three pillars of sustainability. However, if we want to achieve an industry's transformation, SMEs need to improve their environmental performance, because of their cumulative impact. But first, before introducing circularity, it is necessary to acquire a general overview of the market, whereas currently there is a lack of knowledge on which practices related to the product SMEs are mainly focusing on, and which are the challenges they face when introducing product-related sustainability practices. Indeed, the importance of having this knowledge is also highlighted by the EEA. In the last report published in June by the European Environment Agency (2017, pp. 6), it is stated: "increasing circularity requires insight into the current drivers of product design, form and function as well as emerging trends that may change these".

## Purpose statement and research questions

The purpose of this thesis is to investigate SMEs in the fashion system and enhance the knowledge on current and potential practices related to the possibility of closing their material loop. In order to reach this goal, the following research questions have been investigated:

RQ1: Which sustainable design strategies are SMEs in the fashion system mainly implementing in their products creation?

RQ2: Which are the barriers that sustainable fashion SMEs face when including sustainability aspects in their products? And which are the main drivers?

RQ3: What is sustainable fashion labels' perception of circular fashion and circular issues in general?

## **Overview of the Methodology**

To investigate the Research Questions previously mentioned, the author adopted the following methodology. To examine which are the product-related sustainable practices implemented by small fashion labels in Europe, the author firstly condensed three different frameworks, in order to develop a new one that presents the various and applicable strategies. Then, based on the principles that have been identified through the literature review, websites have been scrutinized in search for keywords that could link brands' environmental claims with the different sustainable design strategies, through an analytical coding process.

To investigate what influences SMEs in creating sustainable products and which barriers must be overcome by these enterprises, first a literature review has been conducted in order to identify which barriers and drivers can relate to SMEs independently of the industry in which they operate. This served as the basis to create a framework that has been used for the coding and analysis of 18 interviews conducted by the author among sustainable fashion labels in Europe. Furthermore, the coding of these interviews allowed the author also to investigate the willingness of sustainable fashion labels to move towards more circular models.

## **Findings**

In the design process of any clothing brand, environmental considerations should deserve the same importance as the colour, texture or shape of the garment. However, as Tham suggests "at present it seems that the goals of the [fashion] system and its mind-set still reside in business or design as usual and that efforts have not been dedicated to a shift at the paradigmatic level" (2010, pp.15).

The findings of this study show that currently fashion SMEs are mainly focusing on the Materials Selection (specifically organic cotton), and Ethical production, when it comes to include sustainability practices in their offerings.

So, they do not seem to apply a lifecycle thinking approach when developing their products. Indeed, even when trying to optimize the longevity of their products, the focus seems to be on the application of a Timeless design. However, brands are not verifying if this aim is fulfilled and users are actually changing the way in which they interact with their clothes. Moreover, currently most of them do not have anything in place to keep the value of their garments inside the loop, when they are disposed. Having said that, materials selection plays an important role when considering circular systems. Indeed, controlling the quality of the materials that will be introduced in the market is essential to guarantee that these same products when will reach their end-of-life, will provide high quality recycled materials. Furthermore, sustainable SMEs seem to be aware of the enormous social consequences of that the fashion industry, thus trying to produce ethically and locally seem to be on the top on their priorities, even if building trusting relationship with suppliers can be problematic.

The reason of such behaviour relates to the fact that fashion labels are primarily commercial businesses: consequently, there are trade-offs that they must make in order to stay competitive on the market. Their smaller supply chain and management style allow more flexibility and adaptability when adopting sustainable-product related principles. However, the barriers that they face in the market when introducing sustainability are various: some could be considered as common barriers that SMEs face independently of their field of activity, like for example lack

of time, lack of resources or consumers' awareness. However, some others seem to be more fashion-industry specific, such as availability and minimum orders, communication of sustainability efforts to stakeholders, and style and aesthetic qualities of their products. Whereas the main drivers seem to be personal commitment to not contribute to the degradation of our planet and self-awareness of their role as product developer. Indeed, most of the brands interviewed have been created based on some sustainability values, with the declared intent to prove that it is possible to create responsible products that do not harm our Earth.

It is important to investigate fashion labels, even if they represent just one actor involved in the textile industry. To foster the change, it is necessary to start adopting a system thinking approach and consider all the relevant leverage points so, when identified, the next step should be the implementation of cross-sectoral collaboration, because just by bringing actors together and aligning various interests, the industry as a whole will move forward towards more circular models.

Currently, sustainable labels seem to be aware of the importance of circularity, however they do not seem to be ready to implement the necessary changes to become circular brands. This perception is justified by the fact that currently it does not exist a circular fashion system yet. Brands that want to become circular need to invest money and resources in creating their own reverse supply chain. More important, these brands need to involve consumers in this changing playing field, and convince them to adopt new habits, such as taking back unused clothes. However, the system currently lacks the technologies that would facilitate this change to happen. Indeed, currently the safest way for brands to guarantee recyclability of their products is the use of mono-material, but this restricts the design possibility and performance of garments. Moreover, to have a 100% material garment various barriers must be overcome by brands in finding the sustainable zippers, or button, or other finishing products. It is unlikely that labels will eventually stop using blended fibres, so to finally close-the-loop, the development of advanced technologies that will eventually allow garments to be properly sorted and recycled must be achieved.

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## Abbreviations

B2B = Business-to-business

B2C = Business-to-consumers

CE = Circular Economy

CEP = Circular Economy Package

CFS = Copenhagen Fashion Summit

CSR = Corporate Social Responsibility

EMF = Ellen McArthur Foundation

GOTS = Global Organic Textile Standard

GRS = Global Recycled Standard

LCA = Life Cycle Assessment

ROI = Return on Investment

SAC = Sustainable Apparel Coalition

SDGs = Sustainable Development Goals

SMEs = Small-and-medium Enterprises

WRAP = Waste & Resources Action Programme

# 1 Introduction

It is widely known by now that there are numerous social and environmental impacts related to one piece of garment. Over the past 50 years our society and industrial systems changed, becoming deeply rooted on planned obsolescence and overconsumption (Niinimäki & Hassi, 2011). Lynes & Fletcher (2015, pp.16) enunciate: “Our ideas of progress have become so tied to a societal narrative of growth through continuous buying that the accelerating purchase and disposal of garments is now seen as a necessary component of modern living”. According to Fashion Revolution, people used to spend more than half of their money on food and clothes, while today less than a fifth are spent on those products. But on the other hand, the consumption increased, and today consumers purchase 400% more clothing than they did 20 years ago (n.d.).

Our current economic model can be defined as “linear”: we take-make-dispose (Ellen MacArthur Foundation, 2015c), and this behaviour is responsible for the enormous negative consequences of this industry on our planet, because valuable resources are lost within the system. Businesses and governments are starting to realize that this model will not allow us to guarantee what was articulated in the Bruntland Report, because we are actually compromising the ability of future generations to meet their own needs (IISD, n.d.).

The change is needed, and according to Paola Deda, Chief of the UNECE/FAO Forestry and Timber Section, “Changing the production and consumption patterns of this sector would have a domino effect on many aspects of development, and provide a visible and meaningful contribution to the achievement of the 2030 Agenda for Sustainable Development” (2016). The Agenda consists of a plan of actions for people, planet and prosperity developed on 17 main goals. By signing this document, members of the UN committed to change the way we produce and consume goods and services in our societies, by including environmental and social considerations. SDG number 12, which deals with “Responsible consumption and production”, can immediately relate to the fashion system; however, the promotion of sustainable development in this sector would be beneficial for the achievement of all the other goals.

One possible solution is offered by the concept of circularity, which seeks transformational changes across the value chain in order to retain materials in the ‘circular economy loop’ and preserve their value for as long as possible (Rizos et al., 2016). The concept of circularity itself is not new, but the origin of the term is still debated. However, according to Milios (2016), an increasing number of literature seem to identify two main academic publishing that framed the term of Circular Economy. One contribution refers to Boulding’s *The economy of the coming spaceship earth* (1966), while the other is *Economics of Natural Resources and the Environment*, written by two British environmental economists Pearce and Turner (1990). They state that our economies, based on open-ended system, do not consider recycling as a necessity, and this leads to the mistreatment of the environment which is considered as a “waste reservoir”(Su, Heshmati, Geng, & Yu, 2013). Milios (2016, pp. 22) argues, “although the concept of Circular Economy is not new, what is new is the momentum that this concept is gaining among business practitioners and policy advocates”.

According to the Ellen McArthur Foundation and McKinsey & Company (2014), circularity is essential even from an economic point of view, because “closing production-to-waste loops and increasing the reuse and recycling of materials would reduce demand for virgin materials and help to mitigate both demand-driven price volatility on raw material markets and supply risks”. Because of the several advantages of this concept, in December 2015 the European Commission adopted the Circular Economy Package (CEP), with the aim of establishing a common and coherent EU circular economy policy framework, with waste-related directives and new EU recycling targets. In March 2017, the Commission also launched the European Circular Economy Stakeholder Platform (European Commission, n.d.), conceived as “a hub gathering knowledge on circular economy and a place for dialogue among stakeholders”.

However, in the CEP the apparel industry is not mentioned as a priority sector, even if it accounts for 10% of global carbon emissions and remains the second largest industrial polluter, second just only to oil (Conca, 2015). At the EU level this industry has been addressed in 2015 by another policy initiative called “European Action Clothing Plan” (ECAP), led by the British Waste and Resources Action Program (WRAP). The aim of this initiative is the creation of a framework for the sustainable clothing sector to explore “production, design, public procurement, sustainable consumption, collection, recycling and reprocessing as a means of waste minimisation and effective waste recovery” (Wrap, 2016).

So far, a large amount of research has been dedicated to the strategies implemented by luxury and fast fashion brands. Concepts such as recyclability, reuse, fair trade processes and circular economy are already widely used in these companies’ corporate social responsibility reports. However, small firms cannot be treated just as small versions of their larger counterparts (Blundel, Monaghan, & Thomas, 2013). Indeed, SMEs have been slower in adopting environmental improvements, and this is due to a combination of internal and external barriers which are different if compared to bigger-size companies (Blundel et al., 2013). Moreover, many small enterprises simply do not perceive their environmental impacts to be significant when set against those of larger companies, even if their cumulative effect could be substantial (Van Hemel & Cramer, 2002).

Not only business corporations have the power to foster change; indeed, in order for the green transformation to be effective, SMEs need to be taken into consideration, because they are responsible for 64% of the overall environmental impact in the EU (Constantinos, Sørensen, Larsen, & Alexopoulou, 2010). Especially if we consider the fashion market, where small businesses with less than 50 employees account for more than 90% of the workforce and produce almost 60% of the value (European Commission, 2017).

## **EU & SMEs**

In these last few years, European governments have committed themselves to a variety of environmental targets, that will have direct implications for businesses. So, better integrated approaches are required to address today’s complex sustainability challenges. Moreover, various programs and bodies have produced initiatives targeted at SMEs, and this means that EU has finally recognised the importance of SMEs in the transformation into a competitive low-carbon economy (Blundel et al., 2013).

The EU launched in 2011 the Small Business Act (SBA) (Commission Proposal COM(2008)394 final), which highlights the role of the EU as an enabler for Small enterprises (SME) to turn environmental challenges into opportunities. It aims to improve the overall policy approach to entrepreneurship, by adopting in policy making a “Think small first” principle (Oncioiu, 2015). The Green Action Plan (GAP) (Commission Proposal COM(2014)440 final) for SMEs was adopted by the European Commission on 2 July 2014 – together with the Circular Economy

Package, follows on the Small Business Act and Europe 2020 Strategy. The GAP is a description of actions that the European Commission should pursue in order to help SMEs exploit the business opportunities that the transition to a green economy can offer (Rizos et al., 2015). The actions are grouped in five broad themes: Greening SMEs for more competitiveness and sustainability, Green entrepreneurship for the companies of the future, Opportunities for SMEs in a greener value chain, Access to the market for green SMEs, and Governance.

The Executive Agency for Small and Medium-sized Enterprises (EASME) has been set-up by the European Commission to manage on its behalf several EU programmes, like the EU programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME), which runs from 2014 to 2020 with a planned budget of €2.3bn. The aim is to support better access to finance and markets for SMEs, entrepreneurship and more favourable conditions for business creation and growth.

## 1.1 Problem Definition

Currently there is a lot of discussion around SMEs and their need to move towards a greener and circular economy, and different policies could help them to improve their environmental performance. Policymakers could use economic, regulatory and support-based tools, or even a mix of interventions, to achieve maximum engagement and environmental improvement (Parker et al., 2009; Blundel et al., 2013). Porter and Van Der Linde (1995) emphasize the role played by (well-designed) environmental regulations. According to the so-called “Porter Hypothesis”, properly designed regulations could convince firms to overcome uncertainty and organizational constraints, and adopt innovative solutions that would eventually lead to competitiveness gains (Marin, Marzucchi, & Zoboli, 2015).

Although more policies have started to target SMEs, several barriers still pose challenges to those businesses in their transition to sustainability and circularity, especially in the fashion world. So it is necessary for policy-makers to first understand the current practices and the complex challenges faced by SMEs in the different sectors, in order to be able to implement tailored policies that can effectively boost the transformation towards more sustainable and circular systems. Consequently, it is fundamental to start addressing the fashion industry and understand its peculiarities, because each market deals with its own issues. It is necessary to understand what is the brands’ perception of environmental issues, and more specifically, which are the barriers and drivers they faced when including sustainable aspects in their product. Additionally, equally important is the identification of these enterprises’ idea of circularity, their knowledge and possibility to include a lifecycle thinking approach.

The impact of the fashion sector began receiving attention in the early 1990s, when environmentalists started to get worried about workers’ conditions but also the increase in consumption patterns and consequently waste production. In response to that, designers began to explore new materials and new eco-efficient methods to produce their products. During the last 25 years, industrial development has achieved improvements in technologies that can potentially decrease the environmental impact of the industry itself (Lynes & Fletcher, 2015). However, production and consumption have both increased during the same time, and this has reduced the potential environmental benefits of these technological advances – also known as the Rebound Effect (Niinimäki & Hassi, 2011). Even if most of the people might still be unaware of the severe implications that their purchasing decisions have on our society, product developers must know that their initial choices during the product development process hold the potential for leading the way to transform positively the entire industry (Lawless & Medvedev, 2016).

Indeed, addressing how a product is designed is essential because it is estimated that up to 80% of a product's environmental and economic costs are decided when the product is conceived (Fletcher, 2008; European Commission, n.d.). Furthermore, considering that the design of a product directly influences the management of a value chain, building circular and global value chains require fundamental changes in the current practice of design (De los Rios & Charnley, 2017).

Designers need to start adopting a lifecycle approach: it means that all the stages of the product and the different impacts are taken into consideration, in order to implement strategies that would allow to keep the value inside the loop. However, it is not always easy for SMEs to take into consideration all the stages of the life of their product's life because of the different trade-offs that they must make. According to the last report published in June by the European Environment Agency (2017, pp. 6) "increasing circularity requires insight into the current drivers of product design, form and function as well as emerging trends that may change these". This statement highlights the importance of considering the design aspect of a product, if the goal is to introduce circularity in the fashion system. But what is currently missing is a general overview of the market: there is a lack of knowledge on which practices related to the product SMEs are mainly focusing on. According to Deda (2016), "There is a need for comprehensive research on the economic, environmental and social impact of the sector, with up-to-date data and statistics. No comprehensive study has been developed so far, and the available information remains scattered and unreliable".

Sustainable innovation is defined by Charter and Clark (2007, pp. 9) as, "a process where sustainability considerations are integrated into company systems from idea generation through to research and development (R&D) and commercialisation. This applies to products, services and technologies, as well as new business and organisation models". This study focuses on the product level and the various barriers and limitations faced in the fashion market by companies that try to innovate, especially in relation to the interrelated influences of the "three pillars of Sustainable Development" which are (Gibson, 2006; Crul, 2006);

- a) Ecological Stability - Fit within the carrying capacity of supporting ecosystems,
- b) Economic Viability - Create equitable value for customers and stakeholders along the global value chain
- c) Social Equity - Create opportunities to meet social and equity requirements.

The main challenge that SMEs face in any sector, is to deal with these three realms responsibly and within their capacity (Gwilt, 2013); however, a lack of research related to the specific challenges that these companies face in the fashion sector has been identified.

## 1.2 Research Questions

The purpose of this research is to enhance the understanding on issues surrounding the current and potential undertaking of small enterprises in the fashion system related to closing their material loop. Based on this aim, the paper will develop on the following research questions (RQs):

**RQ1:** Which sustainable design strategies are SMEs in the fashion system mainly implementing in their products creation?

**RQ2:** Which are the barriers that sustainable fashion SMEs face when including sustainability aspects in their products? And which are the main drivers?

**RQ3:** What is sustainable fashion labels' perception of circular fashion and circular issues in general?

### 1.3 Limitations and scope

Only designers working in small-and-medium enterprises have been considered, both in the analysis of the most common sustainable design strategies implemented in the market and for the interviews selection. The SMEs studied and analysed are mainly clothing companies. No accessories-or-shoes-brands have been selected.

To define the concept of SMEs, the classification provided by the EU has been used, which is based on two main factors: staff headcount ( $< 250$ ) and either turnover ( $\leq \text{€ } 50 \text{ m}$ ) or balance sheet total ( $\leq \text{€ } 43 \text{ m}$ ) (European Commission, 2017-b). According to the EU definition, enterprises with up to 10 employees are called micro enterprises, enterprises with up to 50 employees – small and up to 250 employees – medium (European Commission, 2005).

In this paper, the author investigates which design strategies are implemented in the creation of a product that can have a lower environmental impact throughout its entire lifecycle. Consequently, only strategies strictly related to the product creation have been taken into consideration; those involving managerial level or retailer level, have not been covered. Moreover, the research aims to investigate obstacles and drivers for environmental action; the findings could also be used to assess the effectiveness of existing supporting bodies or programmes, but this analysis is out of the scope.

The geographical scope chosen is EU-28: the reason behind this choice relies on the hope that this study could be used by policy-makers at EU level for the creation of policies that better target small enterprises. However, the author is fully aware that different cultural and social aspects, together with different national regulations, can play an important role in enhancing or hindering the development of a circular economy culture and a circular fashion system. Therefore, results from this research cannot be generalized.

### 1.4 Audience

According to Walker et al. (2008), providing knowledge and information of the various sector has the potential to make a positive contribution to small and medium enterprises participation in environmental management. Consequently, this overview may be of use to intermediates and companies that want to apply specific sustainable design principles, by helping them to prevent or overcome barriers that might arise. It could also be used by SMEs already involved with sustainability, to fill in the gap on the competitors' knowledge, which is fundamental for the market knowledge of designers. The author believes that there is an added value for SMEs and third parties in having a better understanding of what are the trends within SMEs and sustainable fashion. Moreover, as stated by Walker et al. (2008, pp. 11) without evaluating and providing best practices and good examples, it is difficult "to provide a convincing business case as there is insufficient knowledge of what does work and is economically and socially viable".

It is also necessary to have an increased understanding of the associated challenges, relevant for practitioners and policy-makers, which are the other intended audience of this study. A complementary aim would be to provide them with the necessary knowledge of this specific sector and support them with the rights tools prior to the implementation of environmental policies to promote environmentally sustainable economic activities. Policy-makers need to better understand the issues faced by different SMEs in order to design a broader policy mix of interventions, because although these companies need to move towards more circular systems, it is necessary to first highlight where they are at current state. This level of understanding can

be achieved by having a clear view of the companies targeted, their business behaviour and the market conditions under which they operate (Parker et al., 2009). This study allows a “bottom-up” approach to the needs of the industry itself, in order to increase the chances to address the real problems experienced in the market.

## 1.5 Ethical Considerations

Before starting each interview, the author asked the interviewee for their permission to make audio recordings, guaranteeing that they would only be used for academic purposes. Thanks to the recordings, the author has been able to transcribe all the interviews, in order to keep track of the findings obtained and allow the possibility to review the process by other researchers. Prior to the publication, all the experts contacted for primary data collection have been asked to revise the content of the quotes that the author used in this study publicly. However, to guarantee confidentiality, content from SMEs interviews used in the analysis have been anonymized prior to publication.

## 1.6 Outline

This paper is structured as follows:

Chapter 2 shows the research design, including the scope of the literature analysis, the explanation of the primary data collection methodology, and the analysis approach that will be further used. Chapter 3 contains the literature analysis that has been conducted by the author to support the findings. First a review of the available sustainable design strategies has been conducted, followed by a review of the main barriers and drivers experienced by SMEs in their sustainable transformation. Based on this, a deductive category system is developed which guides the subsequent content analysis. Chapter 4 follows a similar structure of Chapter 3. First the chapter presents the results from content analysis of the enterprises’ websites, followed by the content analysis of designers and owners of labels’ interviews. In chapter 5, the findings are interpreted and discussed, successively supported or disproved using the experts’ interviews. Chapter 6 presents the Reflections on the methodology adopted, while Chapter 7 presents the major conclusions of the analysis and checks if the research questions have been answered and explains the contribution of this paper. Further questions for future analysis and limitations of the research are presented as well.

## 2 Methodology

To investigate the Research Questions previously mentioned, the author adopted the methodology that will be further discussed in the following section. To examine which are the product-related sustainable practices implemented by small fashion labels in Europe, the author condensed three different frameworks, in order to come up with a new one that presents the various sustainable design strategies and allow a possible comparison. Then, the focus moved on investigating what influences SMEs in their engagement of sustainability. First, a literature review has been conducted to identify which are the main barriers and the main drivers that SMEs face independently of the industry in which they operate. This served as the basis to create a framework that has been used for the coding and analysis of the 18 interviews conducted by the author. Moreover, the interviews' coding together with the interviews conducted with industry's experts, allowed the author to investigate the perception that sustainable labels have on circularity, and their hypothetical willingness to adopt circular business models.

Figure 2.1 shows the research method applied by the author in this study.

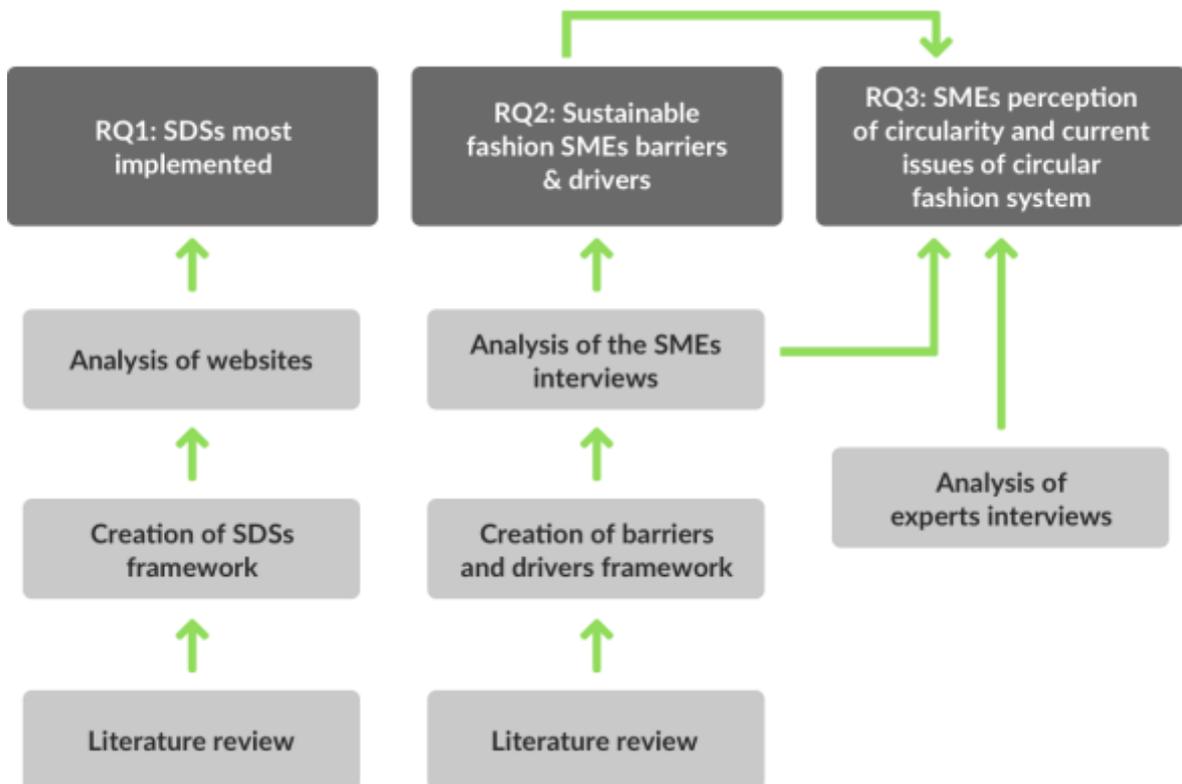


Figure 2-1. Applied Research Method

Source: Own elaboration

## 2.1 Content analysis of websites

Within this changing system, SMEs can interpret new roles in the achievement of a sustainable development: they can be more engaged in society and lead systemic change by adopting new ways of operating. This could be achieved by creating new trends through their design. Indeed, they have the chance to trigger new behaviour by communicating a new vision of fashion and sustainability also through their websites.

To understand which sustainable design strategies brands are implementing, the research uses a sample of 60 SMEs all based in Europe (Appendix I shows the full list of labels considered). The potential bias in geographical location has been taken into consideration by the author, and consequently the results obtained can only be considered as indicative. The selection has been based on their public claims of promoters of “sustainable fashion”. The labels were chosen randomly based mainly on newspapers and fashion magazines’ articles, like Fashionista or the Business of Fashion, and by consulting the database provided by the Ethical Fashion Forum. No specific organizations or associations have been used during the selection process, in order to guarantee diversity among the practices adopted.

The author decided to use websites as primary source of information because considering the size of these companies, they usually do not publish CSR reports, but they communicate their activities and promote themselves by using their websites. According to Ross & Jönbrink (n.d.), websites can be intended as valuable tools to disseminate knowledge, tell successful stories and create motivation for change. The assumption that the author makes is that the brands’ claims publicly available on their websites reflect the reality of their practices. This assumption is acceptable considering that the scope is to gain a general overview of the aspects that are currently prioritized by SMESs and how sustainability is mainly operationalized in the fashion market nowadays.

Through a brief literature review, the various product-related strategies have been described and explained. Several researchers have studied different eco-design and sustainable design strategies (SDSs). The main framework that has been used for the analysis is the Eco-design strategy Wheel, developed by Van Hemel and Becker in 1997, that lists 8 different eco-design strategies, which comprehend more detailed principles, that can help companies to green their products. This framework can be applied to companies of different sizes and that operate in various sectors. To go one step further, and use a framework that presents in detail all the practices that could be applied by fashion companies, the Eco-design strategy wheel has been integrated with the ones developed by two fashion and design researchers. Indeed, Alison Gwilt (2013) has created a framework that links the different phases of the product lifecycle with design strategies that could help to reduce the impacts of each phase; while TED (n.d.) created a framework called “TEN” which serves as a toolbox to introduce the different themes on which designers in their ideation process can influence the system. These existing frameworks have been used to describe the main SDSs that SMEs could implement when adopting a lifecycle thinking approach and will serve as the theoretical framework of this research.

The new framework has been used for the websites’ coding and grouping of the various strategies. Based on the themes that have been identified through this above-mentioned literature review, websites have been scrutinized in search for keywords that could link designers’ claims with the different sustainable design strategies. The process of coding is analytical, and it requires the review, selection, interpretation and summary of the information without distorting it (Walliman, 2006).

## 2.2 Content analysis of interviews

The coding of websites per se does not allow for an understanding if sustainable designers are knowledgeable about the various principles that they could implement, but they feel overwhelmed by the numerous barriers in the market, or if they are not acting proactively because of a lack of education and awareness. Moreover, it is important to define what is their view on circular fashion.

So, after identifying which stages of the product's lifecycle designers are mainly focusing on, a literature review has been provided to assess which barriers SMEs face in implementing sustainability innovation, and also which are the drivers in creating sustainable products, independently of their activity sector. The search of the articles was conducted using two principal sources: library databases (e.g. EBSCOHost) and the internet (e.g. Google Scholar), using search terms relating to SMEs (e.g. SME, small business, small firm) and the environment (e.g. environment, sustainability, eco-innovation). The terms small and medium enterprises, SMEs, small enterprises and small business are used interchangeably because even some literature does not make any distinction among these. A snowballing method has been used to extend the search, for example by using the references cited in a piece of work and reviewing the original source. Moreover, the author tried to ensure the currency of the review by mainly selecting recent studies (2008-2017), both from academic papers and grey literature. However, articles written by expert such as Tilley (1999) or Van Hemel & Cramer (2002), have been considered anyway because of the important value that these researches generated throughout the years for following researchers.

The scientific articles included in this review are both research papers based on case studies (selected through geographical scoping or sector scoping) and literature review per se of previous studies. This review can be defined as integrative: compared to descriptive reviews which focus on the methodology, findings, and interpretation of each reviewed studies, integrative reviews attempt to find common ideas and concepts from the reviewed material (Khoo, Na, & Jaidka, 2011).

The aim is to create a general theoretical framework that comprehend all the main categories of barriers and drivers that SMEs face when dealing with sustainability. Based on this literature analysis, categories will then be defined deductively. This deductive category system served when conducting the analysis of the interviews. The qualitative analysis of this study has been carried out by using a closed coding and a deductive, thematic approach: the main findings from the interviews have been summarized and clustered into groups according to the framework of barriers and drivers created, refining it also based on the themes that will emerge.

