



Copenhagen Business School  
MSc. in Social Science in Organizational Innovation and Entrepreneurship  
Master Thesis [Confidential]

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## One man's trash is another man's treasure

A qualitative case study aiming to explore the contribution of small and medium-sized enterprises' business models by creating value from waste to a sustainable transformation of the fashion industry

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Number of characters/pages: 181.986/ 67  
Date of submission: 02.01.2019

## Abstract

The fashion industry is a major contributor to waste and, thus, to environmental and social problems worldwide. This is especially the case because clothing production has doubled in the past fifteen years, while its utilization rate has halved. When evaluating this development in the context of increasing resource scarcity, rising earth temperatures and a growing world population, a transition from a linear to a circular economic system becomes imperative. Therefore, this study is concerned with fashion SMEs using waste materials and addresses how CEBMs – by *creating value from waste* – contribute to a sustainable transformation of the fashion industry. The purpose of this study is to shed light on the various opportunities and challenges of using waste materials for fashion SMEs and their role in a sustainable transformation. Since CE requires a collaborative approach, the results also provide valuable insights for other industry actors, such as larger companies, policymakers, educational institutions and consumers.

Following an interpretivist and subjectivist perspective, the researcher undertakes a qualitative case study. The data used was obtained from seven semi-structured interviews and two questionnaires with fashion SMEs using a total of eight different types of waste materials. Additional data was retrieved from two field-configuring events entailing fourteen informal interviews and field memos across various industry stakeholders.

First, this study identifies and categorizes the SME's experiences with waste materials into product-related, organizational and environmental/societal opportunities and challenges. While they vary based on the type of waste used, no universal conclusion on the potential of waste material can be drawn. However, the most cited challenges comprise of high prices, high minimum quantity orders, limited financial resources, difficulties in attracting investment, lack of consumer awareness, negative perception of waste and real environmental effect. In contrast, the relevant opportunities are unlocking new market potential, advertising advantage, creating awareness, fostering education and positive environmental contribution. Second, the data indicate that all of the SMEs examined also engage with other sustainable practices in addition to waste materials. These additional sustainable practices lie either within the “from waste to value” approach (e.g. take-back system) or beyond (e.g. clean energy). Third, the study's findings show that the role of SMEs in a sustainable transformation goes beyond simply creating a product from waste. To illustrate this, the researcher develops a *Typology of the roles of fashion SMEs in a sustainable transformation*. Accordingly, SMEs adopt at least one of the following roles: *Entrepreneurial Pioneer*, *Activist Educator*, *Connecting Orchestrator* and/or *Visionary Change Seeker*. Finally, while the environmental contribution of a SME depends primarily on the specific waste material and sustainable practices it uses, its social value, through creating awareness and changing the perception of waste, also has a major impact on the sustainable transformation. This study demonstrates the relevance of CEBMs and in particular, waste materials for SMEs. It further contributes to a comprehensive understanding of and appreciation for fashion SME's working towards a sustainable future.

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## Abbreviations

BM	Business Model
BMI	BMI
C2C	Cradle-to-Cradle
CE	Circular Economy
CEBM	Circular Economy Business Model
EU	European Union
NGO	Non-governmental Organization
SBM	Sustainable Business Model
SME	Small and Medium-sized Enterprises

## 1. Introduction

The IPCC (2018) special report on global warming and the research on planetary boundaries by the Stockholm Resilience Institute (Steffen et al., 2015) project a bleak future for the planet and humankind, if human activities continue unchanged. Four out of nine boundaries have already been crossed. With rising global temperature, more boundaries are likely to be passed, leading to further destabilization of the earth system (Steffen et al., 2015). This is why the Paris Agreement was entered in 2015. The Agreement commits over 200 signatory countries to keep the global temperature increase below 2 degrees Celsius, with an agreed aim to limit it to 1.5 degrees Celsius (UNFCCC, 2019). As CO<sub>2</sub> emissions are key drivers of global warming and thus climate change, entrepreneurial pursuits play a major role in this effort (The George C. Marshall Institute, 1992). The majority of businesses are rooted in a linear economy, in which valuable resources are extracted to create products that are used for a limited period of time and eventually discarded. Considering the impending scarcity of resources and increasing population growth, the prevailing linear economic system is evidently unsustainable (Circle Economy, 2019). For the sake of the planet and humankind, the creation, marketization and consumption of products have to be radically reimaged. To this end, the European Union (EU) (EU - action plan, 2019) developed an action plan for an alternative economic system, namely the Circular Economy (CE). In a circular system, no resources are lost due to constant cycling of materials and products (Murray, Skene & Haynes, 2017).

While a transition towards a CE is taking place in many industries, it is especially significant for the fashion industry. The fashion industry's linear thinking is a product of endless growth aspirations and excessive consumption and has already caused severe social and environmental problems, which make a change towards a CE particularly necessary (Hvass, 2016). In addition, the CE in the fashion industry is also especially relevant because it brings a concept that is often considered intangible closer to a global public. Few are interested in concepts, but almost everyone wears clothes (CFS).

Due to the urgency of aligning business aspirations with environmental and social benefits, several disruptive innovations - ranging from clothing rentals to recycling technology - have been developed to foster systemic change. However, the biggest drivers for CE are linked to the materials themselves and the re-use/recycling of them for future products (Global Fashion Agenda, 2019). For this reason, this study is concerned with circular economy business models (CEBMs) in general and with the potential of waste materials in particular. Additionally, the few available studies on circular practices have mainly focused on incumbent fashion companies and how they create a business transformation towards a CE (Franco, 2017). However, as a sustainable transformation requires the involvement of all stakeholders (EMF, 2017), it is astonishing that the majority of businesses, namely small and medium-sized businesses (SMEs), have received little attention. Accordingly, fashion SMEs using waste materials for their collections and thus employing a CEBM has not

yet been researched. Moreover, little is known about the current gap between the existence of innovative waste materials and their limited use by fashion SMEs, pointing towards potential barriers of waste materials.

Accounting for the above, this study is exclusively about fashion SMEs employing a CEBM with a particular focus on the opportunities and challenges of waste materials and their role in a sustainable transformation.

Therefore, this study poses the following research question:

*How can circular economy business models of fashion SMEs – by creating value from waste – contribute to a sustainable transformation of the fashion industry?*

The study consists of six chapters. The introduction has clarified the field of interest, the relevance and structure of this research. The literature review provides necessary background information on the fashion industry, the CE concept, the translation of circularity into products and business models (BMs) as well as on SMEs in a sustainable transformation. It is followed by a chapter on methodological considerations applying Saunders, Lewis & Thornhill's (2016) research onion. The fourth chapter presents the findings in light of the research question. Subsequently, the results are discussed by outlining various theoretical and practical implications. The discussion chapter also highlights the study's limitations and suggests further avenues of research. The study is rounded off by brief concluding remarks.



## 2. Literature Review

This chapter seeks to provide a theoretical background relevant to answer this study's research question. The main themes are the fashion industry, CE, waste products, CEBMs and SMEs in a sustainable transformation. More precisely, the researcher will introduce the *butterfly diagram* (EMF, 2017) and *the product design strategies for CE* (Bocken, de Pauw, Bakker & van der Grinten, 2016) to familiarize the reader with waste products. Since the *creating value from waste* approach is the focus of this study, the concept of *sustainable business model archetypes* (Bocken, Short, Rana & Evans, 2014) will then be illustrated. Thereafter, based on Hockerts & Wüstenhagen's (2010) theory on *greening Goliaths versus emerging Davids*, the dynamics of SMEs and larger brands in a sustainable transformation will be demonstrated.

### 2.1 The Fashion Industry

Fashion is concerned with everything that is governed by style, which often lasts only a limited period of time. This element of style is particularly relevant to the textile industry. However, while the term fashion can apply to several items guided by style, such as jewelry, for the purposes of this study, the term fashion refers only to clothes, shoes and bags. Fashion brands are those which make fashion available to consumers via design, quality, brand and stores. Fashion can be further classified into luxury, premium, high, medium and low-price brands (Hvass, 2016).

The fashion industry is one of the biggest consumer industries worldwide. The industry makes roughly 1.5 trillion Euros (in 2016) in revenue and employs approximately 60 million people along its value chain (Pulse, 2017). It encompasses processes such as the production of raw materials, fibers and fabrics, dyeing, printing and finishing, manufacturing the final product, transportation, product use and maintenance, recycling, and incineration or disposal (CIRFS, 2017). One of the most characteristic features of the fashion industry is its global and thus highly complex supply chain based on many decentralized, fragmented activities and involving a multitude of actors (Pulse, 2017). This is primarily due to increasingly fierce competition, the invention of 'fast fashion' and the associated sharp rise in outsourcing activities to suppliers and sub-suppliers in low-wage countries. While there used to be between two to four collections per year, 'fast fashion' brands such as Zara make it possible to please customers every week with the latest and most fashionable products at an affordable price (Hvass, 2016). The products' decline in price, quality and thus life span leads to excessive consumption. If the growth of the world population continues as projected, a total of 8.5 billion people will ask for clothes by 2030 and thus, the level of consumption will only increase (Pulse, 2017). Since fashion is marked as a consumer-driven sector, growing demand for fashion items is considered the driving force for more production activities, hence more employment and overall economic growth.