A qualitative investigation using interpretative methods of analysis was also used by Tilley (1999, pp. 240) in her study of environmental attitude and behaviour of UK SMEs, because according to the author "this approach best suited a study seeking understanding and meaning of the environmental attitudes and behaviour of small firms". Oxborrow & Brindley (2013), in order to identify how SMEs in UK innovate in terms of sustainability and determine the benefits and the obstacles they face, used an exploratory approach by analysing 15 case studies and interviews, and the same goes for Van Hemel and Cramer (2002) and Revell, Stokes, & Chen (2010), who adopted phased qualitative methodologies when researching SMEs and eco-principles. A similar approach has also been preferred by Lawless & Medvedev (2016), whose goal was to assess the sustainable design practices adopted by small companies in the US fashion market. To gain an understanding of SMEs' knowledge and practices used in sustainable design, interviews were conducted in all these above-mentioned studies. The author of this work opted for a qualitative analysis because the scope of the interviews is the identification and recognition of certain patterns. Adding a quantitative analysis could be valuable for the research, but it has

been excluded because what is pursued by the author is an in-depth understanding and description of SMEs knowledge and perceptions, in order to identify clear trends.

The interviews were conducted individually and adopted a semi-structured format (please refer to Appendix II). This approach, as stated by Saunders, Lewis, & Thornhill (2003) offers the opportunity for exploring and probing of the data, while allowing the researcher to delineate his own themes. The interviewees have been selected through a purposive sampling - which is the deliberate choice of an informant by the author due to the qualities that the informant possesses (Tongco, 2007).

In this thesis 24 interviews have been conducted. The author contacted 100 brands in Europe, some of which introduced by Tobias Noe Harboe, project manager of The Design for Longevity project. In total 18 among owners, designers, creative directors and sustainability leaders agreed on being interviewed. Table 2-1 shows which labels have been included in the coding process. The name of the interviewee and his role in the company is provided, together with the modality of how the interviews took place. Furthermore, interviews with two more brands have been conducted, but have not been included in the coding because not sustainable labels that produce apparel-products: one is with Eric Roosen, owner of Star Sock, brand that produces socks by using an innovative fibre, and Kiat Yen, co-founder of Indigo People, a social enterprise. Moreover, four experts' interviews have been used to expand what is described in the literature review and to support the analysis of this study. These experts are: Dr. Anna Brismar from Green Strategy, consulting firm based in Stockholm; Gwen Cunningham, Lead of Circle Textiles Programme, at Circle Economy in Amsterdam; Anita de Wit, co-founder of Reblend; Cecilia Takayama & Debora Tricarico, respectively Director and Project Manager of the Materials Innovation Lab at Kering Group.

The SMEs selected were all already engaged with sustainability: only those that claim to be sustainable have been considered, both for the websites coding and the interview process. This study wants to investigate which are the main practices currently implemented by sustainable brands, and obtain practical insights on the challenges that those companies face in their path towards sustainability. Moreover, considering that circularity is now a hot topic in the market, it is important to understand what is the point of view of these brands that are already a step ahead in terms of environmental considerations, if compared to the general SMEs operating in this market. Consequently, it is necessary to establish their willingness and capability to implement new business models that would facilitate the development of circularity.

By investigating what SMEs are already doing or not doing in their product, it could be possible to better engage them and show them possible pathways that they might find beneficial for their businesses. Just by understanding the practicality issues and obstacles that sustainability and circularity require in the development of the product, it could be possible to determine whether these could be removed or reduced through the implementation of proper policy interventions that could fall under the categories of Information and awareness, Collaboration platforms, Business support schemes, Public procurement and infrastructure, Regulatory frameworks or Fiscal frameworks (Ellen MacArthur Foundation, 2015).

Table 2-1. List of interviewees

Company name	Location	Size (employees)	Interviewee name	Role in the company	How & when
Henrica Lang	Finland	<5	Henrica Lang	Founder and designer	Skype, 26/06
NVK Daydoll	Italy	<5	Natasha Calandrino Van Kleef	Founder and designer	Skype, 26/06
Good Society	Italy	<5	(Not specified during the call)	Owner	Skype, 26/06
Ramnation	United Kingdom	<5	Talia	Founder and designer	Skype, 27/06
Mantis World	United Kingdom	=13	Prama Bhardwaj	Founder and CEO	Skype, 27/06
Stanley and Stella	Belgium	=80	Bruno Van Sieleghem	Head of Communication and Sustainability	Skype, 29/06
The Autonomous Collection	United Kingdom	=5	Kim Stevenson	Founder and designer	Skype, 29/06
Quagga	Italy	=5	Stefano Bonaventura	Product manager	Skype, 29/06
Rawan Maki	United Kingdom	<5	Rawan Maki	Founder and designer	Skype, 29/06
Skunkfunk	Spain	=50	Jon Curuchet	Corporate Sustainability manager	Skype, 30/06
Bav Tailor	Italy	<5	Bav Tailor	Founder and designer	Skype, 30/06
Creation 26	United Kingdom	<5	Charlie Fleet	Founder and designer	Skype, 30/06
Farrah Floyd	Germany	<5	Bojana Draca	Founder and designer	Skype, 03/07
Format	Germany	<5	Mareike Ulman	Founder and owner	Skype, 13/07
Barbara I Gongini	Denmark	=11	Lea Zaar	Designer	Email, 14/07
Cream and Co.	United Kingdom	<5	Vicky Gerrell	Founder and owner	Skype, 14/07
Van Jos	The Netherlands	<5	Rosa Van Ederen	Founder and designer	Skype, 18/08
Carcel Carcel	Denmark	=24	Johanne Jacobsen	Communication manager	Email, 25/08
<b>Other interviews</b>					
Green Strategy	Sweden		Anna Brismar	Founder	Skype, 26/06
Reblend	The Netherlands		Anita De Wit	Founder	Skype, 29/06
Star Sock	The Netherlands		Eric Roosen	Founder	Skype, 06/07
Circle Economy	The Netherlands		Gwen Cunningham	Lead, Circle Textiles Program	Skype, 07/07
Indigo People	The Netherlands		Kiat Yen	Founder	Skype, 16/08
Kering	Italy		Cecilia Takayama	Director of the Materials Innovation Lab	Person, 1/09

### 3 Literature analysis

In this section, first the author describes both the economic and environmental importance of SMEs in Europe. Then, meaningful concepts such as sustainable fashion, circular fashion and lifecycle thinking approach are described. Next, the product development process inherent to a garment is briefly explained, to allow the reader to understand the entire journey from the ideation to the final product. Successively, the alternative sustainable design strategies applicable to a product and the relative framework that the author created for the analysis are presented, followed by the description of barriers and drivers that SMEs face when dealing with sustainability, identified through the literature review.

#### 3.1 The importance of SMEs

The role of micro, small and medium sized enterprises (SMEs) in the sustainable transformation is extremely important, because they represent the cradle of entrepreneurial skills and innovation (Vasilenko, Arbačiauskas, & Staniškis, 2011). Definition of SMEs can vary in different countries, but mostly it depends on the number of employees. According to the EU definition, enterprises with up to 250 employees can be considered SMEs (European Commission, 2005).

Their importance is mainly due to their number: 99 % of all enterprises in the EU are SMEs, and they provide around 65 million jobs (European Commission, 2017), which represents two-thirds of European employment (Rizos et al., 2016). According to Pimenova & Van der Vorst (2004), these enterprises represent an important source of employment and they offer a large potential for environmental, health and social improvements in society.

Their number results in consistent pressures placed on our planet's finite resources (Tilley, 1999; Pimenova & van der Vorst, 2004; Blundel et al., 2013). Indeed, they are thought to be responsible for around 60% of all carbon dioxide emissions and 70% of all pollution (Parker et al., 2009; Revell, Stokes, & Chen, 2010), and they produce between 50 and 80 % of the waste generated (Cassells & Lewis, 2011). These data prove the importance of investigating how to encourage SMEs to improve their environmental performance, which Parker et al. (2009, pp. 284) is defined as “changes in practices which reduce the current level of negative impact on the environment”.

So far, research focused on addressing larger organizations, but SMEs should not be considered just as homogenous entities that mimic those bigger companies. Tilley (1999, pp. 238) claims that “small firms cannot be expected to employ scaled down solutions that have been developed by, and for, larger organizations”. According to a report published by the European Commission on public policy initiative to promote sustainable practices in SMEs (2004), a correlation between an enterprise size and its environmental engagement has been identified, with larger companies that seem to engage more in those processes due to greater access to financial and human resources (Pinget, Bocquet, & Mothe, 2015).

However, studies show that smaller enterprises present higher levels of dynamic innovation performance and reactivity (Stock et al., 2002): their shorter supply chain allows more transparency and flexibility, plus they are able to respond promptly to changes (Van Hemel & Cramer, 2002; DeLong, Goncu-Berk, Bye, & Juanjuan Wu, 2013). But, most of the time small companies are unaware of their environmental impacts, and they often believe that it is within the competencies of national and local governments to take a lead in environmental issues (Vasilenko & Arbačiauskas, 2012). In fact, Pimenova & van der Vorst (2004) in their analysis of 250 SMEs in UK, found out that one out of five companies do not have any environmental concerns or are convinced that they do not produce any negative environmental impacts at all due to their size and type of activity.

One sector that is based on SMEs' activities is the clothing industry. By textile industry is meant the entire production chain from the transformation of natural and chemical fibres (such as cotton, wool, and oil) into end-user goods which can include garments, household goods, and industrial textiles (European Commission, 2013). In Europe, small businesses with less than 50 employees account for more than 90% of the workforce and produce almost 60% of the value (European Commission, 2017). So, the clothing sector is an important part of the European manufacturing industry: indeed, according to data from 2013, there were 185,000 companies in the industry employing 1.7 million people and generating a turnover of 166 billion € (European Commission, 2017).

## 3.2 Sustainable fashion

The fashion industry is the second most polluting industry worldwide: both environmental and social implications are related to our clothes, and the situation is worsened by the fact that since the mid-twentieth century, we embraced and became a consumeristic society (Palomo-Lovinski & Hahn, 2014). The fashion system is responsible for various negative externalities, and this relates to our current economic model. According to Tilley (1999, pp. 244) "Neo-classical economics represented by the free market acts as a dominant resistant force governing the behaviour of governments and businesses". One of the building block of neoclassical economic model is the price mechanism, which highlights the role of prices in conveying information and sending incentives. However, prices for environmental goods do not exist or do not reflect full value of resources. Consequently, if the incorrect price message is sent, this leads to market failures, which means that the market stops being efficient. If we decided to internalize in the price of a t-shirt that we currently buy for 5€, those externalities such as water pollution, chemicals use, land degradation and all the others, the price would easily be much higher than what we are currently paying.

Since the 1990s, when environmentalists began to express their concerns over the impacts of waste production and the related consumption patterns, the fashion industry started to experiment with the concept of eco-fashion (Gwilt, 2013). Even if the interest in sustainability grew within the sector, there is still no common definition of what sustainable fashion really means. Green Strategy, a Swedish consultancy firm that helps companies in the textile industry to develop their sustainability and circularity work, has come up with the following definition (2014):

"Sustainable fashion implies continuous work to improve all stages of the product's life cycle, from design, raw material production, manufacturing, transport, storage, marketing and final sale, to use, reuse, repair, remake and recycling of the product and its components. From an environmental perspective, the aim should be to minimize any undesirable environmental effect of the product's life cycle by: a) ensuring efficient and careful use of natural resources (water, energy, land, soil, animals, plants, biodiversity, ecosystems, etc.); b) selecting renewable energy sources (wind, solar, etc.) at every stage, and c) maximizing repair, remake, reuse, and recycling of the product and its components. From a socio-economic perspective, all stakeholders should work to improve present working conditions for workers on the field, in the factories, transportation chain, and stores, by aligning with good ethics, best practice and international codes of conduct. In addition, fashion companies should contribute to encourage more sustainable consumption patterns, washing practices, and overall attitudes to fashion"

At the Copenhagen Fashion Summit, that took place this year in May, the Boston Consulting Group (BCG) and Global Fashion Agenda (GFA) have presented an industry report they developed, *The Pulse of the fashion industry*, in which they have tried to evaluate and quantify the overall opportunity for sustainability in fashion. According to the report (2017, pp. 19) "there is a €160 billion-per-year upside for the world economy that can be realized through more

efficient and diligent use of scarce resources, by treating workers fairly, and by making progress on a range of issues up and down the value chain”. Figure 3-1 shows the value opportunity of sustainable fashion to the world economy, divided per impact category.

	IMPACT	VALUE AT STAKE	UNTIL 2030
ENVIRONMENTAL	1  Water Consumption	Reduced water consumption	€32 Billion
	2  Energy Emissions	Reduced energy emissions	€67 Billion
	3  Chemical Usage	Reduced occupational illnesses	€7 Billion
	4  Waste Creation	Reduced amount of waste	€4 Billion
SOCIAL	5  Labor Practices	Workers earning 120% min wage	€5 Billion
	6  Health & Safety	Reduced number of recorded injuries	€32 Billion
	7  Community & ext. eng.	Increased community spending	€14 Billion
ETHICAL	8  Ethical Practices	Not to be quantified	
			€ -160 Billion/year

Figure 3-1. The Value Opportunity of Sustainable Fashion to the World Economy

Source: Own illustration. Adapted from The Pulse of the fashion industry report (2017)

### 3.3 Circular fashion

Just in the EU and US market, 20 million tonnes of textiles end up in landfill or are incinerated each year (Smits, Cunningham, & Spathas, 2016). It is estimated that 10-15% of the waste textile consists of cutting waste from the manufacturing process (defined as post-industrial textile waste), while up to 33% of the garments produced are unsold and consequently destroyed (and this is usually named pre-consumer textile waste). So, while for packaging, the recovery and recycling rates of the EU-28 Member States and EFTA countries for 2014 are pretty high, with Belgium holding both the highest recovery rate (99.2%) and the highest recycling rate (81.3%) (Eurostat, 2017), when it comes to clothing just 18% is reused or recycled, while more than 80% is just wasted. This is the proof that our current fashion system is mainly characterized by linearity, shown also in Figure 3-2, and the leakages in the system proves that a change is needed.

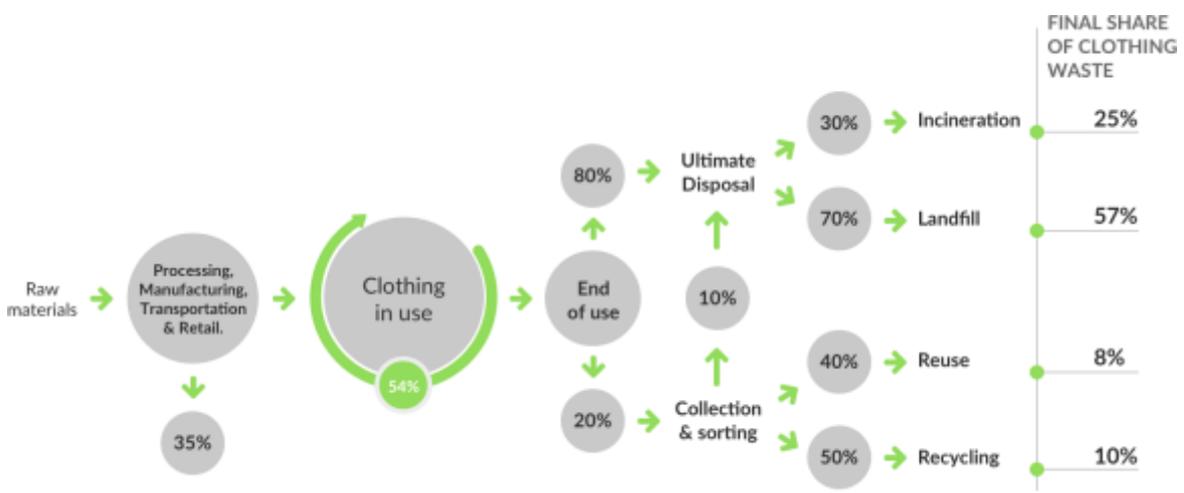


Figure 3-2. Final share of clothing waste

Source: Own illustration based on The Pulse of the fashion industry (2017)

The reason why it is important to move towards a model in which the values of resources stay inside the system in a closed loop, relies on the fact that our resources are limited, and as we are depleting them, we should keep in mind the 1<sup>st</sup> law of Ecology of Berry Commoner, which states: “everything is connected to everything else” (1971). The world’s population is expected to increase and by 2030 reach 8.5 billion people (United Nations, 2015); and as the population grows, the same is going to happen to the apparel consumption, and consequently to all those finite resources necessary for the fibres production. For example, if we consider the cotton production, competition for water and land will increase as they are both needed for cultivating food and crops (Wrap, 2017). While if we consider polyester, which since 2007 overtook cotton as the world’s dominant fibre (M. Bain, 2015) and in 2016 had the biggest share in the market, it requires great amount of energy in its production. These are just examples that show why we cannot afford to let these precious resources go wasted, especially now that the scientific community declared that four of nine planetary boundaries have now been crossed as a result of human activity, which are climate change, loss of biosphere integrity, land-system change, altered biogeochemical cycles (phosphorus and nitrogen) (Steffen et al., 2015).

According to the Ellen MacArthur Foundation (2015a), it is possible to close the loop by implementing these three main principles :

- 1) Principle 1: Preserve and enhance natural capital, by controlling finite stocks and balancing renewable resource flows;
- 2) Principle 2: Optimise resource yields, by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles;
- 3) Principle 3: Foster system effectiveness, by revealing and designing out negative externalities.

These three principles lead to the creation of a system, shown in Figure 3-3, that can relate to circularity in any sector, including the fashion industry.

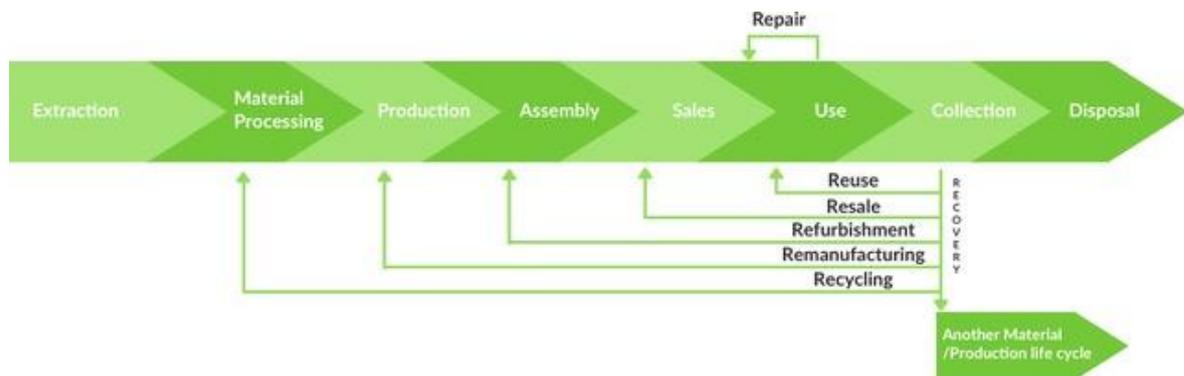


Figure 3-3. Circular system

Source: Own elaboration. Adapted from Ellen McArthur Foundation (2015a)

The Global Fashion Agenda, the institution that organize the CFS, declared that “the fashion industry can lead the transition to a circular system while offering new opportunities for innovative design, increased customer engagement and for capturing economic value” (Watson, Eder-Hansen, & Tärneberg, 2017, pp. 6). Creating such system would reduce the environmental footprint of making clothes, while also creating new business opportunities and increasing the security in the supply of fibres, considering the resource scarcity that we are going to face in the near future. Furthermore, it would help changing the perception that consumers have on

garments: from being disposable they could become items of value in the users' mind. To make this change happen, it is necessary to start creating products differently and start adopting a lifecycle thinking approach, in which all the product's impacts over its lifetime are considered.

### 3.4 The Lifecycle thinking approach

The main goals of a lifecycle thinking approach are “to reduce a product’s resource use and emissions to the environment as well as improve its socio-economic performance through its life cycle” (Life cycle Initiative, 2017). A lifecycle thinking approach involves the different steps that characterize the life of a product, from cradle to grave as espoused by McDonough & Braungart (2002). It includes the extraction of raw materials, production, packaging, distribution, use, maintenance, and eventually recycling, reuse, recovery or final disposal, and transportation in between the different stages.

Considering the whole life cycle of a product ensures that the designer or label is aware of all the environmental issues associated with its design outcome. To take into account the entire life span of a product, designers should go beyond the mere materials selection, and consider the relationship that consumers have with their garments. They need to first understand how clothes are used and discarded, and later develop garments that will bring new value in the system (Gwilt, 2013). For this reason they need a market and competitors’ knowledge defined as structured information about the market (Cillo, 2002, pp.8), so to be able to understand what the market is introducing and the right strategies that respond to what consumers want.

### 3.5 The product development process

According to the Delft Design Guide, “To design a product is to conceive the use of the product and to find a suitable geometrical and physico-chemical form for the product and its parts, so that the intended function, or functions, can be fulfilled” (TU Delft, n.d.). By providing functions, products satisfy needs and realise values. However, designing products usually deals with a variety of interests and stakeholders in the design process.

If we consider the product development process of a garment, usually we refer to designers as those that manage the design phase, and that have complete power to influence this stage. However, there are different roles that perform different tasks, all related to the “design phase”, which are identified by the green squared boxes in the Figure 3-4. The author has been able to map the process thanks to an interview with Cecilia Takayama, director at the Materials Innovation Lab of Kering Group, and Debora Tricarico, Junior Project Manager in the same Lab (personal communication, July 20<sup>th</sup>, 2017).

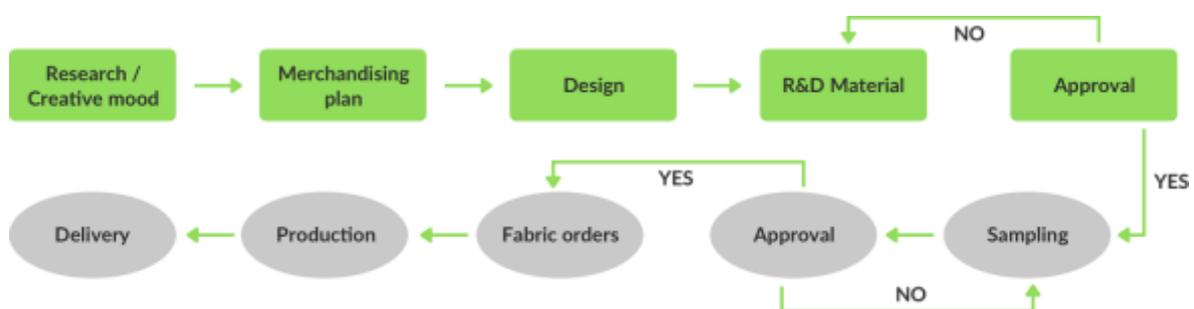


Figure 3-4. The product development process

Source: Own elaboration

Designers are not the only actors involved in the ideation phase. This is also confirmed by Dr. Anna Brismar, founder of Green Strategy, who states: “Design is not only about styles and

pattern making but also about the choice of materials. Generally speaking, there are designers, and then there are buyers. In a bigger company, you would have those tasks divided, so the designers will receive the materials chosen by the buyers. This is why sometimes the designers don't have the power to influence the choice over materials" (personal communication, June 26th, 2017).

When a seasonal collection is created, first the creative director decides the mood of the collection. After that, the merchandiser studies the trends and analyses the market to define the structure of the collection, which means he determines the number of pieces that will be produced and the price-range for each fabric that will be purchased and used. When the structure is decided, the R&D materials figure, or sourcer, whose role is to look for the materials that will be used in the collection based on the instructions received by the merchandiser, proposes the chosen ones to the designer. The design team sketches the final collection, and successively prototypes and samples are made. As soon as they are approved (for bigger labels this includes fashion shows and showroom sales), the fabrics are ordered, which will then be used for the production of the final collection, that we, as consumers, will find in stores after the delivery. This is a simplified reconstruction of the entire process, but it simply shows which actors are involved in the ideation process itself, so this means that there are different perspectives and different interests that might overlap when we considering the design phase.

This is what usually happens in bigger brands. When it comes to SMEs, especially in micro-and-small enterprises, all these roles are usually enclosed in the figure of the designer themselves, which most of the time is also the founder of the company. In other words, one figure that carries out different roles. Probably less influential on the entire system, this allows them more freedom to promote innovation within the single label. Indeed, compared to bigger companies that feel the pressure of various stakeholders, the owner-designer does not have to answer to shareholders or a board, and thereby has more power to implement the desired sustainability practices (ACCA, 2012). According to Fletcher & Grose, small design businesses can be effective change agents, because their smaller structure allows more adaptability and the test of new business models that collectively might influence mainstream culture over time (2012). This is confirmed by some interviewees, like Eric Roosen, owner of Star Sock, who states "It is easy because we are a small-scale company, where me as an owner, I can just make decisions by night. We don't have stakeholders to discuss about profit and loss balances [...] when you talk with owners of small companies, the change can be made in a flash" (personal communication, July 6<sup>th</sup>, 2017). This leads to another important consideration: initiatives created to increase the interest and uptake of sustainability in SMEs need to find the proper ways to engage owner-managers directly with a thorough understanding of their motivations, in order to be effective.

### **3.6 Eco-design and Sustainable design strategies**

According to James (1997), as reported by Oxborrow & Brindley (2013, pp. 356), eco-innovation means developing new products and processes that have a lower environmental impacts, but higher customer and business values. In the development of new products or re-creation of those already existing, the design phase can play a key role because it has the power to re-think how we interact with our products.

The so called Eco design Directive 2009/125/EC (European Commission, 2009) provides a definition of eco-design, which is "the integration of environmental aspects into product design with the aim of improving the environmental performance of the product throughout its whole life cycle". This definition is very similar to the one developed by Van Hemel & Cramer (2002, pp. 440): "by eco-design is meant the systematic and consistent strife for improving the environmental profile of product(s) in all stages of the product life cycle, including proper recycling and disposal". This study extends this definition from Eco-design to Sustainable

Design Strategies (SDS), which means that in the analysis also social and ethical aspects related to the product are included, as shown in Figure 3-5.

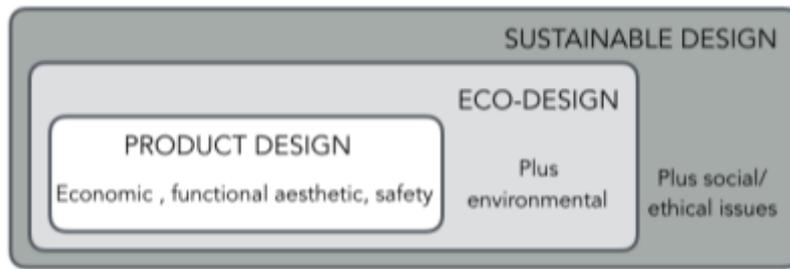


Figure 3-5. The relationship between eco-design and sustainable design

Source: Own elaboration. Adapted from Charter et al., 2001, pp.120

Various researchers have developed frameworks that propose design strategies which help guiding designers and showing them the multitude of practices they could use to green their products. Van Hemel and Brezet (1997) developed the Eco-design strategy wheel, also called Lifecycle Design Strategies, shown in Figure 3-6. The wheel presents 33 eco-design principles that describe possible solutions to improve the environmental profile of a product system, taking all the stages of its life into consideration. These 33 eco-design principles are clustered into 8 main eco-design strategies (van Hemel & Cramer, 2002), which are: new concept development, selection of low-impact materials, reduction of materials usage, optimisation of production techniques, optimisation of distribution system, reduction of impact during use, optimisation of initial lifetime, and optimisation of end-of-life system. All these strategies serve to minimize the impact of the product development on the environment: some strategies relate to the product component level, some others to the product structure level or the product system level.

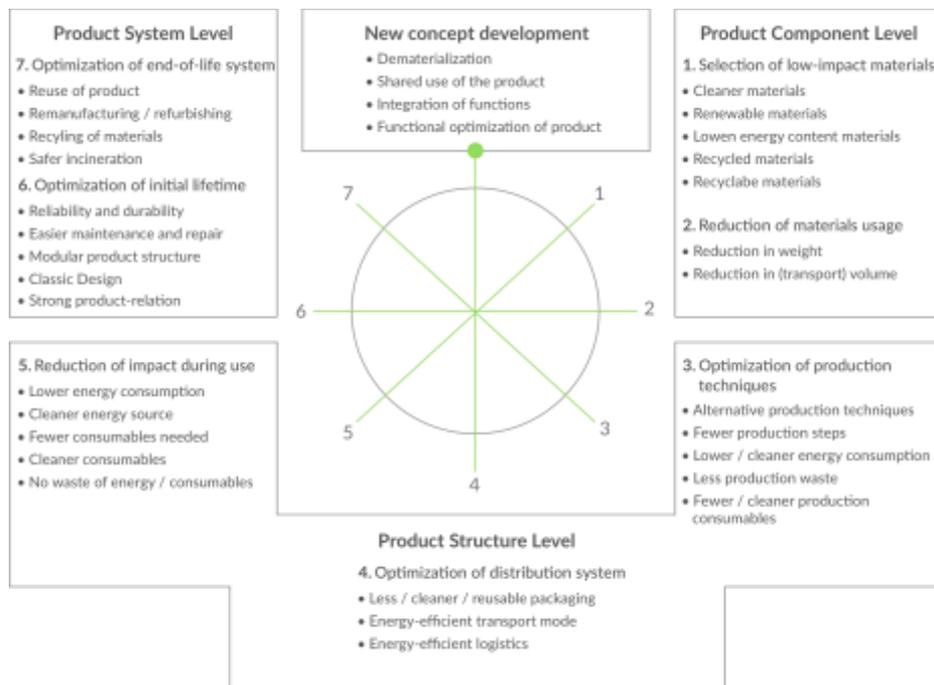


Figure 3-6. The Eco-design strategy wheel

Source: Own elaboration. Adapted from Brezet & Hemel (1997, pp. 139)

The Wheel describes general strategies that hypothetically could be applied by companies of any size in any sector. However, this research aims at analysing businesses that operate within the fashion system, and considering that this industry is not only responsible for various environmental impacts, but also several social aspects must be tackled, the author decided to create a tailored sustainable design strategy wheel for the specific sector under analysis.

In order to identify which are the main strategies in the clothing industry, two main researches have been used. The first one is Alison Gwilt's (2014) framework (Appendix III), whose uniqueness lies on the linkage of the SDSs to the various stages of the garment's lifecycle that they affect which are Design, Production, Distribution, Use and End-of-life. In her research, she maps extensively the process of how improvements could be introduced by designers. She highlights the importance for a designer to be knowledgeable of the lifecycle of his product, because this represents the first step in the integration of sustainability considerations. After defining that, it is possible to identify the key issues involved in each stage, in terms of inputs and potential outputs, and decide which one must be prioritized and addressed, and which SDSs should be preferred to achieve this goal.

The second framework that has been chosen to add content in the final one is the one developed by Textile Environmental Design (TED) (Appendix IV). Since 1996, TED has gathered researchers that have refined a set of practice-based SDSs that assist designers in creating textiles that have a reduced impact on the environment. They developed a framework called "The TEN", in which these strategies have been collected in 10 macro-areas, each one including various sub-strategies. The main difference compared to the previous one is the fact that they have not been related to the different garment's lifecycle steps. They serve as a guide – or toolbox – to introduce the different themes on which designers can influence the system, and being broadly defined, allow them to be used not only in the fashion industry, but also in other sectors.

### **3.7 A framework of SDSs in fashion industry**

For this research, a new framework is tested. It has been developed by using the Eco-design strategy wheel as the foundation, but to create a tailored framework for the fashion industry, the research conducted by Alison Gwilt and TED have also been used to expand on the original one.

The reason behind these changes is mainly to add clarity and precision. First, the author decided to use as the main framework the Eco-design strategy wheel because, even if the principles that optimize the end-of-life of a product are extremely important and must be considered, equal importance should be given to those principles that try to keep the product from reaching its end-of-life for a longer period of time, and this framework clearly address those practices. However, it is a general framework that SMEs operating in the plastic industry or the furniture industry could consider using, while for this study the author wanted to use a tailored framework for the specific fashion sector under.

One limitation of the eco-design strategy wheel in the case of this research, as the name suggests, is that it takes into consideration just eco-design principles. However, since it is the fashion system that has been investigated, the author believed it was necessary to take into consideration also the social aspects related to the garment production. This is the reason why the integration of the researches conducted by Gwilt and TED have been fundamental in order to gain more validity in the analysis. The framework is represented graphically in the Figure 3-7. Each box represents the main strategies applicable as SDSs, which are composed by different principles. The following sub-chapters present a detail description of these strategies, in what they consist and why they should be applied.

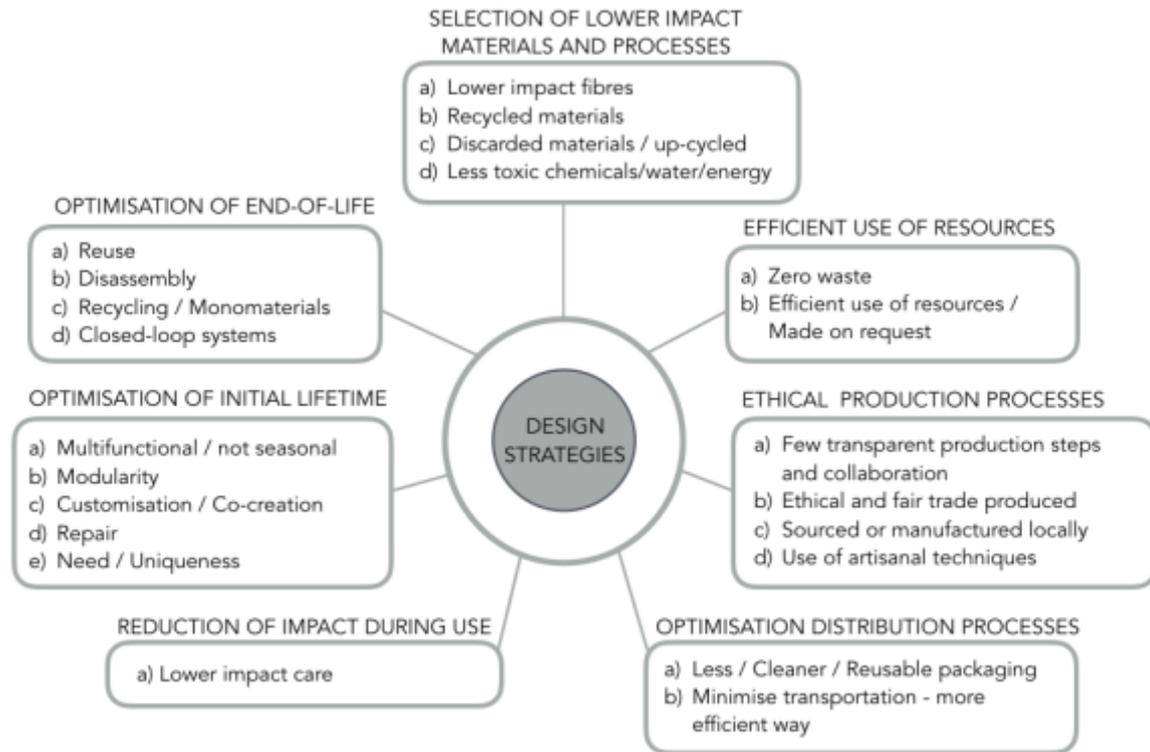


Figure 3-7. Framework of Sustainable Design Strategies

Source: Own Elaboration

### 3.7.1 Selection of lower impact materials and processes

Designers focus on research trends on the market and brainstorm on the messages that they want to communicate to consumers. The first step in the creation of a garment is the selection of the materials that will be used. So, first a prototype is created, and then when the sample is approved, it is ready to be produced.

The fibre production stands for around 10-20% of the total environmental life cycle impact of a garment, so deciding among different materials can lead to different impacts on our environment (Ross & Jönbrink, n.d.). Figure 3-8 gives an overview of the fibres that exist nowadays in the market. Based on the figure, we can see that the main categories of fibres are:

*Vegetable fibres.* These fibres are plant-based and this category includes cotton, linen, hemp, bamboo or coconut. Natural fibres decompose naturally through the action of fungi and bacteria – at least in theory. Indeed, cotton fibre is biodegradable, but a cotton shirt has other components that may not be. For example, sewing thread is often polyester, or even the dye used for colouring could represent an important issue to consider when fibre degrades and leaves this microscopic amount of dye in the soil (Patagonia, 2012). Moreover, depending on how fibres are grown, their impact might change: they can be organic and farmed in a cooperative, or grown using chemical pesticides and fertilizers. The use of pesticides poses many risks to workers, to organisms in the soil, to migratory species like insects or birds, and can pollute downstream freshwater (Truscott et al., 2013). Another important aspect to consider is also the amount of water used. According to Water Footprint Network (n.d.), cotton farming is considered to be the largest consumer of water in the apparel supply chain. The average water footprint of cotton fabric is 10,000 litres per kilogram, but it varies from place to place: indeed, while the water footprint of cotton fabric made with cotton from China is 6000 litres/kg, cotton from India is 22500 litres/kg.

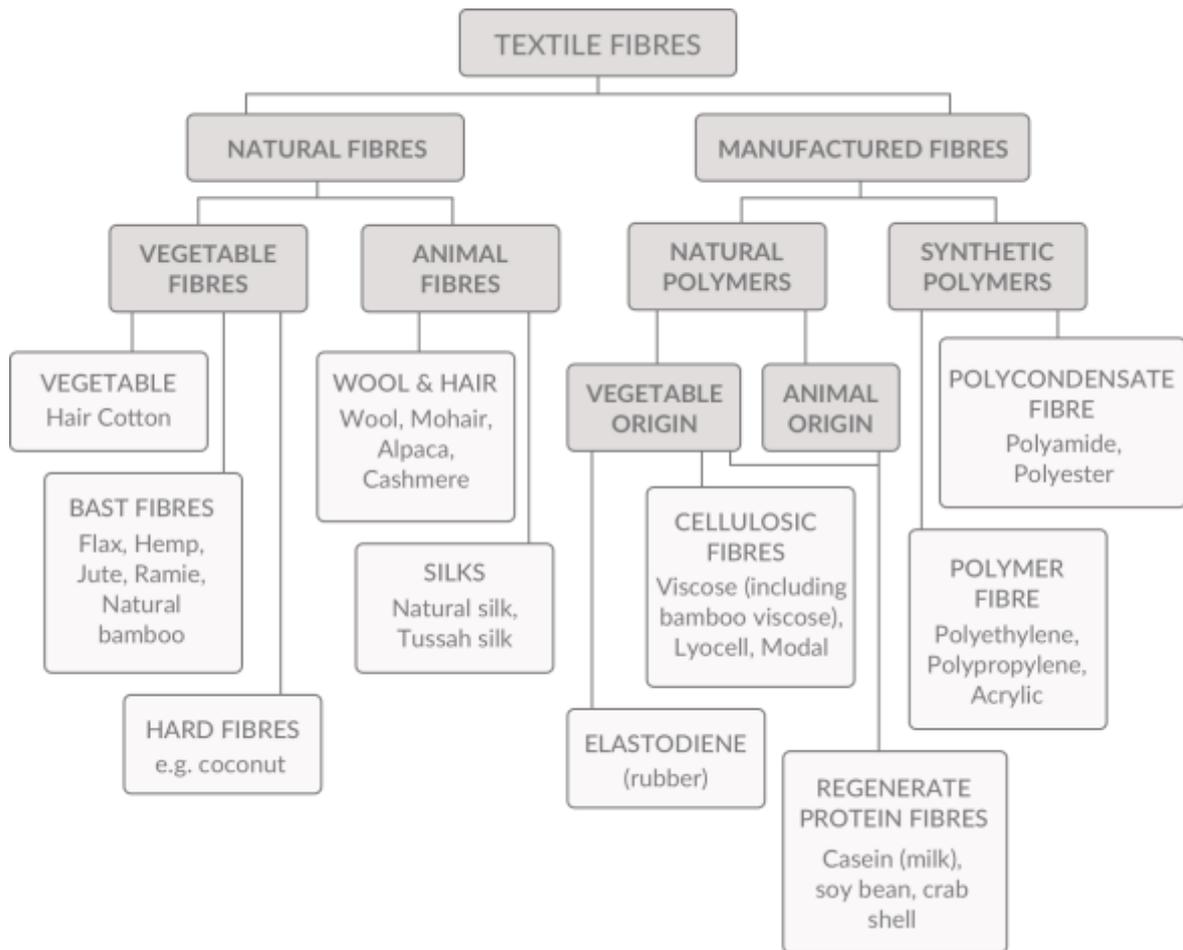


Figure 3-8. Textile fibres on the market

Source: Own elaboration. Adapted from Fletcher & Grose (2012, pp. 15)

*Animal-based fibres.* Examples are wool (from sheep), silk (from silk worms), cashmere (from goats) or alpaca. For these fibres, an important aspect to consider in their environmental impacts is the way farm animals interact with the land. Global wool production has been declining for years, but it is starting to stabilize now. The quantity of fibres produced per land unit from sheep is one of the lowest (Made-by, 2013), and for this reason if the demand increases, goats could damage the fragile grasslands ecosystem through over-grazing and the impact of their hooves on the soil (The Ethical Fashion Source, 2016a). This is what is happening in Mongolia or China, where the increased demand for cashmere led to land degradation (Ng & Berger, 2017)

*Semi-synthetic fibres* (derived from natural polymers). These materials come from plants that are chemically processed into pulp, and then extruded into fibres (Textile Exchange, 2016). It includes viscose, cupro, modal, lyocell (or TENCEL®). Among the environmental issues that should be taken into account, is the use of heavy chemicals needed to transform the hard wood into a soft fibre. The toxic and endocrine-disrupting chemical carbon disulphide is still used in the viscose industry, even if it has been linked to various health problems and illnesses ranging from Parkinsonism to heart attack and stroke (Changing Markets Foundation, 2017). The same goes for the use of sulphuric acid. Moreover, the NGOs Canopy estimated that millions of trees in endangered forests are cut in order to produce the viscose filament in Indonesian and Chinese factories, where deforestation is already spreading (Rycroft, 2014). Thus, even if most of the time are marketed as a sustainable fibres, it is essential to check the production facilities because it might not be so.

*Synthetic materials*, like polyester, nylon and acrylic do not exist in nature but are man-made. The characteristic of these fibres is that through an industrial manufacturing process, petroleum is transformed into fibres for clothing. Between 1980 and 2007, the year in which polyester overtook cotton as the world’s main fibre, the amount of polyester produced annually increased from 5.3 million tonnes to 30.9 million tonnes (M. Bain, 2015). Polyester is made of polyethylene terephthalate, also known as PET, and it is the same material used to make plastic bottles, so in the same way it contributes to the emissions of carbon dioxide as any other fossil-fuels based products. Moreover, the amount of water for cooling is considerable and it requires energy-intensive processes. Another relevant issue occurs during the washing process of these fibres, where tiny microplastics (<5mm), called microfibers, are released (Leonard, 2016). Patagonia sponsored a dedicated study in collaboration with the Bren School of Environmental Science and Management at the University of California (O’Connor, 2016). According to this study, during our washings, microfiber shedding per jacket ranged between 160 mg to 2,700 mg per wash (Bruce et al., 2016). Microplastics shed from both virgin and recycled polyester fabric, even though virgin polyester was found to shed more (1890 fibres per wash) than the recycled one (843 fibres) (Roos, Arturin, & Hanning, 2017). Microfibers can lead to death of marine animals and they easily get into our food chain and consequently they represent a threat for human beings, too. Some possible solutions have been studied like for example the Guppy Bag or the Cora ball, but they are start-ups that just completed the crowdfunding step, so it is yet nor possible to evaluate their effectiveness in tackling these problems. Last, but not least, synthetics do not decompose in landfills.

This brief introduction of fibres shows that there are various options on the market, and the choice that designers make in this phase can lead to different scenarios. To define which materials can be considered sustainable, the author used the Environmental Benchmark of Fibres (presented in Figure 3-9) developed by MADE-BY, a not-for-profit organisation with the goal of “making sustainable fashion common practice”.

**MADE-BY ENVIRONMENTAL BENCHMARK FOR FIBRES**  [www.made-by.org](http://www.made-by.org)

CLASS A	CLASS B	CLASS C	CLASS D	CLASS E	UNCLASSIFIED
Mechanically Recycled Nylon	Chemically Recycled Nylon	Conventional Flax (Linen)	Modal® (Lenzing Viscose Product)	Bamboo Viscose	Acetate
Mechanically Recycled Polyester	Chemically Recycled Polyester	Conventional Hemp	Poly-acrylic	Conventional Cotton	Alpaca Wool
Organic Flax (Linen)	CRAILAR® Flax	PLA	Virgin Polyester	Cuprammonium Rayon	Cashmere Wool
Organic Hemp	In Conversion Cotton	Ramie		Generic Viscose	Leather
Recycled Cotton	Monoel® (Bamboo Lyocell Product)			Rayon	Mohair Wool
Recycled Wool	Organic Cotton			Spondex (Elastane)	Natural Bamboo
	TENCEL® (Lenzing Lyocell Product)			Virgin Nylon	Organic Wool
				Wool	Silk

More Sustainable Least Sustainable

Figure 3-9. Ranking of fibres

Source: With kind permission of MADE-BY (2013)

The benchmark considers the production process of natural fibres and man-made fibres from the origin of the raw material to fibres ready to be spun. It does not include impacts in the following stages: fabric manufacturing, dyeing and finishing, garment making, distribution, the use phase or end of life nor material performance, durability and quality. According to what claimed by Made-by, “this benchmark focuses on the environmental performance of fibres and compares the most commonly used fibres in the fashion industry. It was designed as a tool to

help buyers and designers be more informed in their fibre sourcing decisions; and as a means to develop sustainable material strategies” (2013, pp. 3). This benchmarking uses “1kg of fibre ready to be spun” as functional unit. The parameters chosen for the evaluation are the following: Green House Gas emissions, Eco Toxicity, Human Toxicity (which have been allocated a weight of 20%), Energy input, Water input and Land Use (which have been allocated a weight of 13.33%). Each parameter was normalised and results were then aggregated so that fibres could be compared to one another and ranked; a category of “Unclassified” fibres have been added, for those that still lack of available credible data.

For this analysis, just fibres that are classified A, B, C will be considered as being sustainable, with one exemption which is Modal. According to Textile Exchange (2016), in 2016 the use of traceable Lyocell-TENCEL® and Modal® by Lenzing have increased. Indeed, one of the major supplier of Modal yarn in Europe is Lenzing, which produces this fibre from beech trees in PEFC (Programme for the Endorsement of Forest Certification) certified European forests, and chemicals, water, energy and effluent are managed during manufacturing. The various chemical and waste products resulting from Lenzing’s production process are recycled or sold. Today Modal is widely used in clothing as a replacement for cotton, and considering that Lenzing production system has been recognized for its environmental efforts, the author in this analysis has considered Modal as a possible sustainable fibre. However, this decision is just based on the assumption that the Modal used by European brands analysed is supplied from this company; consequently, SMEs that might read this research should not consider Modal a sustainable fibre without proper verifications on the processes used to produce this fabric.

Part of the “Selection of low impact fibres” strategy, are the following principles:

*a) Lower impact fibres.* Materials selection require compromises and it is up to the designer finding a balance among possible limitations due to availability of sustainable materials, price, minimum ordering requirements and consumer acceptance. For this principle, the author will consider: organic cotton, organic or conventional linen, organic or conventional hemp, Tencel or lyocell, ramie and modal. Organic fibres are considered to have a lower impact because they are grown without the use of pesticides or chemical fertilizers, indeed farmers mainly use natural pesticides and crop rotation strategies (Lakshmi, 2017). Moreover, due to crop rotation the soil of organic cultivations is rich in nutrients, so is able to retain water better. This is an important advantage, especially for fibres like cotton, which is known to be a water-intensive fibre.

Linen is created from the fibres that naturally grow as part of the flax plant, a plant that grows worldwide. It is created from a totally natural material, which means that it is completely biodegradable. Moreover, it can be grown on margin land. The same goes for Hemp, which is a renewable resource that grows faster than trees. Moreover, it is a high-yield crop, which means it produces more fibres per acre than cotton or flax, it is biodegradable and it does not require supplement irrigation (Trusted Clothes, 2016). Ramie is a plant mainly grown in China, Brazil and the Philippines. Even if it is biodegradable, the fibre extraction and cleaning is labour-intensive, and it is not considered a very durable fibre. The description of the cellulosic fibres has been provided in the previous section.

*b) Recycled materials.* According to the EU, “recycling means any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes” (Council Directive 2008/98/EC). There is a huge amount of textiles which end up in landfill every year, and recycling could represent one of the most effective ways to address this problem (TED, n.d.). If we consider the polyester fibre, the process of recycling can lead to the reduction of various environmental impacts. First, the process of converting PET into recycled polyester requires much less energy than producing virgin polyester: it

requires approximately 33-53% less energy, and it generates 54.6% fewer CO<sub>2</sub> emissions (TextileToday, 2010). Moreover, it diverts waste from ending up in landfill (which means less soil contamination, air and water pollution), and if not blended, it is a fibre that can be recycled over and over, even if reaching downcycling. Considering that cotton is reaching its peak, and the demand for oil is still increasing, recycling could reduce our dependence from these materials. However, recycling technologies still need a lot of improvements, and this issue will be further addressed in the Analysis section.

*c) Discarded materials/upcycling.* Used textiles or clothing upcycled into new products is an example of how apparel no longer in use can be transformed into a desirable product (TED, n.d.). Upcycling (or remanufacturing) refers to the reuse of a garment where its quality remains the same or is increased in the process. It can be done by using either pre-consumer or post-consumer waste, or a combination of the two. Pre-consumer waste results when items are manufactured, for example leftover fabric pieces from pattern cutting. Post-consumer waste instead, is the finished product that reached the end of its life for the consumer (Stewart, 2014). An example of this practice from a designer perspective could be the use of mill-ends or textile scraps to create a one-of-a-kind garment or accessory, or details that would make the product more unique (DeLong et al., 2013).

*d) Use of less toxic chemicals/less water/less energy in the process.* Chemicals are used in the entire process, but it is during the finishing stage of the textile production that the most impact occurs (TED, n.d.). Designers should consider using clean/better technologies, like ozone technology that replaces the use of bleach; utilize laser technology that replaces dyes adhesives; digital printing and artisanal block printing; and natural or low impact dyes. Even within this practice, appropriate material choice could be considered pertinent in the reduction of energy and water consumption (TED, n.d.). However, material selection will be excluded as part of this practice; just innovation that decreases the impact of a garment on water and energy will be considered, like using clean energies or recycling the waste water used in production.

### **3.7.2 Efficient use of resources**

In the way clothing is made, it is possible to identify various inefficiencies. Due to the typical fashion calendar, brands must place high-volume orders far in advance, often leading to exceeding the demand (Pulse of the Fashion Industry, 2017). This calendar comprehends from 2 to 4 collections per year, and what it is not sold can easily become waste. Fashion companies and retailers try to anticipate the demand, but considering the impulse-driven market that is the fashion industry, past consumer behaviour does not necessarily lead to a prediction of future behaviour (Danziger, 2017). One good practice could be the implementation of practices that would lead to efficiency, such as:

a) *Zero waste cutting.* Zero-waste design aims to create clothing patterns that leave less (none would be the goal) scraps of fabric on the cutting room floor, in order to minimize fabric waste (Rosenbloom, 2010). The cut-and-sew apparel process is responsible for 10 to 20% of fabric waste (Lawless & Medvedev, 2016). In this phase designers, together with pattern makers can develop new ways of conceiving clothing construction. Indeed, technology can provide new tools, but it is in creative mind of the designer (or who in charge) to come up with innovative ways (Fletcher & Grose, 2012). Adoption of some zero-waste techniques could mean for example the design of pieces that fit perfectly into the shape of the fabric, with gussets, pockets, collars and trims that create a puzzle, or the use of laser cutting technology. Ultimately simply not cut the fabric, but drape it directly onto a mannequin, then tuck, layer and sew, is another solution currently investigated (Rosenbloom, 2010).

*b) Efficient use of resources / Made on request.* The goal is to respond to actual needs, instead of fleeting wants. It promotes a slow fashion that slows down the currently rhythms of fast fashion, and reduces the overproduction of unnecessary products (Gwilt, 2013). Likewise, the Pulse of the Fashion Industry report (2017, pp. 73) identified “production-to-demand” as a key lever in changing the fashion industry, with immediately implementable solutions in terms of reduction in overproduction and markdowns. One example could be represented by the initiation of the production of the garment itself once the garment is ordered by a customer, also called made-on-request.

### **3.7.3 Ethical production processes**

This phase of the process can take place anywhere in the world, even far away from where the ideation process happens and the brand is based. The global garments-trade is worth more than EUR 2.86 trillion and employs over 75 million people, most of whom are female (European Parliament, 2017). This sector’s supply chain is considered among those with the highest risk of violation of human rights and people’s dignity, which is the reason why the significant impact of this phase should be considered from the beginning of the process. As reminded by Lucy Siegle, fashion journalist, “Fast fashion isn’t free. Someone, somewhere is paying” (Bezzant, 2017). Especially after the Rana Plaza accident happened in Bangladesh in 2013, in which 1,134 people died and hundreds were injured, companies around the world had to face the hidden reality of the fashion world: the lack of workers’ safety and rights. For a sustainable brand, it is mandatory to verify that garments are produced not just sustainably in terms of the environment, but also ethically.

Part of this strategy includes the following principles:

*a) Few and transparent production steps and collaboration* – As mentioned, nowadays it is becoming more and more important for a company to be transparent on its products. In 2015 Elite Daily and Forbes released a study on 1,300 millennials: 75% of the people interviewed believed it is important for a company to give something back to society, not just make a profit, and especially being transparent about that (Schawbel, 2015). Obviously, transparency in supply chains can be difficult to achieve, especially when they are long and global. When supply chains are defined as “global”, it means that the different activities (from the raw materials to the end-product) can take place anywhere in the world, and this is the reason why companies lose control over their supply chains.

On May 19<sup>th</sup>, 2017, the European development ministers called on the Commission to promote basic labour and environmental standards in the textile sector of developing countries, through the EU flagship initiative on the garment sector (European Parliament, 2017). The main requests of the resolution relate to:

- Enforce and ensure decent work and social standards;
- Promote consumers’ information tools, and promote new labelling schemes;
- Increase traceability in garments’ supply chains. In fact, we, as citizens, are most of the time completely in the dark when it comes to the conditions under which our clothes are produced, both from a social and environmental perspective.

To achieve this, technology can help. Indeed, Martine Jarlgaard, designer based in London, reported in an interview with Rachel Arthur, “When I think about our world and outsourcing now, we’ve gained a great distance to how things are made. [...] Technology will be what helps to reconnect us to the people and the places involved, and that information will increase consumer expectations, which will put more pressure on the big companies”. Martine in 2017 launched a new initiative within the garment industry that uses blockchain technology to enable

transparency and trust. Thanks to a partnership with company Provenance, consultancy A Transparent Company and London College of Fashion's Innovation Agency, she has been able to track each step of her process from raw material through the supply chain to the finished garment. The future development of this technology could lead to it being considered a standard in the industry.

Moreover, some SMEs might not have the power to influence their suppliers and demand for more transparency. Indeed, very often small companies operate in a situation of supplier dominance (Appendix V). What these companies should aim at in the development of their product is what Cox defines as non-adversarial collaboration (2004, pp. 353) "where the exchange partners operate in a transparent operational manner with long-term relationship commitments and share any resulting commercial value equally", even if, because of their limited power, it can be difficult for them to achieve this goal.

*c) Ethical and fair trade production.* Designers can encourage an ethical production that supports people, their values and skills and combats widespread poverty. Fair Trade means that workers are paid fair wages in order to respect the minimum liveable wages, safe conditions for workers are guaranteed, women and children's rights are ensured, and that the goal of these trade partnership is the creation of a product, but also the empowerment of people in the local community, so it addressed the injustices and discrimination of conventional trade (TED, n.d.). According to Smith (2011), it was only in 2001 that the main actors involved in the discussion of Fair Trade agreed on the following definition: "Fair Trade is a trading partnership, based on dialogue, transparency and respect, that seeks greater equity in international trade. It contributes to sustainable development by offering better trading conditions to, and securing the rights of, marginalized producers and workers – especially in the South. Fair Trade Organizations, backed by consumers, are engaged actively in supporting producers, awareness raising and in campaigning for changes in the rules and practice of conventional international trade" (FTAO, n.d.)

*d) Sourced or manufactured locally.* According to DeLong, "designing locally is about developing greater sensitivity to place where communities are sustained and jobs are supported". This practice promotes products that suit local culture and use the skill sets of people in the community (DeLong et al., 2013). There are various advantages for a company to keep its production more localized. Using local production can minimize carbon-footprints – by simply removing from the equation the need for long-distance transportation. Future designers need to know everything about their products, and domestic manufacturing allows small brands to visit the factories in which the garments are produced, and also inspect the quality of the production. Likewise, in consideration of European regulations, it is also very probable that factories located in Europe have a better eco-profile because of the current stringent laws that regulate emissions and chemicals use (example of REACH). Another important reason, especially for small brands whose target consumer group might be localized too, is that localized production can help to shorten lead times and costs.

Moreover, it could also be considered a viable market strategy because of a matter of trust. According to some research made on consumers' psychology, the country of origin of a product influences the final choice of consumers, because of some predefined stereotypes. Similarly, as the concept of sustainable fashion has been mainly perceived as "un-fashionable" and catered only to those with a "hippie" style, often the "Made in Italy" label is considered to be well-made and higher quality when compared to a "Made in China" label (Fauci, 2016).

*f) Use of artisanal techniques.* Mass consumptions means mass production, which means industrialized processes (The Ethical Fashion Source, 2016b). This practice aims at

reintroducing an artisanal dimension: a return to a craft-based economy (McGuirk, 2011), where imperfection means uniqueness, and skills of artisans adds higher value. Artisans in this context can mean independent craftspeople making products, networks of artisans or cooperatives and social enterprises operating with small-scale factory units or across whole communities. Even UNESCO has included the “knowledge and skills to produce traditional crafts” as part of the Intangible Cultural Heritage that has to be preserved worldwide, because considered “an important factor in maintaining cultural diversity in the face of growing globalization” (n.d.).

### 3.7.4 Optimization of distribution processes

The clothes produced are then distributed to retailers or delivered directly to consumers, depending on the brand policy and offering. This strategy includes some of the following principles:

*a) Cleaner / Reusable packaging.* This practice consists of a more conscious use of packaging. Currently 95% of makers wrap individual garments that has to be shipped by using single-use plastics (Lawless & Medvedev, 2016). One possible solution that could be adopted is the use of biodegradable materials or the creation of packaging that could be easily reused by the consumer.

*b) Minimize / optimize transportation.* This practice can obviously be considered also from a logistics point of view: for example, deciding to ship by boats have a lower impact if compared to airplanes. Indeed, as reported by Lucy Siegle (2014), “A Defra study concludes that 2 tonnes of freight carried for 5,000km by a small container ship creates 150kg of CO<sub>2</sub>-eq (a measure of relative global warming potential) compared to 6,605kg of CO<sub>2</sub>-eq if the freight is carried by plane for the same distance”. However, this is not necessarily something that relates to the product creation, but it relates more to the business model that has been set up. Selling products within the geographic range where they are created would inevitably minimize transportation. Moreover, designers could create flat pack products, that can be stored flat to maximize use of transport/storage space (Gwilt, 2013).

### 3.7.5 Reduction of impact during use

After purchasing the garment, the user interacts with it. Depending on the emotional bond created, the user might take good care of the garment, extending its lifespan. Vivianne Westwood, British designer engaged with various social movements, reminds us “Buy less, choose less, make it last”. This strategy aims at taking into account consumer’s behaviour in relation to the impacts of washing, tumble drying and ironing (European Commission, 2014). Part of this strategy involves the following principles:

*a) Lower impact care:* Fletcher & Grose state: “The realization that most impacts associated with a garment occur in the laundry suggested that one of the most influential sustainability strategies would be to change how people wash and dry clothes” (2012, pp.60). If all citizens in UK started to wash their clothes at 30°C instead of 40°C, just this preventive action would save 12% of the energy currently consumed on washing clothes annually (Bain et al., 2009).

To influence and educate consumers, designers could insert garment labels that suggest washing at lower temperature, like Mark and Spencer that uses the slogan “Think Climate, Wash at 30°C” in their labels. Designers could also decide about using quick drying fabrics, in order to avoid the need of using tumble dryers. And lastly, information on the number of washes the garment can take and still look good should be included, in order to show consumers how they can extend the product’s lifecycle (Niinimäki & Hassi, 2011). However, the creativity of designers should not be limited: another practice that has been investigated is designing for creases and

wrinkles, which for example eliminate the need for iron. This is just an example that proves that depending on the need, especially in this industry, creative solutions can be explored and found.

### 3.7.6 Optimization of initial lifetime / Longevity

According to some statistics, the average lifetime of a garment is approximately 3 years (LeBlanc, 2017), resulting in the industry as a whole producing an estimated 12 million tonnes of waste a year (EASME, 2015). The main issue, as described by Fletcher & Grose (2012, pp. 85) is that “the limited presence of meaning and empathy in so many commodity fashion products, combined with their low cost and ease of purchase, is a key factor in them being discarded long before they are worn out”. It is important to find ways that allow the extension of the product lifespan, because according to some statistics, by extending the average life of clothes by nine months, the carbon, water and waste footprints could be reduced by 20-30% (Deda, 2016). It is important that brands apply a lifecycle thinking approach when developing their products, and consequently create products that once reached their end-of-life can find their way back in the loop; however, even more important, it is to investigate ways that will avoid those products to reach their end-of-life, especially prior their time. Thus, this strategy includes the following principles:

*a) Multifunctional / not seasonal* - Only a few decades ago there were two collections per year (spring/summer and autumn/winter), but today fast fashion brands can present a new collection in stores every two or three weeks (BSR, 2012). This principle aims at creating designs that are considered to be timeless and not dependent on seasons, because of the colours selection, the minimalistic or classical style, or simply because they can be used in different occasions (Niinimäki & Hassi, 2011). Designers aim should be making good quality fashion, that will be used over a long time, with robust materials and able to “age well” (Fletcher, 2016). In order to achieve this, firstly designers have to understand what is needed for a garment to be durable, and secondly it is important to understand consumers’ expectations of durability in relation to the garment design (Gwilt, 2013).

*b) Modularity.* A modular structure means that the product is composed of different detachable parts: it allows consumers to upgrade the product or personalize it according to their own tastes or new trends - for example by selecting particular colours, fabrics or prints (Niinimäki & Hassi, 2011). Zippers, buttons, velcro, or other ways to connect different parts together could be used: this allows the design to be modular, however, if the goal is to be circular, it might not necessarily be suitable because of the different materials that might be needed. In adopting this practice, the designer also must take into consideration consumer behaviour, purchasing habits and social coding, in order to anticipate how the user will interact with the garment and how the wearer usually refreshes its wardrobe. By applying this practice, it could be possible to extend the lifetime of a product, because it gives the possibility to buy new or spare parts and change an item when a piece is broken or not desired anymore.

*c) Customization / Co-creation.* The co-design approach enhances the participation of the user in the design process (Fletcher & Grose, 2012). As Chapman (2005) points out, products that can be customizable offer the chance to create a deeper bonding with the user and consequently lead to an extension of the product’s lifespan. If you create something, you are more likely to become attached to it and less persuaded by current trends resulting in a lower environmental impact. One example of this practice could be represented by kit-based products, or those products that are created by the consumer himself, by using his own creativity. Obviously, there are various challenges that can be faced in the application of this practice. As explained in the report presented by Circle Economy for Sitra (2015), “In contrast to a mass producer, whose focus is on identifying common tendencies so that he can target those needs with a limited

number of standard products, a mass customizer must actively map the idiosyncratic needs of its consumers”.

*d) Repair* – Thanks to this practice, garments are diverted from landfill just because they might have a broken part. Moreover, the possibility of having a loved item repaired can have a priceless value for some consumers. Textiles became low-quality and abundant just in recent years; in the past garments were highly valued items that were carefully maintained by the user both because of their cost and also their scarcity. Different techniques were applied to prevent damages such as patching or edging worn sections, including braid to hems, headlines or cuffs to avoid fraying, and even using large hems so they could be easily repaired. Designers could start re-applying those techniques, but consumers should play their part too in being willing to repair items and pay the price. This practice could also explore methods that encourage wearers to engage in repair work (Lockton, 2013). It is a practice strictly linked to modularity, but it could also include the provision of additional materials, such as extra fabric or matching threads together with instructions, in order to facilitate this process (Gwilt, 2013).

*e) Empathy / Uniqueness* - Niinimäki & Hassi state “the objective of empathic design is to build on a deeper understanding of the individual consumer’s needs and values” (2011, pp.1879). It means being able to design products that are meaningful to the user, and consequently they become less dischargeable. The designer should understand the emotive relationship of the wearer with the clothing, and look for an emotional response. One example is for the user to perceive the garment has been unique or exclusive. According to DeLong, currently the marketplace is offering excessive sameness, and this is causing consumers to look for distinction elsewhere (2013). The uniqueness that consumers are now craving could be provided by small sustainable fashion designers (Ferla, 2012).

### **3.7.7 Optimization of end-of-life**

After using the garment, the user typically will dispose of it, and even if more textiles are being collected for recycling, clothes are mainly discarded alongside general household waste. Since the late 1980s, the lifespan of products has decreased. As highlighted by the European Environment Agency (2017, pp.20), “when producers focus on selling products at high volumes and are not financially rewarded for selling long-lasting products, this automatically leads to shorter lifespans. Some even claim that planned obsolescence is used to drive the market for new products”. It is important that brands and designers start considering what will happen to their clothes when reached their end-of-life, from the ideation phase. This strategy aims mainly at avoiding that some useful resources become waste by keeping the value inside the system. This strategy includes the following principles:

*a) Reuse / Take-back system* – According to Gwilt (2013, pp. 141), the idea is to “begin to design garments for reuse until they have gone beyond repair”. While with recycling, the quality is lowered, reuse overcomes this barrier. However, currently the problem with this practice is that the availability of good-quality garments feasible for reuse is scarce and outweighed by high volumes of poor-quality garments. An important aspect could be the return of the product after the use phase, in order to keep the value inside the system and give the garment new purposes (Niinimäki & Hassi, 2011). If producers ideated the product from the start having the reuse in mind, they would probably also know better how to upgrade and reuse their own creations. However, it is necessary to mention that building up a take-back system requires an infrastructure to be put in place, meaning also an investment of human and financial resources.

*b) Disassembly.* This practice allows each elements of a product quick disassembly and reassembly (TED, n.d.), and increases both the recyclability and the reuse of some materials. Strictly linked

to the design for modularity practice, this goes one step further because pieces should be easily disassembled, even by the user himself, in order to allow proper recycling.

*c) Recycling / Mono materials.* When dealing with recycling, it is necessary to mention that depending on the fabric and the garment, recycling technologies can be varied. Thus far, one of the major challenges for the textile recycling has been how to separate blended fibres and separate dyes and other contaminants from original fibres, in order to recycle them according to their specific characteristics (Gould, 2015; McGregor, 2015). Currently fibres can be recycled through chemical or mechanical processes, and the separated fibres can be remanufactured and used for acoustic or insulation products, or as padding for mattresses. However, even if the reuse of otherwise discarded materials is good, the original value of the product is downgraded (Gwilt, 2013). The problem is that the use of blended fibres by producers is increasing, and so more fibres are getting downgraded, because current recycling technologies are still limited in their possibilities (even if there are some innovations that try to tackle this issue and will be further discussed in section 5.5). As a producer, it would be possible to overcome this limitation by using mono materials. According to Gwilt (2013, pp.66), “by using an uncontaminated mono-material – a fabric of a single fibre type – in a garment’s production, there is a greater opportunity to successfully engage in recycling”. The ability of the designer in applying this practice is to explore the variety of techniques and processes that can alter the appearance of a mono-material garment, without changing the composition. Designing with recyclability in mind indeed allows to waste less resources at the end of the process.

*d) Closed-loop system.* According to Jeffrey Hogue, Global Sustainability Officer of C&A, the fashion industry should move towards a circular system, which means “designing, developing and producing products with their next use in mind; extracting the maximum value from garments while in use, then recovering and regenerating products and materials at the end of use to give them another useful life” (C&A, 2017). This practice includes those actions applied by enterprises that allowed them to build a “circular brand”. This means a brand that is responsible for its product even when it will reach its end-of-life through take-back systems, and also includes in its business model the possibility of keeping the value of this product inside the loop, by for example re-manufacturing it into something new.

### 3.8 Barriers and drivers for sustainable SMEs

The scientific articles included in this review are both research papers based on case studies (selected through geographical scoping or sector scoping) and literature reviews of previous studies. This review can be defined as integrative: compared to descriptive reviews which focus on the methodology, findings, and interpretation of each reviewed studies, integrative reviews attempt to find common ideas and concepts from the reviewed material (Khoo et al., 2011). The aim is to create a general theoretical framework that synthetizes all the main categories of barriers and drivers that SMEs face when dealing with sustainability. Based on this literature analysis, categories have been defined deductively. This deductive category system served when analysing the interviews, in order to identify which barriers are mainly faced by brands in the fashion industry and define if they are common to other sectors. As it is often the case when dealing with a dichotomous issue, in this instance barriers and drivers towards the implementation of environmental practices in SMEs, barriers can be turned into drivers and conversely drivers can become barriers.

Hudson, Lean, & Smart, (2001, pp. 806) give a straightforward definition of a typical SME, which seem to be characterized by “limited resources, limited cash flows, few customers, a firefighting mentality coupled with an emphasis on current performance, and potential staff turnover coupled with a flat organizational structure”. Thus, this structure can present several difficulties in the implementation of sustainability aspects at product level. Mainly financial

obstacles, lack of incentives, lack of time and lack of technological know-how, have been identified in the literature as the most significant challenges that SMEs need to overcome. The market could represent a big potential to encourage environmental action; however, according to Vasilenko & Arbačiauskas (2012), various studies show that SMEs most of the time perceive the market more as a barrier than a driver for good environmental practice.

A description of the different issues that can represent a barrier or a driver for SMEs is provided below, and it is also shown graphically in Table 3-1. Due to the dichotomy that characterizes this issue, the first and third columns represent respectively the barriers and drivers identified in the literature, while the middle column represents those aspects that if absent represent a barrier for a company. Whereas if present they will push the enterprise towards more environmentally responsible practices.

*Table 3-1. Barriers and Drivers for SMEs introducing sustainability*

MAIN CATEGORIES	Barrier	Can be both, a barrier or a driver	Driver
COMPANY CULTURE AND VISION	Improper communication	Owner/manager commitment	Employees commitment
	Short-term vision		
FINANCIAL CONSIDERATIONS	Lack of financial resources		Competitive advantage
	High initial capital costs		Possible costs reduction
	Lack of bank financing		
	No clear economic returns		
GOVERNMENT SUPPORT AND TOOLS	No available tools	Funding	
		Taxation policy	
		Laws and regulations	
INFORMATION AND AWARENESS	No info on the benefits	Collaboration among actors	Available training and courses
	Lack of knowledge on the regulations		
	Inadequate information		
RESOURCES AND TECHNICAL KNOWLEDGE	Lack of time		
	Lack of human resources		
	Lack of qualified personnel		
MARKET		Market characteristics	
		Suppliers' requirements	
		Consumers' requirements	

### 3.8.1 Company culture and vision

The owner or the manager of a company can have significant power in the strategic decisions and direction of the organisation, because some managers could have a positive inclination towards green businesses, and this can shape the company's attitude towards sustainability (Rizos, Behrens, Kafyeke, Hirschnitz-Garbers, & Ioannou, 2015).

Some SMEs may adopt the approach of “not my responsibility” towards the negative consequences that their businesses might have on the environment (van Hemel & Cramer, 2002). Because they consider themselves to be small companies, they might not perceive sustainability as something relevant for their businesses, but more as a duty for bigger companies. Van Hemel & Cramer (2002) believe that this idea has also been spread by environmental action groups who have always exert external pressure and focus attention on larger companies to introduce eco-design, not considering SMEs and their collectively high environmental impact activities. SMEs might not see the need to act in a more environmentally responsible way, and this obviously can represent an important barrier in their adoption of sustainable design strategies, because it won't allow owner-managers or employees to understand the need of proactively undertaking environmental improvements (Walker et al., 2008; Parker et al., 2009). Moreover, the company culture can also result in improper communication structures (Aghelie, 2017), that can cause “a mismatch between views and objectives of managers and skilled workers within firms implementing environmental design changes” (Oxborrow & Brindley, 2013, pp. 361). Another characteristic of many SMEs is that they tackle problems just when they are forced to (Vasilenko & Arbačiauskas, 2012). This trait of short-termism, that is inherent in SMEs, is in conflict with the need of sustainability, which most of the time requires long-term vision, strategic planning and lifecycle thinking.

However, as previously mentioned, some managers or owners, due to their personal knowledge can also represent an important driver (Rizos et al., 2016). Various entrepreneurs claim to be personally motivated, but they might lack the resources necessary to implement long-term changes (Cassells & Lewis, 2011). Even when the manager's commitment is weak, the employees commitment, especially in smaller companies, can represent an important incentive for a company to implement changes (Aghelie, 2017).

### **3.8.2 Financial issues / aspects**

The lack of financial resources has been extensively cited in the literature as one of the main barriers in the adoption of sustainability practices by SMEs (Tilley, 1999; Vasilenko et al., 2011; Marin et al., 2015). According to Rizos et al. (2016, pp. 3), “shifting from a linear to a circular production/business model requires activities such as distribution planning, inventory management, production planning, and management of a reverse logistics network, requiring a substantial amount of time and investment on the part of the company”. Every enterprise worries about not exceeding the costs, but when it comes to SMEs who are even more vulnerable on the market, the costs they have to sustain for investments and the anticipated pay-back period are particularly relevant (Walker et al., 2008; Rizos et al., 2015). Consequently, the shift towards more sustainable practices that require high initial capital costs can be difficult, especially if SMEs experience the issue of limited access to finances or risk capital (Oncioiu, 2015; Aghelie, 2017). Indeed, when it comes to bank financing, SMEs could face challenges in obtaining the collateral or guarantees required by banks (Rizos et al., 2015).

Becoming more environmentally responsible is mainly perceived as a cost, also because there is no clear evidence of the possible economical gains and returns on the investments (Walker et al., 2008; Aghelie, 2017), and it could even be perceived as a commercial disadvantage (van Hemel & Cramer, 2002). Vasilenko & Arbačiauskas (2012), in their study of Lithuanian SMEs, observed that 50% of SMEs that never dealt with any sustainable innovations considered the lack of financial resources as one of the major obstacle, compared instead to 34% of those SMEs that already had implemented at least one sustainable innovation during their green journey. This could be explained by the fact that effective costs, both direct and indirect, of implementing sustainable actions, can be lower than expected by most of the companies, but they do not have a clear idea of what sustainability means and might require from companies.

On the other hand, introducing sustainability can be perceived by some companies as being financially attractive (Rizos et al., 2016), especially if sustainability characteristics can improve the company image and recognition, and transform it into a competitive advantage through a USP (unique selling proposition) (Vasilenko & Arbačiauskas, 2012). This can be considered as an important driver for the implementation of sustainable innovations, together with the possibility of cost reduction (van Hemel & Cramer, 2002).

### **3.8.3 Government support and available tools**

Another important barrier that has been explored in the literature is the lack of government support and enforcement (Oncioiu, 2015; Aghelie, 2017). The current challenge for governments is to make environmentally responsible practices become an extremely important core activity (Walker et al., 2008). SMEs need from the government support mainly through the provision of:

a) funding opportunities: there are limited financial incentives to support green sustainable projects, while their provision would offset the costs (Parker et al., 2009; Rizos et al., 2016; Aghelie, 2017);

b) effective taxation policy: taxes or charges can be introduced to increase the short-term benefits of environmental improvements, because they help discouraging negative environmental impacts by making it financially unattractive (Parker et al., 2009). Tax incentives can also be used to foster change, because usually SMEs respond to legislation only to stay within compliance level, rather than aim for “best practices” (Walker et al., 2008). Some kind of financial mandatory support from the government in the form of soft loan or lower tax rate for businesses that show some kind of green business ethics, can foster the adoption of sustainable practices (Vasilenko & Arbačiauskas, 2012; Aghelie, 2017);

c) laws and regulations: these should be extensive enough to force SMEs to engage in environmental improvement. The lack of a strict legislative framework can often influence SMEs’ perception on the need to integrate green solutions into their operations (Rizos et al., 2015);

The absence or presence of the above-support, can be considered as a barrier but it can also become an important driver for companies (Rizos et al., 2016). Indeed, if present, specific regulations can send a clear message to the market and small firms on the environmental standard that they should aim to reach in order to meet legal compliance (Oxborrow & Brindley, 2013). Moreover, if businesses do not see that governments take the lead on environmental issues and consider them as a priority, it is unlikely that companies will act differently (Walker et al., 2008). Legislation can provide a level playing field, as stated by Tilley (1999, pp. 242) “a major concern for small firms are the possible unjust benefits that could accrue to free riders and cowboy operators who flout their environmental responsibilities. Properly enforced legislation reduces the occurrence of illegal operators”.

Another obstacle that SMEs face, is that there is a general inadequate institutional structure that tend to prioritize bigger companies over SMEs: even the tools for environmental improvements available on the market are conceived for larger companies, and consequently they do not take into consideration the needs of the SMEs sector, while they should be adapted to their size and type of enterprise (Ammenbergh & Sundin, 2005; Rizos et al., 2015). For example, environmental management systems such as ISO 14001 and Eco-Management and Audit Scheme (EMAS), are mainly designed for large businesses, because implementing and maintaining these systems can be expensive (Walker et al., 2008). Another example is the Higg Index developed by the Sustainable Apparel Coalition, a self-assessment tool that allows brands to measure their

environmental, social and labour impacts, while also identify areas for improvement. Even if this tool has been ideated for being applicable for any-size company, during the CFS, it revealed its weaknesses for SMEs application, and during the press conference, the organization claimed that they are actually working on developing a new one that will be SMEs-tailored.

#### **3.8.4 Lack of information and awareness**

Something else that can hinder the improvement of a company's environmental performance is the lack of information about the real benefits (van Hemel & Cramer, 2002; Pimenova & van der Vorst, 2004; Oncioiu, 2015; Rizos et al., 2016), and also poor eco-literacy and awareness of the situation (Tilley, 1999). Lack of awareness lead to an inevitable lack of motivation. Tilley believes that (1999) managers and employees of small firms need the opportunity to develop their own environmental knowledge. This would help them to become more engaged in the environmental debate, to better tackle their environmental problems and to find appropriate solutions.

Many SMEs' owners are not aware of the relevant regulation concerning their own businesses (Aghelie, 2017), and this is why governments should find ways to support them. They lack the specific knowledge and capacity to comply with the necessary requirements. Consequently, they have to rely on external consultants to meet their obligations, which represents an extra cost (Rizos et al., 2015). Moreover, according to Marin et al. (2015) there is a lack of external information, intended as collaboration and cooperation with research organizations and other actors that would lead also to a technological lock-ins. Walker et al. (2008, pp. 21) state "trade and business associations are also important and may be the missing link in communicating environmental issues to the small and medium enterprise sector". Associations, which have direct contacts with SMEs, have the ability to relate to them on a more direct and similar level.

The fact that SMEs do not have easy access to assistance and educational programs, creates challenges for acquiring sufficient knowledge to engage in environmental improvements, whereas training would be extremely important (Parker et al., 2009). The establishment of available courses-consultancies provided by the government (Aghelie, 2017) or a reference point to which SMEs can turn to for support (Rizos et al., 2016), could facilitate the journey of companies that want to get involved with sustainability. Moreover, even if the information is provided, it must be adequate and targeted to the correct audience: the use of inappropriate language, either too technical or too academic, can lead to confusion instead of adding clarity (Walker et al., 2008). One example is provided by Rizos et al. (2015, pp.8), who found out that "SMEs are generally not very familiar with the term circular economy and for example recognise other terms better, such as resource efficiency and green economy".

#### **3.8.5 Lack of resources (human and time) and technical knowledge**

Apart from the direct financial costs, there are also indirect hidden costs such as human resources and time that businesses need to devote when engaging in a sustainable innovation development process (Parker et al., 2009; Rizos et al., 2015). Indeed, as argued by Salavou & Avlonitis (2008, pp. 970) to establish more innovative products there is the need to devote greater efforts and resources. However, because of their inadequate resources and difficulties in allocating them, it is not affordable for SMEs to do some activities such as monitoring and reporting environmental performance data which is relevant for effective green business practices (Rizos et al., 2016; Aghelie, 2017). This is also linked to a lack of time, which revealed to be a crucial factor for SMEs. According to Vasilenko & Arbačiauskas, (2012), more than 40% of the SMEs surveyed have indicated this as one of the main obstacles.

Moreover, environmental responsibilities are often left to the director or manager of the company, mainly because there is not a specific person in the company that takes care of the environmental issues, or because they are not considered important enough to be delegated. Due to that, sustainability is not considered as a priority because the manager has to manage other responsibilities and does not have enough time to acquire the necessary knowledge (Parker et al., 2009), resulting in the postponement of environmental considerations (Pimenova & van der Vorst, 2004; Oxborrow & Brindley, 2013).

Lastly, as Rizos et al., (2016, pp. 5) state, “transforming business-as-usual operations would require new sustainable production and consumption technologies (in the fields of eco-design, clean production, and life cycle assessment) to be integrated into current linear business models, and competent professionals to be able to manage them”. SMEs in this green transformation might lack also internal technical expertise and qualified personnel with sustainability practices experience (Vasilenko & Arbačiauskas, 2012; Marin et al., 2015).

### **3.8.6 Lack of support from suppliers and consumers**

One of the main characteristic that should be taken into consideration, is the fact that SMEs depend heavily on their suppliers and consumers. These actors define the market in which SMEs operate, which can be extremely conservative and reluctant to a sustainable transformation (Rizos et al., 2016). Thus, there is the need to make a strong business case, that is economically, socially and environmentally advantageous, in order to engage SMEs (Walker et al., 2008).

An absence of pressure from customers or buyers – depending on the product - for “green behaviour” seem to be a common barrier (Walker et al., 2008; Oxborrow & Brindley, 2013; Oncioiu, 2015; Rizos et al., 2016). If consumers do not demand for a reduced negative environmental impact and are not willing to pay for it, SMEs will not supply a product that does not match with the current demand (Marin et al., 2015). Indeed, as claimed by Parker (2009, pp. 7) “this in turn influences the perception by SME owner-managers of potential image enhancement, competitive advantage and new business opportunities from environmental improvement”. Moreover, lack of suppliers’ environmental awareness is another discouraging factor (Aghelie, 2017). Indeed, due to their size, their bargaining power is small, so they have little influence on the engagement of their suppliers (Rizos et al., 2015).

The market can also be considered as a driver, because stakeholders can hinder or encourage change (Vasilenko & Arbačiauskas, 2012; Walker et al., 2008; Aghelie, 2017). The influence of the product supply chain actors can be relatively strong (Van Hemel & Cramer, 2002). Nowadays, there is a niche segment of consumers that want to know how their purchases are made and are willing to pay more for those products (Aghelie, 2017). Thus, to meet customer compliance, SMEs could start to introduce sustainability into their thinking. According to Van Hemel & Cramer (2002), SMEs perceive environmental customer demands more as an important driver for eco-design than governmental legislation. This is because eco-design relates to the product characteristics, meaning customers may be more concerned about changes in the final product, compared for example in changes in the company’s management system. Lastly, improving corporate image, could also be an important driver because increasing sales through green practices can earn and retain consumers trust (Aghelie, 2017).

## 4 Findings

In this section, the author presents the results obtained from the study of the various contents, while also giving a brief analysis. First, the findings related to the websites' coding are presented, followed by the analysis of the interviews with fashion brands. The latter part is divided in two sections: the first discusses the barriers and drivers identified through the use of the theoretical framework previously described, while the second part focuses on the discussion around circularity.

### 4.1 Findings on Sustainable Design Strategies adopted

In this section, the author presents the results obtained from the websites' analysis. Based on the themes that have been collected through the literature review of the different strategies presented in Section 3.7, websites have been scrutinized in search for keywords that could link what claimed by brands in terms of their environmental efforts with the applicable sustainable design strategies. Some of the design strategies proposed in the analytical framework might seem interconnected as the implementation of one strategy could lead to the enhancement of another. However, for the sake of this study, in the analysis of keywords the interconnection has not been taken into consideration. Appendix VI collects some of the examples of the coding that has been used by the author in the analysis of the websites, although not exhaustive. The results obtained reveal which stage of the product lifecycle SMEs are mainly considering when implementing sustainable practices, and serve as an initial and rough analysis of the current sustainable fashion market.

Among the brands selected, 22 are based in the UK, 10 in Germany, seven in The Netherlands, six in Italy, three respectively in Sweden, Denmark, Belgium and Spain, two in France and one in Finland. The results obtained from the analysis of the companies' websites, which are presented in Figure 4-2, show that sustainable brands are mainly focusing on resource efficiency and ethical and fair trade production.

Selecting lower impact fibres is the practice most emphasized, together with the use of recycled materials. Figure 4-1 shows the fibres considered to be low-impact fibres and currently used by the fashion brands analysed. Among the 40 brands that declared on their websites to use some *Lower impact fibres*, organic cotton seems to be the most used, followed by hemp, and cellulosic fibres. According to Textile Exchange (2016), projection for fibre growth from 2015 to 2020 sees cellulosic fibres to increase +5/6% per annum, compared to cotton fibres which will increase +1/2%.

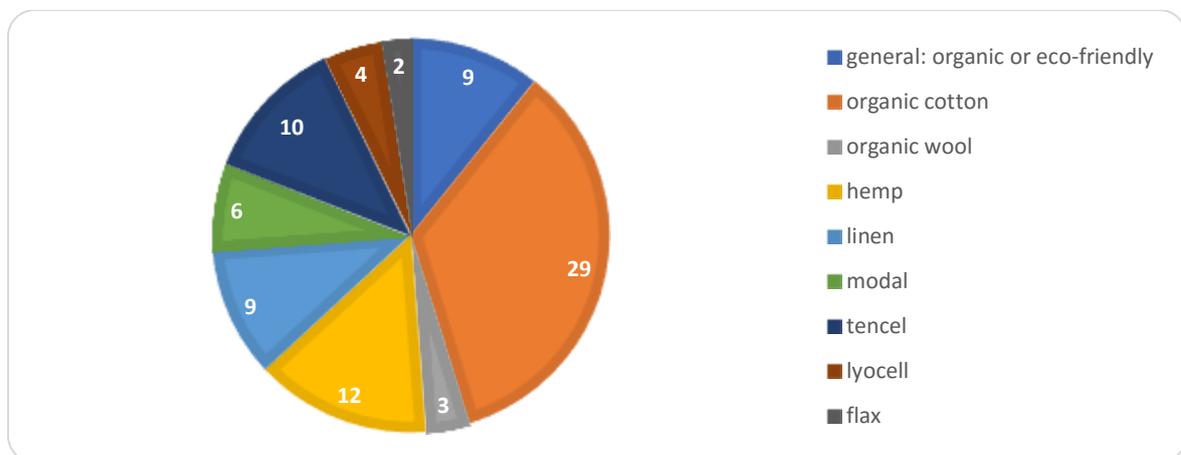


Figure 4-1. Ranking of low impact fibres used by fashion SMEs

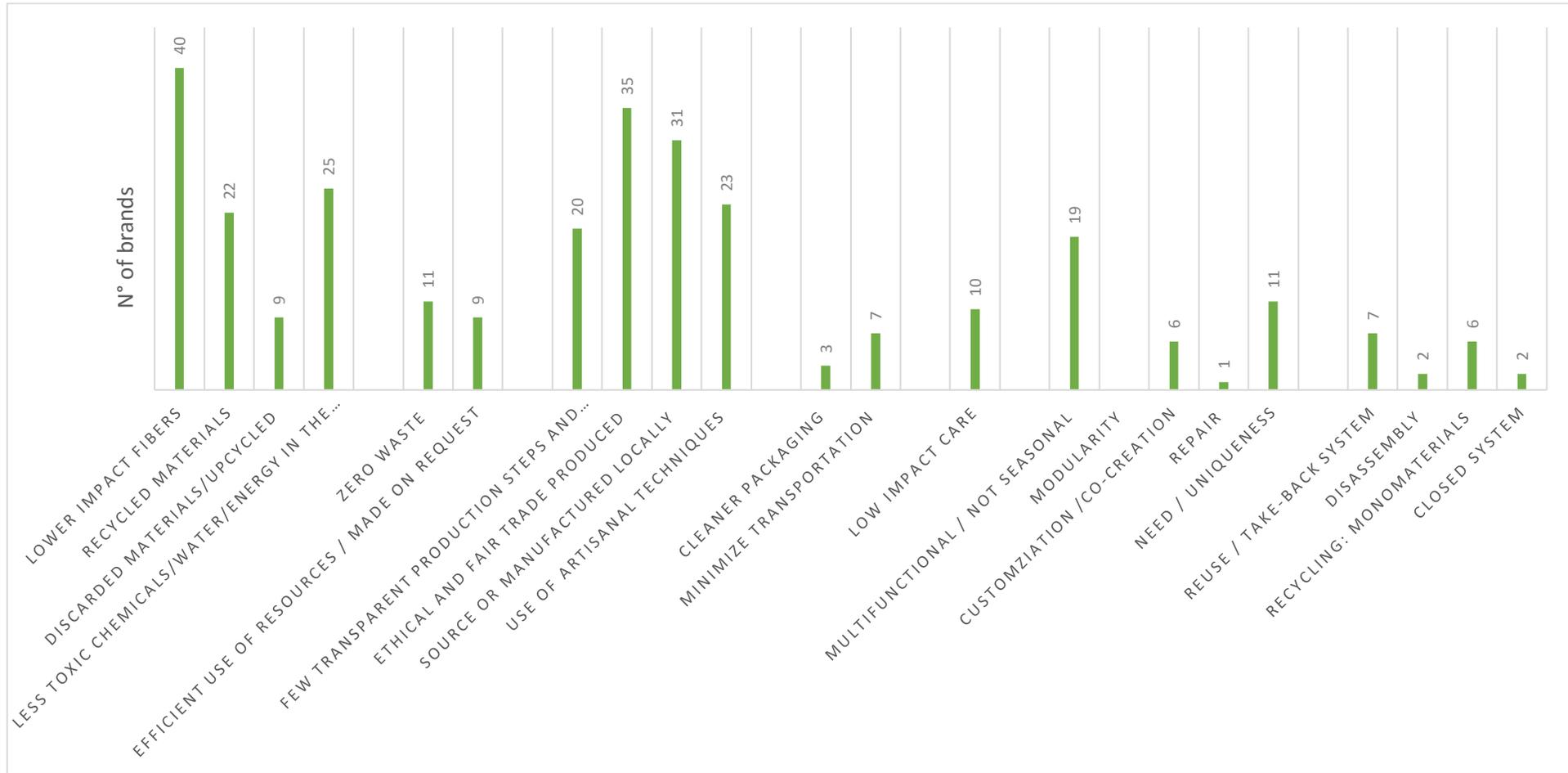


Figure 4-2. Ranking of Sustainable Design Strategies adopted by fashion SMEs

Among the 29 brands that claim to use organic cotton, only 18 are using GOTS (Global Organic Textile Standard) certified cotton. This certification guarantees high level of verified environmental criteria throughout the entire supply chain, from harvesting of the raw materials, through manufacturing up to labelling until the end-product. All the actors involved must be certified, so this guarantees a higher level of transparency to the consumer. The number of brands using certified organic materials suggest that brands perceive certifications to be trusted by consumers and can represent an advantage on the market. One market that seems to give a lot of importance to this certification is Germany. Indeed, among the brands analysed that operate in the German market, seven out of ten claim to use GOTS certified materials in their collections. Moreover, just six brands have been GOTS certified themselves, and half of them are based in Germany.

Other certifications are used by brands to guarantee that sustainability considerations are included in their product. Six companies have been OEKO-TEX certified, which guarantees that their products do not contain any harmful substances; three enterprises have been PETA (People for Ethical Treatments of Animals) certified, which means that they do not conduct any animal tests on ingredients, formulations, or finished products, while two present the OCS (Organic Content Standard) Certification. For cellulosic fibres, considering that they are wood products, one Certification that could be applied is the FSC (Forest Stewardship Council), which has been developed to secure sustainable forest management. However, even if 20 brands claim to use some wood products in their fibres, just one presents the FSC certification. Table 4-1 presents the main Certifications currently used (obviously there are more certification schemes that can be found in the market).

Table 4-1. The Standard Landscape

Logo	Standard name	Input material	Chain of custody	Processing requirements	Product labelling
	OCS 100	Organic material	Yes	No	Yes
	GRS	Recycled material	Yes	Social, environmental, chemical	Yes
	GOTS	Organic material	Yes	Social, environmental, chemical	Yes
	OEKO-TEX 100	n/a	n/a	Chemical (final product finishing)	Yes
	OEKO-TEX STeP	n/a	n/a	Social, environmental, chemical	Yes
	FSC	Forest products	Yes	No	Yes
	Bluesign	n/a	n/a	Environmental, chemical	Yes

Source: Own elaboration. Adapted from *Textile Exchange (2016, pp. 38)*

Various brands are also starting to use *Recycled materials*. According to their websites, among the 22 brands that are using recycled fibres: five state that they include recycled materials in their collections without any specification, 14 are using recycled polyester, six recycled cotton, while recycled rubber, recycled polyamide, recycled nylon, Econyl (recycled nylon 6 from carpets and fishing nets), recycled wool and recycled coffee ground have been mentioned by one enterprise respectively as chosen material in their collections. However, as in the case of the FSC, the related certification which is the GRS (Global Recycle Standard) is present on just one website

(a part from Econyl). *Upcycled* does not seem to be widely practiced by European brands, who apparently seem to prefer the freedom of choosing the material they want for the amount they need. Indeed, just nine brands mention this practice, but scraps are mainly used for creating details or creating accessories; just one brand based its entire business model on this practice.

With respect to *Material efficiency* strategies, it seems that brands are starting to apply the “zero-waste” practice. By avoiding waste during the production process, it is possible to lower costs, because a lot of waste (as previously mentioned around 10/20%) is avoided. Another principle that nine brands mentioned, is the possibility to avoid overproduction by using resources more efficiently. Different enterprises are trying to produce in small series, or are adopting a Made-to-order approach, which as stated by Treches on its website means that, “items ordered through our web-shop are often sewn after the order comes in”, or like Elsie Gringhuis, whose items are produced on order, which means they avoid having any stock.

In the *Production phase*, brands are trying to act like change agents and take into account social aspects, by employing sustainable manufacturing methods, both domestically and globally. Their claims highlight the relevance of considering social aspects in the garment supply chains. Komodo highlights the possibility that brands have in leading the change, and it is stated on their website: “It's a privilege of our civilization to dress up in comfort and style, but it's also the responsibility of today fashion designers to make that style fairly and sustainable for those who work on it”. Brands seem to dedicate special attention to guarantee that their production is ethical and guarantee fair working conditions to the people that are actually producing their garments. However, among the 25 companies that communicate this to their consumers, just 4 are Fair Trade certified and 3 are part of the Fair Wear Foundation.

Furthermore, it seems that brands (in this analysis 31 over 60) are starting to realize the advantages that they can obtain by shifting their production from cheap-labours countries back to those communities in Europe that have always based their economies on creating quality clothes. This relates also to the recognition of the importance of preserving artisanal techniques and craftsmanship. As expressed by People Tree on the website, “traditional hand craft skills and techniques are dying out due to mechanisation. Design, technical input and marketing support through Fair Trade is helping thousands of artisans keep their craft tradition and their communities alive”.

Finally, many of them are starting to follow Cox's suggestion (2004, pp. 351) “successful outcomes for buyers and suppliers must imply that there is an alignment between the goals and aspirations of the buyer and those of the supplier”. Various actors are claiming to produce in close cooperation with the suppliers and deal respectfully with trading partners. As mentioned by the brand Thought on its website, “It's important to us that we continue to work with some of the first factories we did when we founded the company. We've grown our businesses and skills together. And we'll continue to do so”. This attitude proves that collaboration between brands and suppliers is becoming increasingly important, with six brands participated in the “Who made my clothes?” campaign created by the Fashion Revolution, a global movement that asks fashion brands for greater transparency and more ethical practices.

The *Distribution phase* seems to be one of the least considered by designers. According to Lawless & Medvedev, ease and the cost of shipping seem to have the priority for SMEs over sustainability considerations when delivering their products (2016).

The same goes for the *Use Phase*: at large, from the analysis it seems that designers are not rethinking the way users interact with their products. They are mainly trying to communicate to their consumers the need to take good care of their clothes by washing items at low

temperatures, using chemical free detergents, avoid tumble drying, and sometimes they also claim that their products do not need ironing. Just one of the brands analysed took part in the “Iprefer30°” campaign, an initiative of the detergent industry, with the support of fashion industry partners, that aims to raise awareness on the benefits of washing at lower temperatures. However, it seems that brands are getting acknowledged and are trying to work in this direction in order to find innovative solutions, like for example Rapanui, which states “Up to 80% of the impact of a t-shirt occurs after purchase. This means the water, chemical toxicity, energy use and emissions from washing and drying your clothing [...] We are working towards a circular economy with our incentivised material recovery program. Our next big challenge involves the in-use phase”. However, because of the big role that consumers play at this stage, it is difficult for brands to influence such personal practices of the users.

A strategy that designers seem to favour is *Design for Durability* or *Optimization of initial lifetime*, which means trying to extend the life of a garment before it reaches its end-of-life (and this has also been confirmed by the interviews with SMEs, which will be discussed in Section 4.5.4). The Seasonless principle seems to lead the way, with 19 brands that make claims connected to this concept. This means that the SMEs reviewed in this study are not following seasonal trends, but they are trying to produce garments that can be worn in different situations, with a classic design and basic colours instead of prints. As claimed by Elsie Gringhuis “A functional and well thought out design makes me very happy. All good things are simple, but there is nothing more difficult than to make a good and simple design”. This principle is followed by the Need & Uniqueness one, which aims to go against the fast-fashion model that produces clothes in-bulk which do not enhance individuality. It is a principle that Henrica Lang (n.d.) has been able to transform in a mantra, “Before you buy something ask yourself: Do I really need or want this? Instead of shopping till you drop, only buy few items. You’ll have more time to enjoy them”. Uniqueness can also be obtained through customization and co-creation, where the product can be ideated with the help of the consumers; however, this practice, together with repair and modularity, seem to be yet not widely explored.

The last stage of the product lifecycle, the *End-of-life*, holds potential for improvement, because it seems that enterprises are currently not trying to implement new approaches that could help keeping the value within the cycle. Currently on the market, blended fibres fabrics are the most used; however, fibres like poly-cotton cannot be separated and reprocessed when reached their end-of life, because currently there is no commercially available technology at industrial level that allows that. That is why the use of mono-material nowadays is the only principle that would guarantee the garment to be easily recycled, even if this application could limit the designers’ job and the aesthetic qualities of the garment itself. From the analysis, it is claimed to be applied by six brands, while seven mentioned “Reuse /Take back system” as something that they are currently working on. Even this principle presents different challenges in its application, because consumers do not have the education and mind-set to bring back their clothes. Moreover, the financial and organizational capacity could limit the possible implementation of such system for SMEs.

However, there are brands that have been able to create their own circular or reverse supply chain. One example is MUD Jeans, an SME in The Netherlands. They have been able to set up a system in which the pair of jeans that you buy from them, when worn out can be brought back to them where it is shredded, cut into pieces and blended with virgin cotton, in order to create new denim yarn while not compromising on the quality. The author has been able to participate in the “Monday of the Month Skype Call”, in which the MUD Team answers all participants’ questions. When asked which have been the main challenges faced by the brand, the CEO of the company, Bert Van Son, mentioned mainly two challenges: first, the aggregation of sufficient volume to make the entire system works. Indeed, MUD Jeans had to supplement

their volume with general collection streams. So even when brands are successful in the creation of their own reverse supply chain, another obstacle that they face is having their clothes back. While the second challenge relates to finances, because recycled materials are usually more expensive, margin is smaller and ROI is lower in the beginning, so it is common for brands to have a negative flow. These could be considered as common obstacles that the introduction of a take-back system could present for SMEs.

Another aspect that it is important to address, is how brands interact with their own consumers, and how they communicate their efforts in terms of sustainability. Designers can influence consumers using a variety of means: information, education, campaigns, etc. (Pedersen & Andersen, 2015). They could trigger new behaviour by building knowledge about the impacts of the fashion industry and resource cycle and by communicating a new vision of fashion and sustainability, for example by providing information via websites. However, this study shows that not all of the brands analysed have undertaken their role as Educators. Indeed, just 12 designers seem to use their websites not just as e-commerce platforms but more as educational tools, providing information on the general impacts of the fashion industry and related processes. Sharing their motivations and knowledge represents a simple effort, that could instead have positive consequences both in terms of awareness and examples of best practices, because more information would eventually flow in the system.

## 4.2 Barriers and drivers identified by the market

The barriers and drivers that enterprises face when including sustainable product-related strategies in their offerings can be various. In the literature review, the author presented those issues that have been mainly discussed by researchers as the common barriers – or drivers – for SMEs operating in any sector. In this chapter, the barriers – and drivers – that relate to SMEs operating in the fashion system are discussed. The qualitative analysis has been carried out by using a closed coding and deductive approach: the main findings from the interviews have been summarized and clustered into groups according to the framework of barriers and drivers created, refining it also based on the themes that will emerge as sector-specific issues.

Table 4-2 shows the barriers and drivers that have been identified by European fashion SMEs. In presenting the findings some quotes have been used to support the results; however, in order to guarantee confidentiality, the author just used the letter I – which stands for interviewee – and a number. To identify the barriers, the author asked the following question: “*What main barriers did your organisation face when including sustainability aspects in your product?*”; while for identifying the drivers, the question asked has been: “*What have been the main drivers in choosing to integrate sustainability as part of the product’ characteristics?*”. Both categories have been divided in two columns: the first column represents those barriers that have been mentioned by 50% or more of the interviewees; while the second represents the least mentioned. This distinction has been done in order to properly weight the answers obtained. Moreover, the barriers that fashion SMEs have in common with other-sectors SMEs (so that have already been described in the literature review) have been colour-coded with red (and identified by the letter B), while those that are specific to the sector under analysis have been identified using the blue colour (and the letter F). The same logic has been applied to represent the drivers, where the green colour represents the ones already mentioned in the literature review (with letter D), while the blue the ones have been added to the framework after coding the interviews (F).

Table 4-2. Barriers and drivers identified by the interviewees

MAIN CATEGORIES	Barrier		Driver	
	Most mentioned (> or =50%)	Least mentioned (<50%)	Most mentioned (> or =50%)	Least mentioned (<50%)
COMPANY CULTURE AND VISION			D. Personal commitment	F. Designer's job
FINANCIAL CONSIDERATIONS	B. Price premium			
GOVERNMENT SUPPORT AND TOOLS		B. Government support		D. Rules and regulations
		B. Lack of funding		
INFORMATION AND AWARENESS				
RESOURCES AND TECHNICAL KNOWLEDGE		B. Lack of time and resources		
		B. Lack of qualified personnel		
MARKET	B. Suppliers	F. Buyers		D. Market need
	B. Consumers	F. High lead time		
	F. Availability and minimum orders			
	F. Communication to stakeholders			
PRODUCT CHARACTERISTICS	F. Style /Aesthetic characteristics	F. Details/part of the product		

#### 4.2.1 Availability and Minimum orders

The barrier that has been cited the most is the Availability of sustainable material, and the fact that most of the time SMEs must deal with minimum order quantities. Suppliers might request for a few hundred meters of fabric, which represent an important limitation for emerging designers. This is also due to some technical aspects of the fabric creation itself: to create a fabric, first the supplier needs to set up the warping machine, from which the warp is obtained. The warp is then inserted in the loom, from which a fabric is then produced. Because of the complexity of the warping machine, suppliers need to ask for minimum orders, in order to make it economically feasible for them start processing the order. So, the research of small designers for sustainable materials, in addition to the already limited fabric selection, is made even more difficult if considering that suppliers might not be willing to sell them small quantities. Example of brands' answers that support this claim: Interviewee number 9 (I.9) "The range of things available are limited, so you have limited options of what to choose from"; I.14 "I just have to use what I can get, especially in the little amount we are working"; I.1 "I would like to use materials that I can't really get because they have high minimums"; I.4 "anything that relates to small minimums, is always a huge problem. Doing minimum orders for factories, minimum orders for fabrics, or yarn, or buttons and zippers, all those kind of fixtures..."; I.5 "there are very high minimum quantity to make it worth for producer to make that particular fabrication".

## 4.2.2 Suppliers and Price premium

If, ultimately, one supplier decides to provide the brand with the chosen material, there is another aspect to consider: the price. Namely, even if the supplier might decide to produce that fabric when just a small amount is needed, to amortize the risks of not-selling the remaining part, he usually asks for a higher price. Product innovations are not cost-neutral, and lower impacts materials (also recycled materials) are still more expensive. According to Textile Exchange, recycled polyester is usually 10%/20% more expensive (per meter) compared to virgin materials (2016). As described by I.11, “Being an emerging brand, it’s very costly to set up a sustainability project because the costs of the raw materials are extremely high...” or I.9 “any materials that I am going to use that are sustainable, are going to be more expensive if compared to alternative materials, and this get transferred to your consumer as well”.

This is the reason why it could be helpful for the brand to establish a relationship of collaboration with its own suppliers, especially because it is not always easy to find suppliers that share the same goals and vision. According to I.3, “you have to make your suppliers think the way you think, because they might not be used to it”; even I.1 states that, “...it is not easy to find companies that apply sustainable practices to their business”. I.17, instead, claims “...so then I want a locally-produced product, so that I know in which circumstances my clothes are made, but it is hard for a small brand to really get a good working relationship, because a lot of times when the factories have some bigger clients, my clothes are made not in the time that we set up before”. This relates to another barrier: the high-lead time that SMEs have to struggle with because of their small quantities orders, that can undermine the relationship with their consumers.

## 4.2.3 Market-related barriers and government support

Suppliers are not the only actors involved in the market, consumers play a key role as well. Indeed, they are the second-most mentioned barrier, and according to the fashion brands interviewed, consumers are still not concerned enough. Different brands share a similar view on this: I.1 claims “it is said that costumers are more concerned about sustainability, but I don’t think that they are concerned enough”; I.2 “the main difficulty is that people do not really care about sustainability, when they buy something”; I.11 “...millennials in general are much more pro towards purchasing sustainable products, but in general, consumers needs to be more educated, because there is so much consumerism, and they have just become so used to buying in bulk, and buy everything at a discounted price”. It seems that purchasing decisions of fashion consumers are not based on the sustainability of the product, which is a problem faced by other products as well. Sustainability is considered to be a “top-reason”, so they buy the product mainly because they like it, and the fact that is sustainable represents an extra characteristic.

It is also extremely important to be able to communicate properly what a brand is actually trying to implement in order to be a sustainable alternative on the market. However, since there is not a common and accepted definition of sustainable fashion, it is easy to do greenwashing. This negatively impacts those enterprises that instead are trying to bring a real change in the market. I.6 believes that “the first challenge is to let people know that (sustainability) is your strategy and that you are doing it right [...] and this is reason why you need certifications, but the other problem is that you need to explain to people what are the benefits not just for the environment, but for them too”. So, it is a challenge finding the right ways to communicate a sustainable story line, and communication does not involve just consumers, but also buyers, which “(buyers) sometimes are unwilling or they are quite ignorant about what is a sustainable brand” (I.11).

The Pulse of the Fashion Industry report, through the questionnaire of 90 senior managers responsible for sustainability issues, identifies policy makers and regulators as the most

influential stakeholder group in shaping a company's sustainability Agenda (Global Fashion Agenda, 2017). However, this does not seem the case for SMEs. Just one designer mentioned that companies, whether the industry in which they operate, should start including sustainability aspects because there will eventually be rules and regulations that will force companies to make this change. This situation has been confirmed by Gwen Cunningham, who says, "...for bigger companies, drivers could be things like resource scarcity, or the threat of EPR (extended producer responsibility) policies on the horizon, but perhaps these are not on an SMEs mind as much" (personal communication, July 7<sup>th</sup>, 2017). Moreover, some brands mentioned the lack of funding or government support as a challenging factor in their journey, but this is not perceived as one of the main barrier by all of the interviewees.

#### **4.2.4 Product characteristics**

In order to be profitable and stay on the market, for SMEs it is not possible to sacrifice style for sustainability (Rosenbloom, 2010). Indeed, a garment needs to be appealing in addition to be sustainable, otherwise it won't be sold, and this barrier is specific to a market such as the fashion one, where the garment "must be beautiful, you must feel well in it, not only, being ecologic" (I.3). According to I.13, "people spend much more time developing all the ideas about lifecycle, or about supply chain, which are extremely important, but then they do not have time to focus on the design itself. And I don't think that design should suffer. I don't think that this is the way to sell sustainable fashion". This is what Reblend, social enterprise that has been able to develop a technology able to make 100% recycled yarn from post-consumers' materials, tried to achieve. Anita de Wit, one of the founder, states that the aim of the project was "to show that you can make a high design by using circular materials" (personal communication, June 29<sup>th</sup>, 2017).

Another aspect that it could be described as very sector-related, is the fact that sustainable brands seem to have the necessary knowledge when it comes to sustainability and circularity, but "The devil is in the details". Indeed, in creating their products, many brands are struggling with threads, zippers, buttons, and other fixtures that could undermine their efforts and hinder their ability to close the loop. There are a lot of trade-offs that they are forced to make, and it is not easy (or even possible) to determine which solution is more sustainable than the other. For example, is it considered to be more sustainable the use of an organic cotton thread, which guarantees mono-materiality but does not assure resistance, or should brands use polyester thread, because it allows durability and longevity to the garment? I.14 realizes that this ruins the circular aim of her brand, "We try to use just cotton threads for sewing, but it is not strong enough... so, for the production is not really working for us, and we still have polyester yarn for sewing. This means that our garment is not 100% piece, even if we have 100% materials, but then it has polyester yarn in it".

#### **4.2.5 Resources and technical knowledge**

The challenges related to the production processes do not involve just the use of some kind of fabrics, but also the need to find skilled people that are able to support this kind of production. As explained by I.2 "you need skilled people to manufacture this kind of fabric", and even I.1 argues: "the interfacing I use in my clothes is organic cotton, and there is no glue. And this used to be a traditional technique, but now it disappeared [...] So also for the manufacturers, this was not very simple and I had to explain them how to do it".

Moreover, due to their size, SMEs in the fashion industry – and this is something common to all small enterprises – face the issue of time. Indeed, they don't have the necessary resources to help them deal with all the aspects related to sustainability, because a lot of ground work and research must be done concerning several aspects.

## 4.2.6 Personal commitment and the other drivers

For what it concerns the drivers, the most mentioned is “personal commitment”. Brands mainly claimed that nowadays, because of the knowledge that they possess, it is essential to act responsibly in the way we do business. Among the three pillars of sustainability, some of them seem to be willing to make some trade-off on the economic aspects, but they don’t feel comfortable compromising on the environmental and social aspects. These are some of the answers obtained: “today it is still a personal commitment, it’s really in the mind of the owners and the founders” (I.6); “... being humble and knowing in yourself that you are doing the right thing, that’s really what drives me to keep on doing it” (I.7); “there is a personal commitment... to me I also think that that’s the trend where the world is moving towards” (I.9) “I tried to do something good, and new and different, to prove a point” (I.13).

This last quote is interesting because it leads to another mentioned driver: one-third of the brands interviewed understand the importance of their role as product developers, and declare that it is within the designer’s responsibilities to carefully think of what is produced and sold on the market. As McDonough, founder of the Cradle-to-Cradle approach, stated in different occasions, “we should stop doing something less bad, and start doing something good” (2013). I.1 believes that “As a designer, I have a responsibility for the product I create. And I don’t think I could really live with myself if I created more products that weren’t sustainable just for the sake of creating something”, and I.7 “I really wanted to show that any designer throughout the product’s life stages, if there is a little bit of thought behind it, can actually act responsibly”.

## 4.3 Brands perception of sustainability and circularity issues

The author tried also to assess what is the perception of fashion brands when it comes to sustainability and circularity. All of the interviewees define their brands as being sustainable businesses, so they already included this concept within their model, whereas it is interesting to investigate their attitude towards circularity, considered as another means to achieve sustainability.

After investigating why those brands decided to introduce sustainability-related characteristics to their products, the author tried to assess when they did it. When asked “*Did you include sustainability in your product from the start of your company, or did you integrate sustainability aspects later?*”, the 83% claimed that sustainability was one of the core values from the start, while 17% stated that they started to apply sustainable design strategies after the establishment of the company. Based on the data collected (also from the websites’ coding), it seems that most of the sustainable labels present nowadays on the market have been created with sustainability considerations included in their DNA as part of their business model.

### 4.3.1 Competitive advantage of sustainability product

None of the interviewees declared that they introduced sustainability because of some prospected economic benefits. It is known that innovation can foster sustainability, but it is not clear if it represents also a competitive advantage for enterprises. On one hand it could represent for a company an USP, and it could lead to an increased brand value due to differentiation and the leading stand on these issues; while on the other, it could be perceived as a disadvantage, because of the competition with cheaper and non-sustainable brands, possible greenwashing, and consumers not willing to pay more for eco-friendly products (Nidumolu, Prahalad, & Rangaswami, 2009). Among the interviewees (14 answered this question) the responses obtained were quite diversified, as summarized in Table 4-3.

Table 4-3. Interviewees' opinion of sustainability as a competitive advantage

<i>"Do you think that sustainability represents a competitive advantage for SMEs in the fashion industry?"</i>	
Yes, it is an advantage, because ... <ul style="list-style-type: none"> <li>- It is necessary to think about sustainability to be an interesting player for the future;</li> <li>- Even if it is not an advantage now, it will become in the future;</li> <li>- It will become a differentiating factor in each European country;</li> <li>- It is an advantage, because the market is yet not saturated;</li> </ul>	7 respondents
No, it does not represent an advantage, because... <ul style="list-style-type: none"> <li>- There is a lot of greenwashing;</li> <li>- Competition with bigger brands</li> <li>- Fast fashion brands trained consumers to buy cheap clothes</li> </ul>	4 respondents
It cannot be the only proposition, because <ul style="list-style-type: none"> <li>- It is necessary to have an overall strategy which is in line with the expectation of the clients, and then the sustainability aspect can represent a positive advantage</li> </ul>	3 respondents

Furthermore, two brands made some interesting claims. They agreed on the fact that being a sustainable enterprise attracts people that share a vision. So according to I.6, "What actually brings a great advantage [...] is the fact that being a sustainable company helps in the recruitment and retention of excellent people, because when people are working for a sustainable company, they feel it in their hearts". I.5 also agrees with this idea "One of the main benefit of this positioning is that we are attracting a lot of very good people [...] people living conscious about the world, about nature, about other people, and we have a very good and strong team because we are sharing the same values". This view is also confirmed by Anita de Wit, founder of Reblend, who states, "I think that I was positively surprised by the amount of people that were interested in working together with us" (personal communication, June 29<sup>th</sup>, 2017).

### 4.3.2 Sustainability: a limitation or an inspiring challenge?

Another topic that the author discussed with the interviewees, is the perception that they have of their role. It has already been clarified that designers face different challenges when considering sustainability during their ideation process, and one of the biggest one is the sourcing and availability of the fabric. This could represent a limit for brands who might decide not to become sustainable because they do not want their creation and design to be somehow limited. However, when asked "*Do you feel that sustainability, from a designer perspective, represents a limitation or an interesting and inspiring challenge?*", just one brand's response described this situation as limiting. The rest of the brands believe that sustainability allows them to boost their creative thinking:

- I.9 states: "yes, you are more limited in your choices of fabrics, and your choice of design at times, but you can always turn that into something better and more creative", while;
- I.14 claims: "it depends on the point of view...sometimes limitations lead you to develop more in other fields. For me it was good to be limited, because I could develop my skills in pattern making and becoming more experienced in making specialties for the design and patterns".

This means re-gaining the power of being product developers, which is something that some designers have lost, by not creating based on functionality, but on standard designs that end up

in the “off-the-shelf clothing culture” that we are experiencing nowadays (Cunningham, personal communication, July 7<sup>th</sup>, 2017). Some brands are trying to change that, by allowing themselves to experiment innovative solutions: if the lower impact material chosen is not enough resistant, a brand could change the way the garment is constructed; if organic-cotton zippers are not available on the market, the brand could create garments that have no zippers. This means thinking about a concept first, and then design in function of that concept.

Moreover, as previously mentioned, 12 brands over 60 have considered to use their website to educate their consumers. In this changing system, they can interpret the role of communicators and educators and realize the importance of raising awareness. This understanding seems to be confirmed by all the interviewees (5 in total) that replied to the question “*Do you feel that the role of designers and fashion brands is changing to the extent that you’re becoming also communicators and educators?*”. Indeed, I.1 states, “I think that it is definitely a part of the designer’s profession. It is part of being a sustainable producer to also try to educate the customer on how to get the best out of what they are buying” or I.10, who believes that “whatever you do, it has to be communicated to educate consumers, otherwise half of the work you do is just lost”.

### **4.3.3 Source of information**

One of the main issue (as previously mentioned) that characterizes the fashion system, is the fact that currently there is not a common and accepted definition of sustainable fashion. As highlighted by different brands, sustainability means different things to everybody, and even our own definition of sustainability will change and move as we develop. This situation can easily lead to greenwashing, which is not necessarily conducted with the intent of misleading consumers, but it might be due to some ignorance on what sustainability really means, even among designers themselves. Consequently, it is important to understand from where designers and brands source their information, and how they keep themselves updated on eco-innovation, like new fabrics or new processes available.

The results showed that: *Networks and organizations* have been mentioned 8 times by interviewees as a valuable way to keep themselves abreast on innovation, while *Websites and articles* have been mentioned 6 times, and the same goes for *Conferences and fairs*. Among the websites mentioned, The Business of Fashion and Eco-textile News were the most cited. For what it concerns Conferences, the one cited the most was the Copenhagen Fashion Summit, but also trade fairs of fabrics (like for example Premiere Vision, or Milano Unica, or Munich Fabrics Start) were considered relevant for the learning process of brands on innovations. For what it concerns Networks, interviewees mentioned the Ethical Fashion Forum (5), Textile Exchange (2) and Sustainable Apparel Coalition (1). This is particularly interesting because it proves that companies are willing to connect and share good examples, by becoming member of various networks.

### **4.3.4 SMEs’ perception of a circular system**

Networks and collaboration have been identified as one of the key success factor in relation to circularity as well. The author has been able to discuss circularity with 14 brands. Just 3 interviewees were unsure about the meaning of circularity and circular economy, while the others seem to share the idea that a joint effort among various actors in the system is needed, because it is not possible for SMEs to deal with that by their own. According to some interviews, this change should not be driven by policies but by collaboration, because policies can accompany the change. This relates to another factor that has been identified as essential by the 22% of the interviewees in their journey towards circularity: the role of technology. What those brands discussed, is mainly the role that developing recycling technologies could have in fostering the current circular transition. It is unlikely that brands and designers will soon stop

using blended fibres, because of the good price and good functionality, so as explained by I.5 “first what needs to happen is that the technology needs to be there, it needs to be possible. Then there is the need of a large government-driven project to increase post-consumer recycling”. So, the main problem perceived is that the technical solutions on a large scale are still not available.

An interesting result that came out from the 11 interviews that discussed about their idea and vision of circularity, is that currently SMEs in the fashion system consider circularity as something still very far from their brands and businesses. They seem to be aware that this is the direction that enterprises in any sector should eventually undertake, and some of them showed interest in the topic; however, they don’t seem to be ready to implement the necessary changes to become circular brands as well. This is a common perception that all of the 11 interviewees agreed upon, whose answers are summarized in Table 4-4.

Table 4-4. Interviewees’ perception of circularity

<i>“What is your idea and opinion about circularity and circular economy?”</i>	
I.1	“Now, it is very difficult. Even if there is a lot of work being done on that, so maybe it will be easier. But now, especially if you want to create something and you don’t compromise on the design, it is still tricky. So, it is doable, but you need to have a lot of resources”
I.4	“I think the truth about the circular economy is that we have to move to it, eventually. There is just no way around it. It is just how long are we going to take before we will be ready to get there”
I.5	“I think, (circularity) it is many steps ahead of where we are right now, we got other basic steps to do before we get there”; “As a business company, we do not have any touch points with consumers, so there is no way we would be able to follow up on the example of H&M or Mark & Spencer where they try to implement taking-back schemes, that wouldn’t work for us”
I.6	“I believe we have to go step by step [...] it’s very interesting when other companies have more for what we say in French “obsolescence programme”, so trying to find solutions for the end-of-life. I like this idea, we are thinking about it, but first of all we need to make sure that we are really taking care of other aspects”
I.7	“I think we are still far from having the fashion industry considering it”
I.9	“I think circular is where we should go, but right now, there is not yet the technology”
I.10	“Of course, it will come, there is no doubt about that, but we are at the very beginning of it”
I.13	“I would like to do that, but at this moment, I think it is quite complicated. It needs a lot of planning, it needs a lot of knowledge, and technology as well, so for now I am just not able to do it”; “It takes quite a lot of time and planning, and it’s a matter of prioritization and do step-by-step”
I.14	“I think it is a really, really interesting approach. I would love to work more in this direction, but I feel for now we are too little to make it feasible”; “It is complicated to create a circular project [...] I hope, you know, that later there will be more hints for development that we can hop on. But for the moment, we don’t really have a circular system, or anything similar”
I.15	“It will take time to get there – and time is in shortage in the fashion business. So, I’d say that time is a main barrier”; “We are an idealistic brand, but we’re small [...] So at the end of the day, we need to survive, also to keep pushing in a sustainable or circular direction, and hopefully nudge our other colleagues to do the same”
I.17	“I think it is slow, because as I said the process behind a company is so complex, so if you really need it to enrol it in a good way, there are so many things you need to do”; “I would like to have a really circular approach, but because I cannot source the materials I want and so I use leftovers, for me now it is not an option”

Their application of a lifecycle thinking approach is limited to the implementation of those principles that optimize the longevity of their products, instead of focusing on the optimization of the end-of-life phase. So, when asked “Do you apply a lifecycle thinking approach?”, interviewees mainly answered:

- “Our design has by nature a design longevity featured in the actual design mind-set” (I.15);
- “I do think about all the steps, but if we consider the end-of-life of the product, I don’t have a plan to get it back, or repairing, or something like this. It’s more trying to teach people that there is a different quality, so they should wear and appreciate it longer” (I.13);
- “When I design, I think of them as pieces that will last forever. We take care of every details, everything is extremely high quality, so in our vision they are not made to be disposed” (I.9);
- “what we do, is we make products to last, we do not make products to be disposable” (I.5).

### 4.3.5 Suggested EU- support initiatives

One of the last thing that the author discussed with 10 brands, is the role of policy-makers and the various policy tools that could be implemented, in order to facilitate SMEs reaching their green goals.

According to the interviewees’ responses, just one designer has been supported by some governments’ funding in the launch of his label, while another got involved in a government-funded project some years after the brand’s creation. The rest claimed that they received some help from, for example, the winning of some Design Awards, from becoming member of some networks, but with no government involvement. If we want the market to change, there is the need to better support small companies, some of which state that they felt “left alone” in their sustainability journey. I.4 in relation to possible role of policies states, “I believe in the power of enterprises to do things, but then I also believe that regulations have some kind of role to play”, which is in line with the Porter Hypothesis. So, when asked “Which policy tool could be implemented at EU to support sustainable SMEs?” to 8 interviewees, what is found in Table 4-5 are the responses obtained.

Table 4-5. Suggested EU-support initiatives

Believe in the power of the market	3
Information and education, through labelling	1
Fiscal frameworks	3
- Tax reduction for lower impact materials	(2)
- Tax on natural resources	(1)
Business support schemes	3
- Grants or subsidies	(2)
- Practical and technical support	(1)
Regulatory frameworks	3
- Ban on non-environmentally friendly products	(1)
- Extended Producer Responsibility	(1)
- Regulation on textile waste	(1)
Collaboration platforms	2

## 5 Analysis and discussion

In the previous section, a brief analysis of the results has been provided by the author when presenting them. In this chapter, the more relevant findings have been selected, in order to analyse them more in detail. To recap, materials selection and ethical production seem to be the two principles mainly implemented by small fashion labels, which seem to prioritize these sustainability efforts rather than trying to focus on all of the lifecycle's stages.

The main barriers identified from the interviews relate to: suppliers, price premium, consumers, and human resources and time, which fashion labels have in common with other SMEs operating in other industries. However, availability of sustainable materials, communication to stakeholders, as well as the impossibility to compromise on the aesthetic qualities of their products seem to represent more sector-specific barriers. With respect to the main drivers, personal commitment and responsibility as product developer seem to be the most mentioned. Experts' interviews have been used to prove or disprove the findings; furthermore, current initiatives happening in the market which seem to be in line with what was suggested by the author have been presented as well, to back up the author's claims and contextualize the findings.

### 5.1 Materials selection: an important starting point

The analysis of the websites reveals that SMEs in the fashion system are still focusing just on some stages of the product's lifecycle, not considering the importance of some others. According to the findings, SMEs mainly focus on the use of lower impact materials, or claim to use fair trade production. According to Lawless & Medvedev (2016), these practices do not deal with the real sustainability problems, because they remain "symptom-focused". They mainly fit into our current way of doing things and demand small changes from producers and consumers, who can continue with their unsustainable consumption pattern (Fletcher, 2008). This is the case with most of the industry actors who claim to be sustainable, regardless their size and sector, which seem to be still under the governance of old preconceptions and are mainly implementing surface changes. For example, we currently know that environmental impact occurring during the use phase is high (Lawless & Medvedev, 2016), and that up to 80% of the clothes that we consume go straight into landfill or are incinerated (Figure 3-2), while their value could be kept in the system by implementing some practices related to the End-of-life stage. However, not so many brands seem to explore the potential of innovating in these areas.

Fletcher describes as follows the current situation: "it uses yesterday's thinking to cope with the conditions of tomorrow" (2008, pp. 121). However, it should not be underestimated the importance of Materials selection in relation to the industry's sustainability journey. Indeed, to finally close the loop, it is also necessary to control the quality of the materials that actually flow within the system. Because the quality of the output - in this case the recycled material - always depends on the quality of the input. Thus, if fabrics made with low quality fibres continue to be introduced, the entire system will be affected, because the quality of the recycled fabric will be low as well, and consequently it will be necessary to add high percentage of virgin material in the recycled garment.

Even if not mentioned as one of the major barrier by SMEs under analysis, according to the literature review lack of governmental support has been identified as an important obstacle. Governments could provide more support to SMEs (Section 3.8.3) through the provision of funding opportunities and effective taxation policy. If we consider that lower impact materials and recycled materials are the two most mentioned principles, and that price premium is one of the main barriers highlighted by sustainable fashion SMEs, tax incentives could represent a possible means to incentivize enterprises to adopt greener practices and assure that they are not

“left alone” in their journey. To provide an example, the form of lower tax rate for brands that show some kind of green business ethics, such as the use of Certified material, could foster the adoption of sustainable practice. It is something that three different interviewees brought up, because as stated by I.11 “companies need some kind of benefits, because they are thinking business wise. For me, it is more a personal commitment, so I am willing to pay more because sustainability is at the core of my brand, but other companies need to have some kind of cash benefits”. Therefore, it is necessary to make it economically convenient.

## 5.2 Actors involved in the system

Designers cannot be considered the only responsible player to make the change happen. They are part of a system, which is composed by different actors, and to create an effective circular fashion industry, a different mind-set needs to prevail, in which a combined effort of all the participants is necessary. According to the framework presented in Table 4-2, currently the market category seems to represent the main barrier for SMEs in the fashion system, instead of a means to achieve sustainable goals.

One challenge would be to understand the fashion ecosystem and all the different roles that constitute this system (I.9). From a system perspective, designers play one role: indeed, shifting their design practices in order to include a lifecycle thinking approach in mind can have an impact on the entire cycle. But the entire system needs to change. Figure 5-1 shows, in a simplified manner, the different actors that are involved in the fashion system, most of which are currently perceived as a barrier by sustainable SMEs. Their roles in relation to sustainable SMEs is discussed in the following sections.

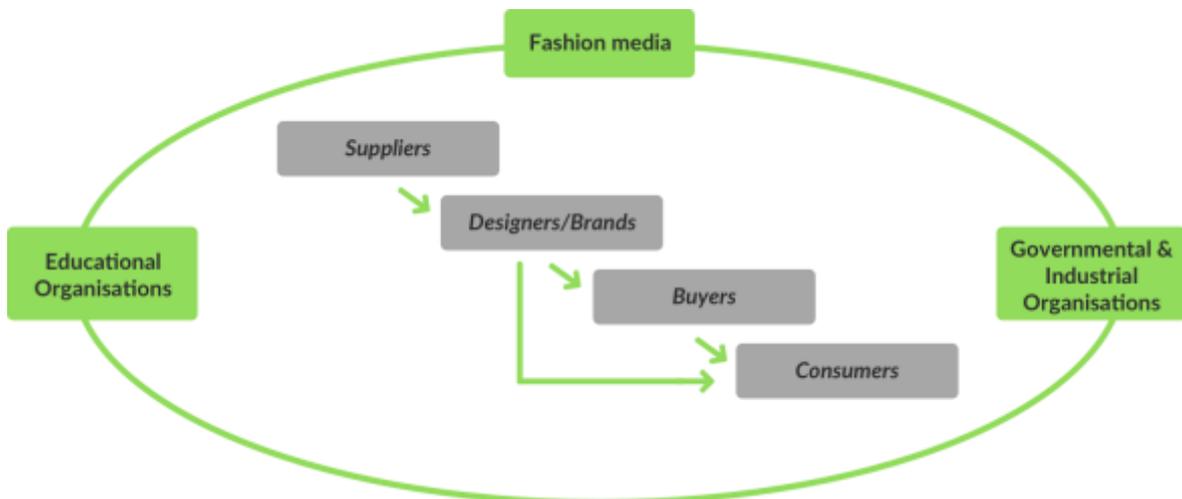


Figure 5-1. Actors involved in the Fashion system

Source: Own elaboration. Adapted from DeLong et al., 2013, pp.61

The role of education and academia is discussed in the next section; in addition to these actors, fashion media should start promoting those trends and designers that aim at closing loop and promote a new vision in the market. Indeed, considering that another barrier identified by the interviewees is how to communicate to stakeholders their real efforts, fashion media could provide a valuable support to sustainable small enterprises, because considering their financial constraints, most of the time they face difficulties in marketing their products.

Even if some brands are starting to perceive that in the last few years consumers’ awareness grew, the majority agreed that consumers are still not aware enough of the power that their purchasing decisions have in dictating new trends in the system. According to the interviewees

indeed, most of the consumers are still not willing to pay the price premium that sustainable products might require.

Moreover, in the discussion on possible ways to green the fashion industry, usually mainly fashion labels are addressed. The role that suppliers and buyers have in facilitating this transition is often omitted. However, their role is fundamental because suppliers, which are currently considered to be the main barrier in the market, could facilitate brands in the sourcing of the materials. Also, buyers are the direct channel for most of the fashion SMEs and their consumers, so they allow the presence of sustainable brands on the market. They are mainly perceived as a barrier, because they seem to be very exigent with brands: they require environmental certifications to prove that sustainable claims are verified. However, they are not willing to pay a major price for it; this attitude is detrimental for SMEs who don't find the right incentive to become more sustainable (Yen, personal communication, 18<sup>th</sup> August, 2017).

In order to improve the industry performance, holistic government interventions addressing various actors in the entire value chain should be implemented, together with the support of industrial organizations.

### 5.3 The role of designers and their education

According to the Design Delft Guide, “designing is an activity that is supposed to lead to new possibilities and an embodiment of those possibilities” (2010), while Fletcher & Grose declare “It is the designer’s creativity and ability to make quantum leaps of imagination that holds the potential to transform not just the way we make things, but also the way we think (2012, pp. 48)”. Based on these definitions, we can assert that designers have in fact the possibility with their creativity and their behaviour to influence different levels within the system, by delivering products that are good for the environment and that change our current disposal relationship with the fashion products. From the findings of this study, 17 interviewees agreed on considering the sustainability not as a limitation, but more as something that can enhance their creative thinking. Moreover, 6 brands seem to be fully aware that as product developers they have a big responsibility for the product they create. The will to overcome possible barriers and the awareness of their role represent important results. However, as already mentioned in the literature analysis as something common to SMEs in general, lack of awareness lead to an inevitable lack of motivation. To implement circularity, brands need to be educated on which are the impacts related to their businesses, what being circular really means and the real benefits that could be obtained.

The main driver that has been identified in the fashion sector is personal commitment of owners and designers, which generally is essential in shaping the company’s attitude towards sustainability, especially in small companies. Consequently, the more knowledge flows within the system, the more chances there are to make professionals more aware of their roles as possible leverage points. Moreover, it is essential to remember that when it comes to SMEs, the owner/designer performs different tasks that, as shown in Figure 3-4, usually requires different competencies and expertise. Thus, receiving a proper education is needed. Adopting new ways of thinking can be difficult, especially for those people that haven’t been taught circularity in design schools. Indeed, likely new and young designers might have more understanding of this topic, but older ones have mainly received an education based on designing garments having mainly the performance or price point in mind (Brismar, personal communication, June 26<sup>th</sup>, 2017).

If we compare recycled fibres with virgin ones, the result will likely show that recycled fibres have less quality and are less strong. However, changing the mind-set means that the product should start being conceived differently: instead of asking which materials could be used to

create a new garment, we should consider which garment could be produced with the material that we have at our disposal, because having the highest amount of strengths or the highest quality is not always necessary for every creation. A new mind-set has already emerged, but still need to spread, and this will be achieved just if knowledge will be shared. We are now aware of the huge impact that design can have on the product's different scenarios, so it is necessary that the importance of considering a lifecycle thinking approach is addressed in design and fashion schools.

Educational institutions should take a proactive role in providing sustainability and circular literacy to those students that will apply those tools once established in the market. Different interviewees agree on the idea that it is inarguable that design schools have changed quite a bit compared to the past, but sustainability aspects are still not taught enough in design schools. For sustainability education in fashion it would be necessary to come up with an alternative framework of questioning and analysing, because we should not make improvements if we are still stuck in old way of thinking, otherwise we would risk to limit the potential effects of these new actions (Fletcher & Williams, 2013). It is possible to ascertain that these changes in education are on the way; for example, if we consider the London College of Fashion (LCF), one of the most prestigious fashion school in Europe, in 2008 they established the MA Fashion and Environment course, now become MA Fashion Futures, and in the same year, they also opened the Centre for Sustainable Fashion, to support all the sustainable initiative of the College. However, if we consider other fashion schools, sustainability courses are not part of the main curricula yet, but are still an optional course.

#### **5.4 The role of consumers and the need of a common standard**

In the literature review consumers have been presented as a possible barrier or driver for SMEs: in the fashion system however, consumers are currently perceived as a barrier by labels. Interviewees argued that people do not buy garments because they are sustainable: indeed, the mismatch between stated interest and observable behavior among consumers is referred to as 'attitude-behavior gap' (Rettie, Burchell, & Riley, 2012), and consumers seem to show this gap when purchasing any kind of products, ranging from food to care products.

Moreover, as already mentioned, labels face challenges in communicating their efforts and sustainable story-line. According to Kiat Yen, founder of Indigo People, "a challenge could be selling the product, especially if consumers just look at the product and its price without knowing how it is produced. So, when the story is not told, it can be difficult to sell the product" (personal communication, 16<sup>th</sup> August, 2017).

Certifications and eco-labelling schemes could help in bringing more clarity within the system, because they are means for providing accurate and verifiable information to consumers. However, as the results show, if we consider the GOTS certification which is the one mainly used in the market, among the 29 brands that claim to use organic cotton, just 18 are using GOTS certified cotton, and just 6 companies are GOTS certified themselves. This is because SMEs face various issues when dealing with Certifications or labelling schemes, because size matters (Ahmed, 2012). Indeed, environmental certifications are not easily obtained by SMEs because these programs usually require changes which are not easily compatible with the management style that characterize SMEs, described in the literature review and characterized by no advanced planning, short vision, time and resources for collecting the necessary data, financial issues. Certifications represent an extra cost that these enterprises might not be able to sustain. For this, government support could be of use for SMEs: indeed, direct subsidies could incentivize those small companies to confront with the necessary expenses that the process of obtaining certifications requires or through some other incentives.

It is important because according to the European Commission, “When well designed, recognised, understood, trusted and perceived relevant by consumers, labelling can have a significant influence on the purchasing behaviour of consumers” (2011). Labels could be considered as important tools for shaping consumer behaviour towards more sustainable purchases and could improve the brand’s image. However, the proliferation of information could easily overwhelm consumers and lead to mistrust. The fashion industry already addressed the sustainability of products and tried to regulate through standards, certifications and initiatives, but each of them focused on one specific aspect: some cover the naturalness of materials or the recycled content, while others certify the non-toxicity of a product or the labour conditions during production, or other aspects. Thus, another problem of certification schemes, is that it is not always easy for consumers to know what each label stands for, because as shown in Table 4-2, there are various labels nowadays on the market, and this can easily lead to confusion. Indeed, consumers today have to deal with more than 455 eco-labels across 25 industry categories, such as energy, food, clothing, household and care products, and very few seem to give people meaningful guidance in their green purchases (Atkinson, 2014).

As previously mentioned, one of the request of the EU flagship initiative is the promotion of new labelling schemes, that could lead to the development of a common language of standards applicable to all garments and textile products worldwide. According to Deda (2016), “The fashion industry could actually learn from the lessons of forest certification and standards in other sectors and even develop a more universal certification system based on clear and accepted indicators to be reflected in a universal *fashion passport*, which would speak to consumers and provide them with the necessary information for them to make an informed choice”. Obviously, implementing such a tool would require time and effort, but if governments were able to require such a passport from labels, it would become the norm, as various standards have become the norm in other sectors.

France has tried to develop something in line with the idea of the Fashion passport since 2008, and it launched in 2017 the “Affichage Environnemental” of a product, which aims to communicate to consumers some quantitative information on the main environmental impacts, calculated on the entire product lifecycle. It represents a new standard, framed by common rules defined by ADEME (Agence de l’environnement et de la maîtrise de l’énergie) (Renaud, Clément, & Tarayoun, 2017), that provide consumers with comparable information that should be helpful in clarifying their purchasing decisions. Moreover, a secondary scope, would be to encourage producers and distributors to enhance their eco-design efforts. Three sectors so far agreed to voluntarily participate in the launch of this standard: the clothing sector, the furnishing and the hotel industry. This scheme could be composed by the following parts:

- A separate presentation of the results for each environmental indicator, which ensures more transparency;
- Two compact labels that can be applied directly to the packaging of products, in the form of a numerical index or a note with a letter A, B, C, D, or E. This type of format with a single indicator allows consumers to simply see the environmental performance of a product compared to that of the products of the same family.

According to the CDGG (Commissariat général au développement durable), who conducted some research prior the launch of the scheme, 77% of the consumers were favourable to the implementation of the environmental label under analysis, and 56% believed that it should be mandatory for all the products. Because the scheme has just been launched, it is yet not possible to make an evaluation on its efficacy; however, it is considered to be a world premiere and it represents a starting point towards the implementation of a “unique” label scheme.

## 5.5 The role of collaboration among actors

Collaboration is needed, now more than ever. The change towards more sustainable and circular fashion system could be achieved only when multiple players, across business and research communities, and supported by policy-makers, come together and create partnerships. All the actors involved must be aware of the role that they play and their correlation. In the current model, where collaboration among actors is limited, brands interviewed perceive lack of time and lack of qualified and skilled resources as important barriers in their engagement with green practices. This is a barrier that SMEs seem to face independently from their operational sector. Indeed, the transaction costs of making the necessary shift could be extremely high unless these actors work together. No single actor could cover the costs, and that is why a business-crossed collaboration is needed.

The EU clearly presented its direction towards cross-sector opportunities and collaboration through the Circular Economy Stakeholder Platform, launched in March 2017 after the Conference in Brussels (Commission Proposal COM(2014)398 final/2). This goal is also pursued by the Ellen McArthur Foundation with the Circular Fibre Initiative, launched in May at the CFS (2017), which aims at bringing together key industry stakeholders from the textile world. That is also what Fashion For Good is trying to achieve by building a coalition of brands, producers, retailers, suppliers and non-profit organisations in their ambition to transform how fashion is currently produced (2017).

Essential is the inclusion of various medium, small and micro-enterprise as partners of every initiatives. As suggested by Anita de Wit in her interview “Connection and collaboration between small companies and big companies is the way to go, because none of the companies can make the transition on their own, but in collaboration it is possible to create a new supply chain together” (personal communication, June 29<sup>th</sup>, 2017).

The same approach is adopted by the Alliance for Responsible Denim (ARD), a two-years project initiated in 2016 and implemented by the House of Denim, Made-By, Circle Economy and the Amsterdam University of Applied Sciences. The aim of these organizations is to work with denim brands together to take steps towards improving the ecological sustainability impact of denim production. It includes brand of varying sizes, including Mud Jeans, KOI, Nudie Jeans, Chasin, Just Brands, Coolcat, America Today, Kuyichi, and Imps & Elfs. Gwen Cunningham, when interviewed, described the project as follows: “I think that there is a huge value to be added in bringing SMEs together, even with bigger companies - so that they can learn from each other, and use their collective power to implement change [...] Having large and small companies working together in a pre-competitive space is truly inspiring and I believe this level and type of collaboration can help to push circularity forward” (personal communication, July 7<sup>th</sup>, 2017). This quote recognizes the role that SMEs have within the system.

Eric Roosen, owner of Star Sock, agrees with this vision too, and claims that “working together is the key for small enterprises to make their goals bigger. You have to share your small ambitions to transform them in real ambitions” (personal communication, July 6<sup>th</sup>, 2017). Through the project Healthy Seas, which is described in Figure 5-2, Star Sock proved that it is possible to create cross-sectoral cooperation. Healthy Seas is a cross-sector initiative created by two NGOs (Ghost Fishing and ECNC Group) and two businesses (Star Sock and Aquafil Group) that have joined forces to tackle the problem of marine litter by bringing together divers, fisheries, NGOs, governments, communities as well as salvage, recycling and production companies. Their innovative model shows that SMEs should take advantage of the power that connecting different abilities and interests could guarantee them. Star Sock through the participation in this project, gained an eco-advantage, intended as “delivering environmental and social benefits in the pursuit of economic success (Oxborrow & Brindley, 2013).



Figure 5-2. Cross-sector initiative: the Healthy Seas

Source: Own elaboration

## 5.6 The role of suppliers and shared-orders platforms

According to the findings, many different barriers identified are linked to the role of suppliers. The second most applied SDS relates to ethical production, which means that SMEs in the market are currently looking for suppliers and manufacturers that share their green vision, and also local production seems to be of interest for fashion brands. Moreover, in their research for the right supplier, labels deal also with the issue of minimum order quantities and availability of sustainable materials, which consequently lead to price premiums and high lead times, common obstacles among SMEs.

As explained when listing the possible sustainable design strategies, building lasting relationships is essential though not necessarily easy (Malem, 2008). The alignment of goals and aspirations of buyers and suppliers, pursued by Cox (2004), is not always a reachable goal for SMEs. Indeed, what it came out from this research is that if we consider the Power Matrix developed by Cox, most of the time labels find themselves in a situation of “supplier dominance” (Appendix V describes the other possible power regimes in the market). Supplier dominance means that: a) there are many buyers - in this case many labels, but few suppliers; b) the buyer has low share of total market - because of its small size; c) supplier has no dependence on buyer for revenue - because usually SMEs’ orders quantities are limited; d) suppliers’ offering is relatively unique - because sustainable materials are not always available; e) buyer’s switching costs are high - because of the lack of resources and time that; g) supplier has information asymmetry advantage over buyer (Cox, 2004, pp. 352).

What usually happens to SMEs is clearly described by I.17: “I want a locally-produced product, so that I know under which circumstances my clothes are made, but it is hard for a small brand to get a good working relationship, because many times when the factories have some bigger clients, my clothes are not made in the time that we set up before, so that’s why I have been forced to shift to different factories many times”. This is a concrete example indicating that suppliers have a big role to play in allowing the fashion system to become more sustainable. For the reasons explained in Section 4.2.1, suppliers require minimum orders, and considering that they are commercial enterprises, it is unlikely that they will jeopardise their own profits. As discussed in Section 5.5, however, collaboration could play a big part in this green transformation: so, even collaboration with suppliers could represent a viable solution.

The results also showed that 22% of the interviews realize the importance of technologies in facilitating this green transformation, but most of them were limited to the advancement of recycling processes. If we consider the broader range of technologies, it would be possible to take full advantage of the possibilities that a digital transformation would allow to achieve.

Digital disrupts the way we produce and consume, and creates innovative business models established by innovative technologies. New technologies have been able to connect people and actors together across the world, and it seems that this kind of networking is appreciated by SMEs, because they mentioned associations and platforms as a valuable resource that support them and keep them abreast on what new is on the market.

The different brands interviewed (and those analysed through their websites), seem to share similar needs and face similar challenges. So, one of the main goal should be the connection of those brands having similar needs, but operating in different markets. Considering the urge of solving the issue of minimum orders, technologies could be used to try to find solutions to remove this obstacle. One example could be the creation of some kind of platform which is able to collect the small quantities ordered by different brands, creating a bigger batch, and consequently closing the distance between actors (as shown in Figure 5-3). 100 meters as a minimum order quantity could be unaffordable for just one SME, but could instead be achievable by several brands that decide to cooperate in order to reach their goals, which in this case is the selection of the sustainable materials that they want to propose on the market without compromising. Moreover, choosing a classical design, without prints, would guarantee longevity. This would mean re-gaining their power as product developers, because the importance would be how the garment is created.

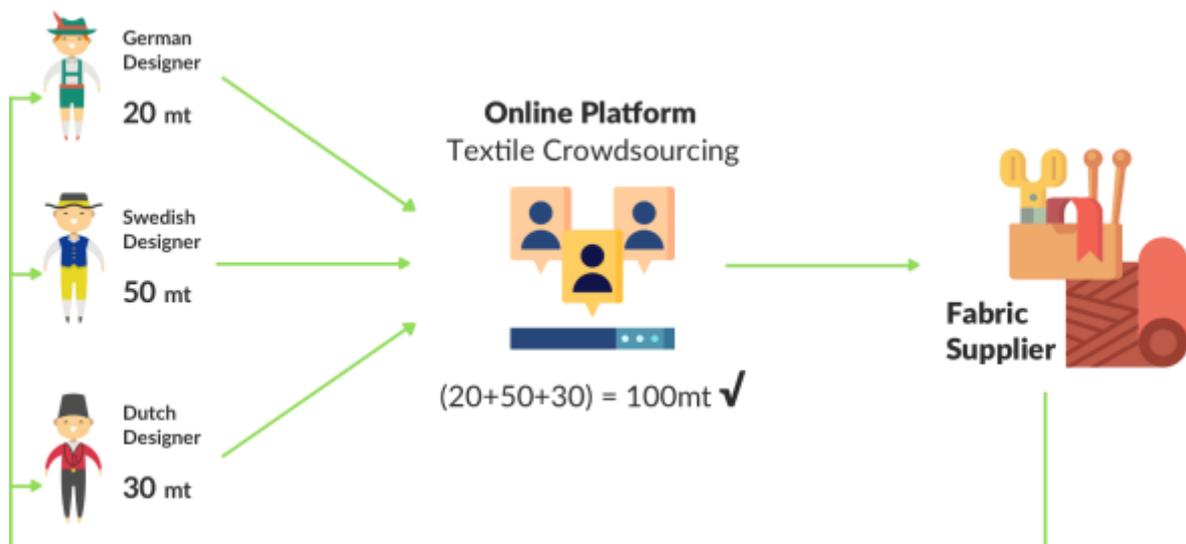


Figure 5-3. Shared-orders platform

Source: Own elaboration

When asked I.17's opinion on this idea, the interviewee stated: "Of course I would use it! I consider my brand more as a tool in the bigger picture, so my real goal is to make the fashion industry a better place [...] I think it really depends on what kind of design you make with it, so I don't think it would be a disaster if a couple of brands have the same sort of fabrics". Moreover, depending on the amount of the order, it could be asked to suppliers to provide different pieces of fabric that have the same warping yarns, but different weft yarns. This would result in even different textile design, within the same batch.

These tools aiming at bringing actors together and sharing challenges, could be appreciated by sustainable labels. This system would allow SMEs to finally source the sustainable materials they want with the possibility of having them for a lower price, because the order would not necessarily be minimum quantity anymore. Moreover, the suppliers, by having more sustainable-

materials orders, could start increasing the amount of sustainable materials produced and kept in stock, which would facilitate the access to those materials also to other designers.

Moreover, as already mentioned, to finally close the loop, it is also necessary to start addressing the materials that flow within the system, because to obtain high-quality output, the input cannot be the low quality garments that currently are discarded. Last but not least, this platform would avoid any fabrics to be wasted, because the order would just be confirmed when the necessary meters are ordered by the different brands and the required minimums are reached.

## 5.7 Circular fashion brands and circular system

### 5.7.1 A circular-supply chain is not yet in place

There is a lot of discussion around circularity and circular businesses, but is there already a system in place that would allow sustainable fashion SMEs to become circular? According to Gwen Cunningham, Lead of Circle Textiles Programme at Circle Economy, is not. She stated: “There is no circular textiles system yet, so many brands have circular intent in a linear world. Moving to a fully closed loop system requires that you set up your own circular supply chain which means that a brand's concerns should move from only finding the right fabrics and suppliers, to finding the right collection partners, the right textile recycling partners, the mill that can process the recycle content, etc. [...] a standard “plug and play” circular supply chain unfortunately does not exist yet. Various brands are starting to design for (re)cyclability, but in reality, when that 100% recyclable garments reaches end-of-life, it will probably end up not being collected and going directly to landfill or incineration, or if collected and non-rewearable, it will probably be downcycled” (Cunningham, personal communication, July 7<sup>th</sup>, 2017).

A circular (or reverse) supply chain means that all actors involved, and shown in Figure 5-4, are defined and are aware of how their individual role fits into the bigger picture.

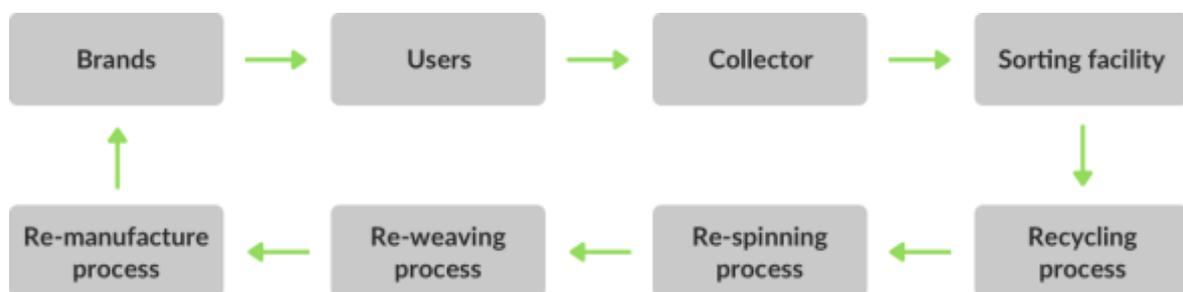


Figure 5-4. A circular fashion system

Source: Own elaboration

First of all, users need to be involved in this process; however, most of the time brands do not have contacts with their own consumers. For example, most of the brands interviewed seem to favour a “Design for durability” strategies, instead of optimizing the end-of-life of their products. In the literature review it has been mentioned that in applying a Timeless design principle it is important to understand consumers’ expectation of durability: are consumers really conceiving their products as made for longevity? Are they treating these garments differently? However, labels do not seem to have investigated the efficiency of their practices yet. So, in order to convince consumers to bring back their clothes, a deeper understanding of their behaviour should be prioritized by labels, which are the closest point of contact. Moreover, some of the challenges faced by the recycling industry are made worse by poor relationships between textiles producers and recyclers, so again cooperation seems to be a necessity.

An important barrier that should be discussed is the recycling technology currently available on the market. Currently there are two main methods: chemical recycling and mechanical recycling, as described below (TextileToday, 2010; Global Fashion Agenda, 2017):

- Chemical recycling can produce fibres of a quality comparable to that of virgin materials, but only polyester and certain nylons can currently be reprocessed using this technique (Gould, 2015) at large scale, and it adds chemical by-products to the product.
- Mechanical recycling is mainly used for natural materials, but the shredding usually leaves the individual fibres shorter, and this is the reason why it is rare to find garments on the market that have more than 20% recycled content. So, it is considered a downcycling technology, because it reduces the quality of the material over time and create a lower-value product.

According to Textile Value Chain, due to the high capital investment requirements, chemical recycling method can be applied just by large-scale manufacturers, which can achieve cost efficiency by reaching capacities of 50.000 tons per year (Agrawal, 2015). Moreover, according to McGregor (2015), “an accurate and efficient way to sort products based on material composition is currently non-existent”. Hand-sorting is time consuming and costly, and labels are often inaccurate, so high-value recycling and circular textiles have not been a real option up until now. Moreover, existing methods do not allow to separate dyes and other contaminants from the original fibres, which means that the resulting fabric must be over-dyed into black or grey.

Finally, another issue that is challenging the end-of-life of garments, is related to blended-fibres fabrics, like poly-cotton, or mixed with elastane, which cannot be separated and reprocessed. This precludes recycling with current technologies, and this is the reason why the use of 100% mono-material nowadays is the only principle that would guarantee that the garment could be easily recycled. However, the application of this principle does not come without struggles, because “the devil is in the details”, and one of the main challenge for sustainable brands is the sourcing of zippers, threads and all the other fixture products, which are sustainably-produced, because otherwise their circular effort becomes vain. Moreover, designing by using mono-material can affect the style of the garment, which is something SMEs claimed cannot be compromised.

To recap, currently it is difficult for SMEs to become circular brands. Firstly, because a circular system does not exist yet, so even if these labels decide to adopt a design for recyclability approach, their products will probably end up in the same waste stream as the rest of the other garments. Moreover, for their clothes to be fully recyclable, brands should create mono-material products, because currently there is no available and industrial technology that allows blends to be recycled at large. It would be like asking sustainable fashion labels to create their collections using just mono-materials, even if this means higher prices - blended fibres are the most used fibres because of their performance and their price - and less competitiveness, because consumers might not be willing to pay the price premium that it is necessary to incorporate in the final selling price. Without, on the other hand, giving these brands any guarantee that their efforts could eventually result in a positive outcome in terms of keeping the value inside the loop.

### **5.7.2 Need of technologies development**

However, the change is on the edge, mainly because the environment needs it, but also because of the economic gains that this will allow to obtain. As reported in the Pulse of the Fashion

Industry, “a large opportunity for value creation awaits the world economy if the fashion industry manages to convert textile waste into raw materials using advanced recycling techniques” (2017, pp. 12). Currently, the amount of recyclables [which are items unfit for reuse] is increasing, but the quality is getting lower (Lockerbie, 2015). The author in this section describes three of the most interesting projects that are trying to challenge the current system, to prove that there are different actors that are already developing the technologies needed. Even if yet not ready on a large scale, it is important to mention them to share good-examples and best practices and to highlight that special Europe-wide support should be given to these initiatives.

### **Re:newcell**

If we consider the viscose fabric, today it is not generally recycled (Green Strategy, 2017). However, the use of cellulosic fabrics is expected to grow in the near future, so it is important to address what could be done with garments produced using this material, once they reach their end-of-life.

The Swedish company Re:newcell, founded in 2012 by a group of researchers from the Royal Institute of Technology in Stockholm and a small investment company, has been able to develop a patent process that converts cotton and other cellulosic fibres like viscose into a dissolved cellulose that can be spun into new viscose yarn. Recycling 1 kilogram of cotton would conserve 3.6 kilograms of carbon dioxide and 6,000 litres of water in the apparel manufacturing cycle (Scarano, 2016), so this innovation represents an important achievement. The textiles are ripped and dissolved, and this process allows the separation of cellulosic fibres from non-cellulosic fibres (like oil-based fibres) and non-textile components. The two main challenges faced by the company have been the range of pollutants found in raw material (like flame retardants), and the range of dyes used, which led to a decolourization before process. The greatest innovation of this technology, however, is that the tests made on the new fibres seem to reveal that the quality is comparable to the original ones (Re:newcell, 2017). In September 2016, the Swedish government-owned investment company, Fouriertransform, and private investor Girincubator, invested \$5 million in Re:newcell, to build the world’s first recycled textile pulp production facility in Sweden, which opened this year in Kristinehamn. It is still a demo plant, capable of producing 7.000 tons of pulp each year, but scalability is possible and expected.

### **Reblend**

Reblend is a start-up created in 2013, with the aim of recycling post-consumers blended fibres, and thanks to a collaboration with the University of Niederrhein, Faculty of Textile and Clothing Technology in Germany, and the Spanish company Recover, and in 2016 they created the first industrial produced batch of 6000 kg yarn made from 100% recycled from post consumer waste. When interviewed, Anita de Wit, founder of the company stated, “I think we have explicitly chosen to show that you can make a high design by using circular materials” (personal communication, June 29<sup>th</sup>, 2017). Indeed, they primarily partnered with brands to bring this innovative material on the market, while now they decided to move from just B2B to B2C.

The company is currently working with poly-cotton blended fibres, and uses post-consumers’ textile waste (>70%) in a process that does not require any water, additional chemicals or dyeing to make the new yarn. They have been able to set up an efficient circular supply chain. First, post-consumer garments are collected and sorted - also based on colours - by Sympany, a Dutch charity, and successively colour-sorted textiles are transported to Recover. Here textiles are stripped from non-recyclable pieces such as zippers and buttons. The cleaned textiles are then cut, mixed with recycled PET from bottles and pulled into fibre by Recover. By mixing colour-sorted post-consumer textiles according to the trade secret process, 80% of the dyeing process that would be necessary with virgin raw materials is just avoided. Yarns are finally transported

back to the Netherlands, where weavers & knitters can produce different types of textile products. Circle Economy performed a Life Cycle Assessment on the white-cream recycled yarns to estimate the environmental impact savings, and the analysis showed a decrease in energy use by 33%, a reduction in water consumption by 62%, and a decrease in greenhouse gas emissions by 18%, in comparison with virgin yarn of similar composition (Smits et al., 2016).

### **Fibersort**

Another important issue that has been identified connected with recycling is the fact that an efficient way to sort products based on their composition does not exist; moreover, labels inside garments can be inaccurate. To solve this issue, Fibersort stepped in. It is a technology developed by Valvan Baling System, that allows automatic sorting of large volumes of mixed post-consumer textiles by fibre type. Consequently, high value textile will be supplied to textile recyclers, who could provide a better-quality output themselves. The scanning technology uses NIR Spectroscopy: it is a spectroscopic technique based on molecular absorptions measured in the Near Infrared part of the spectrum (Valvan, n.d.). The NIR technology used for sorting textiles by fibre composition is similar to one used by NIR sorters for plastics polymers. As this technology allowed to have more clean streams and higher value recycling in the plastic industry, similar results could be obtained by implementing the same technology in the clothing industry.

### **5.7.3 Circularity: a step too far for SMEs**

The results from this study show that SMEs interviewed seem to introduce sustainability in their product creation with a step-by-step approach, so they apply the different sustainable design strategies previously described when it is feasible for them, one after the other. As summarized in a comment from I.15: “Rome wasn’t built in a day”, which means that implement such changes requires time. Considering the different issues and challenges that have been listed, fashion brands are forced to make trade-offs: when it comes to include the different sustainable practices, it is not a matter of knowledge, but more the need to stay competitive on the market. Moreover, they argue that before approaching circularity, there are other steps that should be prioritized in the industry. When they have been asked about their idea and vision on circularity, almost all of them stated that they are aware that this concept represents the future for the fashion industry and businesses in general, but they consider it to be something still very far from their current business model. This observation led to two important considerations.

First of all, the concept of circularity and circular economy is based on the establishment of this mind-set at large, which involves a reconsideration of the entire current model, where new approaches and new businesses are proposed. By considering circularity as simply the “next step” in this step-by-step approach that has been adopted so far, there is the risk of falling into the same old pattern of making environmental changes, and remain symptom-focused. Instead, in this prospected new economic system, it is necessary to re-think the way products are created and used.

In order to unleash the potentiality of circularity, it is necessary to first understand what it really requires from brands the fulfilment of this new concept. Labels should start designing and conceiving products differently: not considering just Timeless design as a viable solution for extending the lifespan of a product, but explore approaches such as modularity, co-creation, disassembly and repair. Brands should rethink of the role that partnering with complementary counterparts could have in this new system: as it has already been highlighted, other brands do not have to be perceived necessarily as competitors, but they can be possible collaborative players. This would be possible if the design re-gains the position that it used to have, when the style and the values expressed by one brand determined the uniqueness of the brand itself, away from the off-shelf clothing culture. Labels need to re-think the way users interact with their products, because this would allow them to re-gain also the power that their role as product

developer possesses and start ideating again based on functions and values. New models have to be investigated, like product-service systems that emphasize the possibility to focus and satisfy consumer needs in a competitive way and with a lower environmental impact, by creating offerings in which consumers purchase functions instead of buying products (Mont, 2002). By shifting the costs of ownership from consumers to retailers, the focus would automatically move away from product obsolescence to longevity and reusability.

The second consideration to address, is that we should not take for granted that sustainable SMEs will eventually move towards circularity just because they are more knowledgeable of the environmental damages that the fashion industry is responsible for. Circularity is one model that falls under the umbrella of the possible pathways to undertake to achieve a sustainability transformation of an industry; however, sustainability today does not necessary means circularity for enterprises.

The hypothetical achievement of this industry transformation is described by Hockerts & Wüstenhagen (2010) and shown in the Figure 5-5.

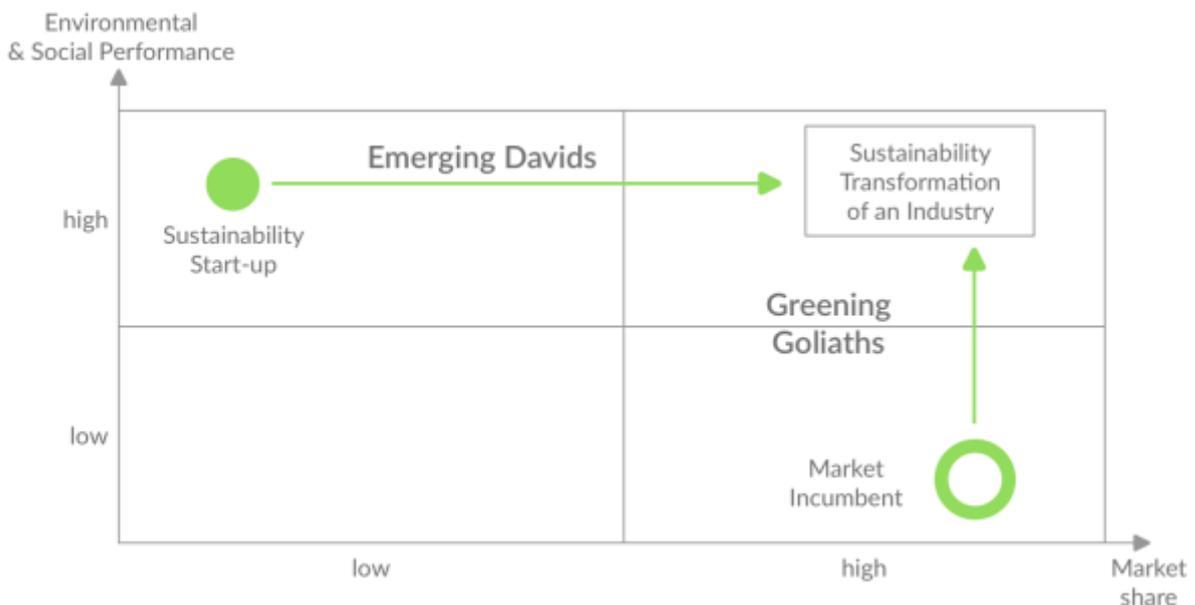


Figure 5-5. A Co-evolution of sustainability start-ups and market incumbents

Source: Own elaboration. Adapted from Hockerts & Wüstenhagen (2010, pp. 488)

According to their study, in order to achieve the industry’s sustainability transformation there is the need to have two main actors that interact together, allowing a co-evolution. There is the need to have “Emerging Davids”, which are typically small firms and new entrants that launch sustainability innovation in the market because their model allows more flexibility and adaptability. However, due to their low market share, there is the need to have “Greening Goliaths”, which are leading premium brands who can capitalize on the growing trends and spread the innovation in the market. This idea is shared by some of the interviewees; also Eric Roosen states, “Small companies can innovate, for them it is easier, but to scale innovation you need bigger companies, because they are the gateway for big consumer numbers” (personal communication, July 6<sup>th</sup>, 2017).

However, this consideration of the market transformation seems to leave out those enterprises that have low market share and low environmental performance, which if we consider the fashion industry, represent 90% of the market. It seems that those non-sustainable fashion

SMEs have not been targeted and helped in their sustainability transformation so far. This assumption is supported by the data collected from the findings: 15 brands over 18 interviewed have created their labels based on some sustainability values, and the analysis of the 60 websites led to similar results. These companies can be considered as “Emerging Davids”. Just three brands have been fulfilling the sustainable transition, starting from being a non-sustainable brand to the inclusion of sustainability considerations as part of their core business.

They are part of that smaller group of SMEs that, even if not proper Goliaths because of their smaller size and potential to spread innovation on the market, have understood the potential and applied the necessary changes to become environmentally responsible. Obviously, the numbers are still too small for allowing a generalization; however, since the start of the sustainability movement, it seems that the market have experienced more the creation of new sustainable fashion labels instead of witnessing the shift towards sustainability from older enterprises.

If we consider circularity now, the same pattern seems to be in place. The market is currently experiencing the launch of new businesses and start-ups, the new Emerging Davids, like Vigga, MUD Jeans, Reblend, which based their entire business model on circularity. These breakthrough innovations will eventually be spread on the market by bigger brands. However, equally important is to address and bring on board those sustainable (and even yet not sustainable) enterprises that are currently considering circularity as a step too far from them.

Obviously, once a circular system will be put in place, the shift will be facilitated; however, it is important to remember that still nowadays circular design is not taught in design schools as a mandatory course. So, in order to avoid misinterpretation, it is important to start creating initiatives that target specifically these businesses and provide practical examples and roadmaps that show how to integrate those principles and how to prioritize them. It is important because considering the substantial impacts that SMEs have collectively, it is not wise to rely just on start-ups to bring circular innovation in the market.

## 6 Reflections on the research approach

The findings of this research have been discussed in the previous chapter. In this section of the study, the author mainly focuses on reflecting upon the analytical framework used and the methodology applied in this thesis.

### 6.1 Discussion on the analytical framework

This thesis aims to provide inputs and enhance the understanding of the issues surrounding sustainable fashion SMEs. To guide this research, three main questions have been investigated: RQ1 – “Which sustainable design strategies are SMEs in the fashion system mainly implementing in their products’ creation?”; RQ2 – “Which are the barriers that sustainable fashion SMEs face when including sustainability aspects in their products? And the drivers?”; and RQ3 – “What is the perception of sustainable fashion labels with regards to circular fashion and circular issues?”.

The intended outcomes of these questions are: 1) identify on which product-related strategies, SMEs in this market are mainly focusing on; 2) analyse which are the barriers and drivers for these brands when engaging in sustainability; 3) investigate if they are ready and have the means to move towards adopting circular models.

Overall, the author concluded that the research conducted has been able to respond to these three research questions, even if not exhaustively because the numbers do not allow for a real generalization. Moreover, some limitations related to the data collection like for example the difficulty in finding an organization or association that could share its contacts, contributed in shaping the research approach adopted. However, it should be remarked that the approach adopted was mainly exploratory, so further research should be conducted on quantitative data, which will be further discussed in the following section.

### 6.2 Discussion on the websites analysis

Due to the lack of available data on the approaches that SMEs favour to adopt when it comes to the product level, this thesis mainly focused on the examination of the “About”, “Story”, “Philosophy” pages of various brands’ websites when examining the application of SDSs among fashion labels. The analytical framework created for analysing those websites certainly may not be the only and ultimate one. Indeed, currently new researches are on the rise, which means that new principles and strategies might be developed. However, the author considered it complete enough to show SMEs a clear picture of the different design strategies that could be implemented in relation to a fashion product.

Other frameworks, as the two from which the author took inspiration, are valid and could be used to pursue a similar goal. The reason why a new framework has been developed based on the Eco-design strategies wheel, is because in the latter those principles whose aim is to prolong the lifespan of products are clearly expressed and presented. Both the websites analysis and the interviews seem to prefer principles connected to this strategy, instead of those related to the optimization of the end-of-life. So, in order to allow a more detailed analysis, the wheel presented by Van Hemel & Brezel provided more functionality, and was used as the base for further development.

One important limitation that should be addressed is the fact that what is communicated by brands on their websites, does not necessarily correspond to what is happening in reality, and it is not controlled or reviewed by third parties. However, the author assumed that, because the information is made public by brands, what is shared on their websites concerning their environmental efforts could be considered as a self-declaration of their current practices and

vision. For more accuracy, it could be interesting to create a survey to send to the same brands, so that they can describe in detail what they are actually implementing. Unfortunately, the author has not been able to find any initiatives willing to share their database of contacts in order to send a survey to a relevant number of sustainable brands. The Design for Longevity project, directed by Tobias Noe Harboe, in September will launch a design platform that will function as a dynamic toolbox for designers and product development teams across all garment categories. It could be particularly relevant to analyse the information that this platform will be able to collect, in order to expand on the current findings and add validity.

### 6.3 Discussion on the interviews analysis

The interviews conducted have been all planned, and some interviewees asked to receive the questions in advance; however, interviewees provide their honest opinions and perceptions, which was the aim of the study. Depending on the availability of the interviewee, the duration of the interviews has been different, but the average has been around 30 minutes. From those interviews that lasted longer, the author has been able to extract more data; however, only those topics that have been discussed with the majority of the interviewees have been considered in the coding process.

The author used MAXQDA as a software for coding the information which allowed transparency and objectivity. It proved to be a valuable tool in the analysis of data from different sources and stakeholders.

From the data obtained in the interviews, 16 brands can be defined as small enterprises according to the EU definition, while 2 enterprises, with more than 50 employees, are considered to be medium-size enterprises. Within these two companies, the communication manager and the sustainability manager have been interviewed, instead of the owner or founder. Consequently, their perception and point of view – because of the fashion ecosystem previously mentioned – could be slightly different.

The author is well aware that one of the main influential factors in the implementation of environmental practices is the number of employees; consequently, the classification of SMEs is wide and any initiatives that focus on engaging the SME sector should not only consider the differences between large companies and SMEs, but also the differences between micro, small and medium-sized enterprises. For this study, considering that the scope was mainly a preliminary research of this segment of the market, it was sufficient to use the wide definition of SMEs. In addition, it is impossible to check the exact number of employees of each company considered for the websites analysis. However, based on the results obtained from this research, it could be interesting to verify if the results may be different when focusing on a smaller group of enterprises that are part of this category.

Both in the analysis of the websites and the interviews, a closed coding and a deductive thematic approach has been used: the main findings have been summarized and clustered into groups according to the framework created for the purpose. Based on that, the content analytical procedure applied can be considered as a subjective interpretation, which means that possible biases cannot be entirely avoided.

## 7 Conclusion

In the last few years, EU has committed to a variety of environmental targets, and also started to produce various initiatives targeted at SMEs. This is a sign of recognition from the EU of the importance that SMEs have both from an economic and environmental point of view. However, in order for policies to be effective, they need to be tailored to the specific needs of each sector, and consequently it is extremely important to investigate current practices and current challenges faced by enterprises in this changing system. It is important to start a discussion with key stakeholders as soon as possible, in order to better refine specific circular economic opportunities and related barriers.

This thesis aimed to provide input to the process of helping SMEs implementing sustainable design practices and going further towards their journey to circularity. Intended outcomes have been: 1) understanding which SDSs could be implemented at product level, and which are the ones labels are focusing on, in order to better understand market's current practices; 2) the barriers that SMEs face when including sustainability in their products, but also the drivers that push them in becoming sustainable fashion labels, in order to be able to better identify initiatives that will hinder current barriers while incentivize current drivers; 3) the perception that sustainable fashion brands have on circularity, in order to better identify the current issues that hold back a circular system to be developed and to highlight which aspects policies should mainly consider in order to facilitate the shift of these labels towards circular economy. A summary of answers to the research questions is presented below.

### 7.1 Research questions

RQ1: Which sustainable design strategies are SMEs in the fashion system mainly implementing in their products creation?

Environmental and social considerations should be included in the design process as colour, texture or proportion considerations are essential aspects in the process. However, even if findings might prove that there is cultural shift on the way, at present it seems that the mind-set governing the system mainly relates to business or design as usual (Tham, 2010). Indeed, the findings showed that currently sustainable fashion SMEs are mainly focusing on the Materials Selection principle and Ethical production, and are yet not fully applying a lifecycle thinking approach, which is mostly conceived by designers interviewed mainly as Timeless Design.

Obviously, it is extremely important to address materials selection, even in relation to the implementation of a circular system, because controlling the quality of the products that are introduced on the market, can consequently guarantee a higher quality of the same products when they will reach their end-of-life and will be recycled. Moreover, sustainable SMEs seem to be aware of the enormous social consequences of the fashion industry, thus trying to produce ethically and locally seem to be on the top on their priorities, but various barriers have been identified in the implementation of those practices.

However, the websites analysis also showed that brands do not seem to take into consideration the end-of-life phase of their product yet, and when asked to the interviewees if they apply a lifecycle thinking approach when creating their products, most of them claimed they mainly try to design for durability by adopting timeless design, but they do not have anything in place for keeping the value inside the loop when discharges by consumers.

RQ2: Which are the barriers and challenges that sustainable fashion SMEs face when including sustainability aspects in their products?

SMEs seem to have a proper knowledge of sustainability and circularity, but as commercial enterprises, there are trade-offs that they are forced to make. Their model, which shows more flexibility and adaptability, in addition to the fact that a smaller team is in charge of the design process, could facilitate the adoption of sustainable-product related principles. However, the barriers that they faced when introducing sustainability in their offerings are various: some could be considered as common barriers that SMEs face independently of their field of activity, such as lack of time, lack of resources and consumers' awareness.

Indeed, the literature pinpoints lack of consumers' awareness as one important challenge, together with lack of funding. Whereas, sustainable fashion SMEs identify consumers as important actors that could help them in driving the change; however, what they are mainly struggling with are suppliers and minimum quantities orders. Some other fashion-industry specific challenges seem to be the communication of their sustainability efforts to stakeholders and the impossibility of compromising on aesthetic qualities in order to stay competitive on the market.

Consequently, in this specific sector, initiatives that would shorten the distance between brands-suppliers would probably be more effective than just providing funding (even if of course financial aspects deserve special considerations). Fashion labels are just one actor involved in the bigger picture, so it is necessary to start adopting a system thinking approach in order to evaluate where in a system it is more effective to intervene to change its overall behaviour (Abson et al., 2017). Moreover, in order to establish a common playground for those companies that are really working towards creating a sustainable industry, the development of a "Fashion passport" that would guarantee a common playground, could be further discussed.

The main driver seems to be a personal commitment to not contribute to the degradation of our planet. Indeed, most of the brands in this analysis have been created based on some sustainability values, with the intent to prove that it is possible to create responsible products. So, considering the power that the company culture has on shaping its vision, education and knowledge sharing should be promoted in all its forms.

RQ3: What is sustainable fashion labels' perception of circular fashion and circular issues in general?

Sustainable labels seem to know that circularity is the direction that every business will eventually undertake. However, they don't seem to be ready to implement the necessary changes to become circular brands. This perception is justified by the fact that currently a circular fashion system does not exist. So those brands that want to become circular need invest money and resources for the creation of their own circular supply chain to include the actors downstream: the appropriate collecting partner for collection and the right recycling partner able to process the recycle content, and more importantly, they need to involve consumers in taking back the clothes they no longer use. So, projects that aim at bringing at the same table different actors able to create such supply chain should be supported.

Moreover, the role that the technology could play is fundamental. Indeed, currently the safest way for brands to guarantee ease recyclability to their products is the use of mono-material, but this principle restricts the design possibility and performance of their garments. Moreover, to have a 100% one material clothing various barriers are faced by brands in finding the sustainable zippers, or button, or other finishing products, so it is not always possible for them to create

such clothing. Consequently, it is unlikely that labels will eventually stop using blended fibres. Therefore, it is necessary to develop the technologies that will eventually allow garments to be properly sorted and successively recycled, to finally close the loop.

## 7.2 Recommendations for policy-makers

The findings of this study indicate that SMEs face various challenges. In order to facilitate the shift towards more sustainable-product related practices, various types of government actions would be of use. This section provides some insights of the concrete policy actions which could be adopted that are in line with the findings, also considering that policy-makers have been mentioned as one possible intended audience of this research.

To summarize such policy actions, the author decided to use the framework created by Ellen MacArthur Foundation. Ellen MacArthur Foundation (2015a) identifies six key categories of policy interventions, which are: education, information and awareness; collaboration platforms; business support schemes; public procurement and infrastructure; regulatory framework; and fiscal framework, which are shown in the Table 7-1. The column “Suggestions from this study” refers to the author’s findings within the specific sector which is the fashion industry. However, this list does not claim to be exhaustive, because among these six key categories various initiatives and policies could be implemented, but it just reflects the analysis of this study.

Table 7-1. *Suggestions of Policy interventions*

Policy intervention type	Suggestions from this study
Education, Information and awareness	Integration of circular economy/systems thinking into school and university curricula
	Public communication through labelling schemes
Collaboration platforms	Public-private partnerships with businesses at national, regional and city level
	Encouragement of voluntary industry collaboration platforms, cross-sectoral initiatives and information sharing
Business support schemes	Financial support to business through direct subsidies
	Technical support, advisory, and training
Public procurement and infrastructure	Public investment in infrastructure, and set up a proper system for recycling
Regulatory framework	
Fiscal framework	VAT or excise duty reductions for sustainable or circular products and services

For what it concerns *Information and Education*, considering that the concept of circular economy is not widely known and assimilated by the public or business community, policy interventions aimed at increasing awareness play an important role, by integrating the discussion into schools or university curricula, because fashion designers need to know what it means to design a sustainable or circular product. Moreover, it has been highlighted the importance of product labelling: eco-labelling can represent a useful tool for governments in encouraging sound environmental practices, because these schemes generally work towards the fulfilment of three main goals: 1) protecting the environment, 2) encouraging environmentally sound innovation and leadership, 3) building consumer awareness of environmental issues.

*Collaboration platforms* can involve various forms: including industrial symbiosis, public-private agreements, R&D clusters and voluntary industry initiatives. The importance of collaboration has been widely discussed, and companies can benefit from industry collaboration platforms if when looking for partners they face high transactions costs or lack of information. The shared-

orders platform suggested tries to address this issue, but it is just an example of feasible platform that could be centred on some association, institution or even a company, with also the government involvement.

Policy interventions in the case of *Business support schemes* can take the form of financial support, such as grants and subsidies, but can also provide technical support, advice, training, demonstration of best practices and development of new business models. Indeed, interviewees mentioned this kind of support as a valuable mean to incentivize more enterprises. Indeed, in the case of SMEs most of the time they lack the financial resources, but they also lack the internal capacity and time to understand the benefits of such changes, so the technical support could be very beneficial. Advice would be advantageous also in terms of sharing of good examples and best practices, in order to show labels how to effectively achieve the transformation towards circularity.

In the analysis, the author found out that one of the current issue when it comes to the fashion system, is that a circular system is not yet in place. If there is an insufficient *public infrastructure*, in terms of waste collection and sorting systems and treatment facilities, the public sector could provide investments that would enable private-sector circular economy activities and boost potential investments.

When it comes to circular fashion, there is an inadequately defined *Regulatory framework*, so new regulations may be needed (Ellen McArthur Foundation 2015a). According to the EMF, such interventions can come in the form of implementing existing restrictions or setting a positive legal framework for circular economy activities. However, *Regulatory framework* have not been properly discussed with fashion SMEs in this study, so this part would deserve more investigation.

Last, fiscal instruments could address barriers related to the profitability of companies and externalities that are not included in the final price. These instruments could be applied both to discourage non-sustainable activities, or to explicitly support circular economy opportunities. Thus, considering that one of the main barrier identified in this study is the price premium for sustainable materials, reduced or eliminated VAT on goods produced from recycled materials or sustainable materials could be an interesting option to investigate, together with tax credit in favour of those brands that are closing the loop. Labels are mainly commercial enterprises, so it is necessary to increase the benefits that they could obtain if a change in their business model is achieved.

### 7.3 Further research

This study identified several gaps in knowledge that could be addressed in future research. Since this thesis is mainly based on interviews, this may limit the final results. Indeed, the numbers do not allow for a proper generalization of the findings, so another research addressing a bigger sample of companies could be conducted. Moreover, just brands that consider themselves to be sustainable have been analysed, so it could be valuable to add the perception of non-sustainable enterprises who do not consider themselves as being sustainable, in order to be able to compare first if the barriers perceived correspond to the ones faced by sustainable brands, and second to check if they share the same idea of circularity.

Another aspect that could be investigated is the design stage: as previously described, it is important to keep in mind that different roles and figures might influence the creation process. For example, R&D materials or sourcers have a lot of power, because they research and present the fabrics to the designers who will choose among those for the collection. So, it could be interesting to investigate their sustainability knowledge and if they are making any sustainable

considerations when choosing a fabric. This is just one example of the several actors that are part of the fashion ecosystem, but currently not well-addressed by researchers yet.

Last, results showed that sustainable fashion SMEs seem to consider circularity an interesting concept, but not applicable at the moment. Similar researches could be conducted in other sectors, in order to analyse if this is a consistent pattern among sustainable small enterprises, or if because of some intrinsic characteristics, it mainly affects the fashion system.

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## Appendix I. List of websites analyzed

Name of the brand	Country	Website	Interviewed ?
1. Stanley and Stella	Belgium	<a href="https://www.stanleystella.com/en/">https://www.stanleystella.com/en/</a>	Yes
2. Sennes	Belgium	<a href="http://www.sennes.org">http://www.sennes.org</a>	No
3. Ilke Cop	Belgium	<a href="https://www.ilkecop.com">https://www.ilkecop.com</a>	No
4. Barbara I Gongini	Denmark	<a href="https://barbaraigongini.com">https://barbaraigongini.com</a>	Yes
5. September Salon	Denmark	<a href="http://www.septembersalon.dk">http://www.septembersalon.dk</a>	No
6. Carcel Carcel	Denmark	<a href="https://carcel.co">https://carcel.co</a>	No
7. Signe	Denmark	<a href="https://www.bysigne.com">https://www.bysigne.com</a>	No
8. Henrica Lang	Finland	<a href="https://henricalangh.com">https://henricalangh.com</a>	Yes
9. Myphilosophy	France	<a href="http://www.myphilo.com">http://www.myphilo.com</a>	No
10. Ultra-Tee	France	<a href="http://www.ultra-tee.com/en/">http://www.ultra-tee.com/en/</a>	No
11. Farrah Floyd	Germany	<a href="https://farrahfloyd.com">https://farrahfloyd.com</a>	Yes
12. Format	Germany	<a href="http://www.format-favourites.de/cms/">http://www.format-favourites.de/cms/</a>	Yes
13. Deepmello	Germany	<a href="http://www.deepmello.com">http://www.deepmello.com</a>	No
14. Alma & Lovis	Germany	<a href="https://www.almalovis.de">https://www.almalovis.de</a>	No
15. Armed Angels	Germany	<a href="https://www.armedangels.de/en/">https://www.armedangels.de/en/</a>	No
16. Treches	Germany	<a href="http://www.treches.com">http://www.treches.com</a>	No
17. Langer Chen	Germany	<a href="https://langerchen.com">https://langerchen.com</a>	No
18. Jay 'N June	Germany	<a href="https://jannjune.com">https://jannjune.com</a>	No
19. Sveekery	Germany	<a href="http://sveekery.berlin">http://sveekery.berlin</a>	No
20. Recolution	Germany	<a href="https://www.recolution.de">https://www.recolution.de</a>	No
21. Bav Tailor	Italy	<a href="http://www.bavtailor.com">http://www.bavtailor.com</a>	Yes
22. NVK Daydoll	Italy	<a href="http://www.nvkdaydoll.it">http://www.nvkdaydoll.it</a>	Yes
23. Good Society	Italy	<a href="https://goodsociety.org">https://goodsociety.org</a>	Yes
24. Quagga	Italy	<a href="http://www.quagga.it/en/">http://www.quagga.it/en/</a>	Yes
25. Cangiari	Italy	<a href="http://www.cangiari.it/en">http://www.cangiari.it/en</a>	No
26. Wave-O	Italy	<a href="http://www.wave-o.it/wave-o/Wave-o%20designed%20By%20Ondine%20de%20la%20Feld%20Home%20wa%20ve-o.html">http://www.wave-o.it/wave-o/Wave-o designed By Ondine de la Feld Home wa ve-o.html</a>	No
27. SkunkFunk	Spain	<a href="https://www.skunkfunk.com/en/">https://www.skunkfunk.com/en/</a>	Yes
28. Ecoalf	Spain	<a href="https://ecoalf.com">https://ecoalf.com</a>	No
29. Lifegist	Spain	<a href="http://www.lifegist.es">http://www.lifegist.es</a>	No
30. Boob Design	Sweden	<a href="http://www.boobdesign.com">http://www.boobdesign.com</a>	No
31. Ama Awe	Sweden	<a href="http://www.amaawe.com">http://www.amaawe.com</a>	No
32. Matilda Wendelboe	Sweden	<a href="http://matildawendelboe.se/sv/">http://matildawendelboe.se/sv/</a>	No
33. Mud Jeans	Netherlands	<a href="http://www.mudjeans.eu">http://www.mudjeans.eu</a>	No
34. Kuyichi	Netherlands	<a href="https://kuyichi.com">https://kuyichi.com</a>	No
35. Elsie Gringhuis	Netherlands	<a href="https://www.elsiengringhuis.com">https://www.elsiengringhuis.com</a>	No

36. Studio Jux	Netherlands	<a href="https://studiojux.com">https://studiojux.com</a>	No
37. Paala	Netherlands	<a href="https://www.paala.nl">https://www.paala.nl</a>	No
38. Bright Loops	Netherlands	<a href="https://www.brightloops.nl">https://www.brightloops.nl</a>	No
39. Mantis World	United Kingdom	<a href="http://www.mantisworld.com">http://www.mantisworld.com</a>	Yes
40. Cream and Co	United Kingdom	<a href="http://www.creamandco.com">http://www.creamandco.com</a>	Yes
41. The Autonomous Collection	United Kingdom	<a href="https://www.theautonomouscollections.com">https://www.theautonomouscollections.com</a>	Yes
42. Creation 26	United Kingdom	<a href="http://www.creation26.com">http://www.creation26.com</a>	Yes
43. Rawan Maki	United Kingdom	<a href="http://rawanmaki.com">http://rawanmaki.com</a>	Yes
44. Ramnation	United Kingdom	<a href="http://ramnation.co.uk">http://ramnation.co.uk</a>	Yes
45. Choolips	United Kingdom	<a href="http://www.choolips.com">http://www.choolips.com</a>	No
46. Mayamiko	United Kingdom	<a href="https://www.mayamiko.com">https://www.mayamiko.com</a>	No
47. Ümran Aysan	United Kingdom	<a href="http://www.umranaysan.com">http://www.umranaysan.com</a>	No
48. Wool and the Gang	United Kingdom	<a href="https://www.woolandthegang.com">https://www.woolandthegang.com</a>	No
49. THTC	United Kingdom	<a href="https://shop.thtc.co.uk">https://shop.thtc.co.uk</a>	No
50. Bibico	United Kingdom	<a href="https://www.bibico.co.uk">https://www.bibico.co.uk</a>	No
51. Noctu	United Kingdom	<a href="https://www.noctu.co.uk">https://www.noctu.co.uk</a>	No
52. Misense by Mila B	United Kingdom	<a href="http://www.misensefashion.co.uk">http://www.misensefashion.co.uk</a>	No
53. People Tree	United Kingdom	<a href="http://www.peopletree.co.uk">http://www.peopletree.co.uk</a>	No
54. Thought	United Kingdom	<a href="https://www.wearthought.com/women/">https://www.wearthought.com/women/</a>	No
55. Tammam	United Kingdom	<a href="http://tammam.co.uk">http://tammam.co.uk</a>	No
56. Christopher Raeburn	United Kingdom	<a href="http://www.christopherraeburn.co.uk">http://www.christopherraeburn.co.uk</a>	No
57. Komana	United Kingdom	<a href="https://komana.myshopify.com">https://komana.myshopify.com</a>	No
58. Komodo	United Kingdom	<a href="https://komodo.online">https://komodo.online</a>	No
59. Beaumont Organic	United Kingdom	<a href="https://www.beaumontorganic.com">https://www.beaumontorganic.com</a>	No
60. Rapanui	United Kingdom	<a href="https://rapanui clothing.com">https://rapanui clothing.com</a>	No

## Appendix II. Semi-structured interview guide

### Introduction questions to contextualize the company

- 1) What is your role in the organization?
- 2) How many employees do work in your company?
- 3) How old is your company?

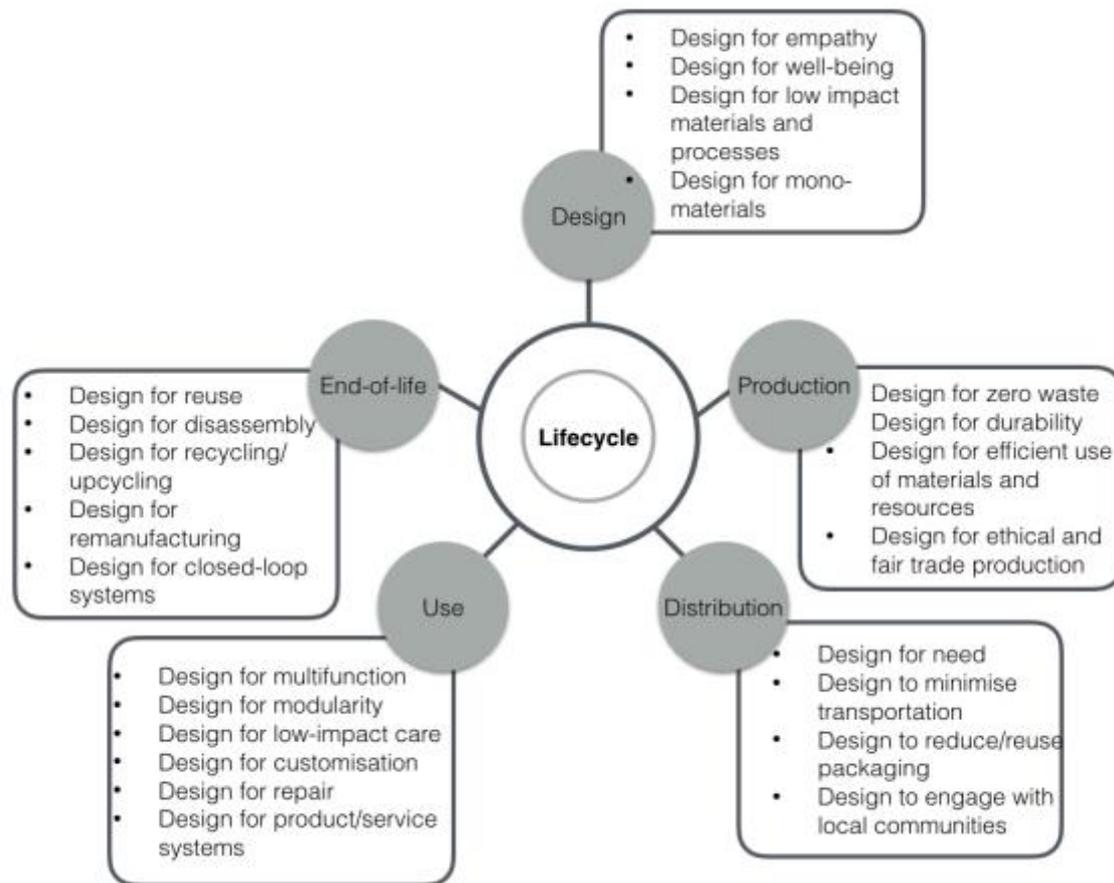
### *Core questions:*

- 4) Did you include sustainability in your product from the start of your company, or did you integrate sustainability aspects later?
- 5) You consider your brand has been sustainable: which sustainable design strategies are applied to your product?
- 6) Are there other sustainable design strategies that you would like to apply to your product?
  - a) If yes, which one? And why you don't implement those strategies?
- 7) What main challenges did your organisation face when including sustainability aspects in your product?
- 8) What have been the main drivers in choosing to integrate sustainability as part of the product's characteristics?
- 9) Do you think sustainability can turn into competitive advantage for SMEs?
- 10) Do you feel that sustainability, from a designer perspective, represents a limitation or an interesting and inspiring challenge?
- 11) Do you feel that the role of designers and fashion brands is changing to the extent that you're becoming also communicators and educators?
- 12) Have you been supported by any European or national program while starting your company?
  - a) If yes, could you list which one?
- 13) Do you apply a lifecycle thinking approach when developing your product?
- 14) How would you define circular economy and circularity?
- 15) What do you perceive as the main barriers to the implementation of a "circular" brand?
- 16) Would you consider the implementation of new strategies or actions in your brand to become more circular?
- 17) After this conversation, if you should list the three main barriers that you faced when dealing with sustainability, what would you say?
- 18) Do you use any website, blog, or journals to keep yourself updated on eco-innovation, like new materials or new processes?
  - a) If yes, could you provide any examples?

### *Final questions:*

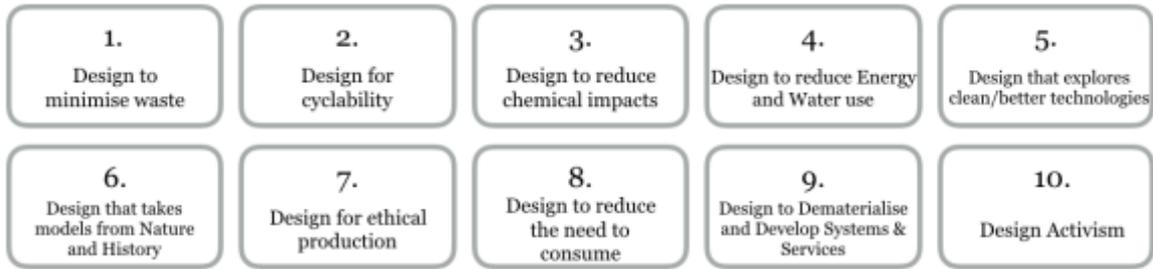
- Is there anything else you would like to add or ask?
- May I contact you for follow-up questions and clarifications?
- Would you like to have a copy of the audio and/or the final thesis?

## Appendix III. Allison Gwilt's framework



*Source: Own Elaboration. Adapted from Gwilt, 2013*

## Appendix IV. TED's framework



*Source: Own Elaboration. Adapted from TED (n.d.)*

1. Design to minimize waste. Examples: Slow design; Design for long-life and short-life applications; Zero waste cutting; Design with enhanced aesthetic value.

2. Design for cyclability. Examples: Design for recycling/upcycling; Design for mono materiality; Design for disassembly for the closed-loop systems of the future; Think re-useable/non-invasive installation or renewal.

3. Design to reduce chemical impacts. Examples: Seek organically produced materials; Use mechanical technology to create non-chemical decorative surface pattern; Create effects to replace materials and processes known to be harmful.

4. Design to reduce energy and water use.

*In the production phase:* Exhaust printing and dyeing; Dry patterning systems; Air-dyeing; Distributed manufacture.

*In the use phase:* Design for no/low launder; “Short life” textiles; Technical coatings to reduce washing; Innovative and informative labelling; Localisation; Natural energy systems.

5. Design that explores clean/better technologies. Examples: Bio-based materials and processes; 3-D printing; Laser; Water-jet; Sonic cutting; Sonic welding; Digital printing; ‘Re-surfacing’ of polyester; Novel dyeing techniques; Digital finishing; Tagging.

6. Design that takes models from nature and history. Examples: Shape-memory polymers to mimic natural movement; “Lotus effect” nano-coatings; Velcro; Austerity repair; Make-do-and-mend; D.I.Y/ punk customization; Modern nomads; Historic dyeing/ printing techniques.

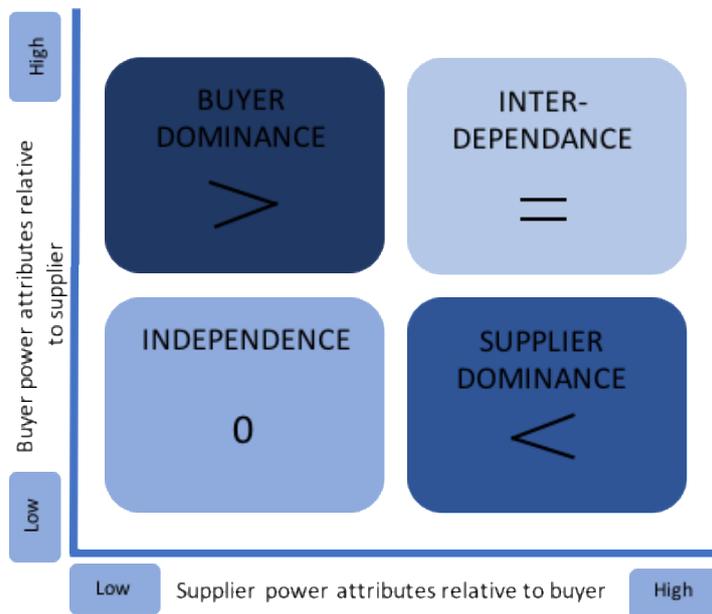
7. Design for Ethical production. Examples: Sourcing fair trade materials; Engaging suppliers who abide by codes of conduct; Vertical supply chains; Consideration of local resources; Designers acting as facilitators of sustainable enterprise in communities.

8. Design to reduce the need to consume. Examples: Emotionally durable design; Slow design; Consumer participation in co-design and collaborative consumption, crowd sourcing and social networks; Apps for bespoke information.

9. Design to dematerialise and develop systems & services. Examples: Lease; Share; Repair; Experience design; User-centered methods to design services; Collaborative online/local communities; Transition-towns.

10. Design Activism: Publications; Blogs; Open-source networks; Exhibitions; Conferences; Festivals; Social media; Manifestos.

## Appendix V. Power Matrix of Cox (2004)



Source: Own Elaboration. Adapted from Cox (2004, pp. 352)

The description of the four possibilities is provided by Cox in his research as follows (2004, pp. 352):

### 1) Buyer dominance:

Few buyers/many suppliers; buyer has a high percentage share of total market for supplier; supplier is highly dependent on buyer for revenue with few alternatives; supplier's switching costs are high; buyer's switching costs are low; buyer's account is attractive to supplier; supplier's offering is a standardized commodity; buyer's search costs are low; supplier has no information asymmetry advantages over buyer.

### 2) Interdependence:

Few buyers/few suppliers; buyer has relatively high percentage share of total market for supplier; supplier is highly dependent on buyer for revenue with few alternatives; supplier's switching costs are high; buyer's switching costs are high; buyer's account is attractive to supplier; supplier's offerings is relatively unique; buyer's search costs is relatively unique; buyer's search costs are very high; supplier has substantial information asymmetry advantages over buyer.

### 3) Independence

Many buyers/many suppliers; buyer has relatively low percentage share of total market for supplier; supplier has little dependence on buyer for revenue and has many alternatives; supplier's switching costs are low; buyer's switching costs are low; buyer's account is not particularly attractive to supplier; supplier's offering is a standardized commodity; buyer's

search costs are relatively low; supplier has very limited information asymmetry advantages over buyer

4) Supplier dominance:

many buyers/few suppliers; buyer has a low percentage share of total market for supplier; supplier has no dependence on buyer for revenue and has many alternatives; supplier's switching costs are low; buyer's switching costs are high; buyer's account is not particularly attractive to supplier; supplier's offering is relatively unique; buyer's search costs are very high; supplier has substantial information asymmetry advantages over buyer.

## Appendix VI. Examples of coding used for the websites analysis

Design for...	Examples of keywords identified on the designers' website that link their claims to the strategy
Lower impact fibres	"The designer uses only certified materials"; "we only use sustainable materials such as organic cotton, organic linen, organic wool, recycled polyester, Lenzing Modal® and Tencel®. To show that these are not just empty words, we have been GOTS certified since 2011"; "All of our organic cotton fabrics are either GOTS or IVN Best certified [...] Micro Modal® is produced of cellulose sourced from European beech trees"; "Organic is not just a trend for us it's our belief and taking responsibility and protecting our environment is not an option but a must"
Recycled materials	"Recycled PET"; "recycled nylon from fishing nets, recycled coffee grounds; recycled wool"; "recycled cotton"
Upcycled materials	"we use our scraps for creating details"; "he sources his fabrics from de-commissioned military stock and re-designs to create beautifully crafted garments"; "Known for its taste to utilise all of its textile production leftovers in innovative collaborations creating accessories"; "My favourite materials include unique end of roll fabrics and exciting finds from antique textiles markets"
Less toxic chemicals/water/energy in the process	"made with low impact dyes, and consume low amounts of energy during their production process."; REACH; "Use of hand-screen printing"; "using non-environmentally damaging natural dyes and traditional hand printing"; "wind powered factory"; "All of our dyes and printing inks are natural and/or organic"
Zero-waste	"every collection is designed using zero waste pattern making"; "During the production process, the reduction of waste is made a priority by using all components of sourced fabrics"; "Our new low waste (and certified organic) printing technology was developed to reduce wastage, cut costs, and improve print quality".
Efficient use of resources / Made on requests	"We do not do mass production but work in small series"; "We do not keep stock apart from what is for sale at SHIO store, so items ordered through our web-shop are often sewn after the order comes in"; "All items are produced on order."; "Utilise all of its textile production leftovers"
Few transparent production steps and collaboration	"All garments are produced in close cooperation with the suppliers"; "We have a contract with our manufacturer that strictly forbids to pass on our order to third parties so we can guarantee full transparency."; "It's important to us that we continue to work with some of the first factories we did when we founded the company. We've grown our businesses and skills together"
Ethical and Fair Trade Production	"Through a close and cooperative partnership with our suppliers and producers, we ensure that all products are produced under fair working conditions."; "Fair Wear Foundation Certification"; "we work exclusively with exemplary factories that protect rights of the men and women they employ and do their utmost to minimize their environmental footprint"; "We have a Code of Conduct"
Source or manufactured locally	"With the production of 100% Made in Germany"; "All our garments are produced in Wroclaw, Poland. Why Poland? Because we want a close-by production so we have an eye on what's going on"; "All production is made in Europe"; "Our organic cotton and our organic linen come from Europe and are processed there.
Use of artisanal techniques	"People Tree designers create beautiful clothes using hand skills for a simple reason: traditional skills such as weaving and embroidery provide livelihoods for artisans in rural areas across the developing world, meaning that they do not have to travel to the cities for work"; "For over a decade we have been building relationships with the most talented and dedicated craftsmen to create exquisite and exclusive sustainable luxury fabrics."

Cleaner packaging	“RePack is a returnable and reusable packaging that rewards you for every order”; “We go even further and save about 90 per cent of plastic through collective packaging and fabric bags”
Minimize transportation	“Design and development of the collection takes place in Berlin. As a result, the supply routes are short and the CO2 emissions are kept low”; “Smaller distances mean lower carbon emissions”
Low impact care	“A member of the Iprefer30 campaign”; “Wash at 30°”; “We teamed up with Seepje, a Dutch company who makes natural washing soap”
multifunctional / Not seasonal	“The label is anti-seasonal”; “One of our most valued goals is for the designs to be timeless. Our clothes aren't only available for one season”; “Instead of chasing the latest trends we focus on timeless design”; “They are independent from trends, versatile and minimalistic with original details”; “the label is globally inspired by climate change in nature and culture, therefore conceived as an annual wardrobe”
Modularity	None
Customization/ Co-creation	“The individual models of the collection can be customized”; “You buy a knit, and you knit by yourself”; “Each product is handcrafted and customised”; “Thanks to the direct control of all the production chain, our clothes can be highly personalized”
Repair	“We extend the life of damaged pieces by offering in-house repairing”
Empathy/Uniqueness	“Working with individual artisans means we can spend time on development of design and production and create small one off orders, meaning a lace we create for our clients is completely unique”; “When you buy a Mayamiko piece, you buy one of the only 10-15 pieces ever made in our exclusive fabric.”
Reuse	“Freepost anything that's got our name on it back to us at <a href="http://backtorapanui.com">backtorapanui.com</a> We'll give you a credit note”; “Returned jeans are upcycled and sold as unique vintage pairs”
Disassembly	“This ready-to-wear collection is designed to be 'mortal', meaning that once a garment eventually reaches the end of its life cycle, it is easy to take apart”; “That's why we don't use leather labels, but printed ones instead”
Recycling/Mono-material	“The starting point of our designs is recycling”; “All Memento Mori tops are made from 100% organic cotton jersey”; “100% Organic cotton”
Closed-loop systems	“In the circular economy waste is seen as a source of growth to make something new. We like the idea. That's why we create new jeans from our old jeans”; “We collect old (Kuyichi) jeans in selected stores to turn these into something new.”