However, this development comes at enormous social and environmental costs (Pulse, 2017; Hvass, 2016). The Global Fashion Agenda (GFA) identified the following key environmental and social issues of the fashion

industry: water consumption, energy emission, chemical usage, waste creation, land-use, labor practices, health and safety, as well as community and external engagement (Pulse, 2017). While many activities in the fashion industry rely heavily on water (even including consumer's washing habits of clothes), the most notable water consumption arises at the stage of raw material production, in particular, leather making and cotton cultivation. This is especially severe since cotton is mainly grown in areas that already suffer from water shortage. Due to the rising demand for clothing, water consumption is expected to climb by 50% by 2030, and Co2 emissions by a further 60%. In fact, the release of Co2 emissions happens primarily during the stage of processing, production of raw materials and waste generation. As a consequence, the fashion industry is not only a major contributor to climate change but it is also strongly affected by it since its manufacturing locations are particularly vulnerable to climate disasters. Moreover, the extensive usage of chemicals, especially for cotton and leather production, has profoundly negative effects on both people, as they are exposed to chemicals during the production of raw materials and/or affected through toxic waste water which enters the drinking water (Pulse, 2017), and their environment (e.g. water pollution). Additionally, as a result of the increased sales and decreased usage per fashion item, more waste is generated (EMF, 2017). Annual waste occurring in the fashion industry is predicted to increase by 60% (or 57 million tons) by 2030. At this point, it is estimated that the fashion industry will produce a total of 148 million tons of waste per year. This is especially alarming since globally, only 20% of textiles are reused or recycled and the planetary boundaries on waste are already overstretched. The planetary boundaries are also exceeded when it comes to land-use (Pulse, 2017). "By 2030, it is predicted that the fashion industry will use 35% more land for cotton, forest for cellulosic fibers, and grassland for livestock - altogether over 115 million hectares that could be used to grow crops for an increasing and more demanding population or to preserve forest." (Pulse, 2017, p. 15).

However, the fashion industry causes both environmental and social problems. Over the past decades, it has become evident that many workers, especially in emerging and developing countries, are often paid only half a living wage. This situation makes people not only more vulnerable to be trapped in poverty but also enhances gender inequality, as most workers in the garment factories are women (Pulse, 2017). In Bangladesh, for instance, women account for around 80% of the workforce in the fashion industry (Leitheiser, 2019). Besides wages, labor concerns also include child labor, workers' rights, workers' treatment and hours of work, to name only a few. With falling prices, it is unrealistic that these conditions will change. Especially the initial phases of the value chain in the fashion industry have tremendous negative impacts on the health and safety of people. Dilapidated factories that cause fire or collapse, as happened to Rana Plaza in 2013, are just the most sensational examples of the many profound issues that plague the fashion industry. Despite this myriad of negative effects, fashion brands do not take enough responsibility, spending, on average, only 0.2% of sales revenues on activities contributing to the wellbeing of people (Pulse, 2017).

And yet, that fashion brands have been pursuing economic growth at the expense of the planet and the people, has increasingly moved into the center of attention. Scandals such as H&M employing child workers or

catastrophes such as Rana Plaza, spurred by documentaries like ‘The True Costs’, have not only enhanced consumers' awareness of the existing grievances in the fashion industry but also put companies under collective pressure to change. This change is not only mandated by consumers (especially millennials) but also represents an economic opportunity. GFA estimates that there is an opportunity worth 160 billion euros per annum if the fashion industry would eliminate the above-mentioned environmental and social costs (Pulse, 2017). It is for this reason, that many fashion companies nowadays have sustainability-related company goals. However, they are mostly being implemented by either large corporates or niche brands (Pulse, 2017). In comparison, a large part of SME's, which account for almost half of the fashion industry has not started to engage with sustainable practices. This is especially surprising since the Pulse (2017) revealed that putting sustainability at the core of a business is not only economically viable for the world economy but also for the individual brand itself. While some brands are only starting to see the importance of sustainability, others have made significant progress in recent years. These often refer to codes of conduct, multi-stakeholder agreements, awareness campaigns and certifications but less to profound and disruptive changes spurred by innovation. However, it is innovation - such as recycling mechanisms, innovative raw materials, product design and entirely new BMs - that have the biggest impact on sustainability and thus are crucial in a transition from a linear to a circular system (Pulse, 2017).

## 2.2 From Linear to Circular Economy

### 2.2.1 Linear Economy

The term linear economy refers to the linearity of the supply chain in the prevailing industrial system. Such a system is based on a *take-make-dispose* approach (EMF, 2017), in which natural resources are extracted (*take*), turned into products (*make*) and discarded after they have been used by the end-consumer (*dispose*). More drastically put, “a linear economy is one defined as converting natural resources into waste, via production.” (Murray et al. 2017, p. 371). Since end-consumers throw away the products after they have been used and buy new ones whenever necessary (e.g. coffee cups, cotton pads), companies operating in this linear system generate revenue by making products that are meant to be discarded from the very beginning (Franco, 2017). McDonough & Braungart (2002, p. 28) refer to these as products that are made with “*built-in obsolescence*”. Therefore, in a linear economy, which assumes that natural resources are infinite, the extraction of resources and economic growth are positively linked (Cooper, 1999; Murray, 2017). However, in reality, resources are limited and continuously shrinking (Franco, 2017). Along with an exponentially growing population and increasing disposable incomes (Korhonen, J., Honkasalo & Seppälä, J., 2018), the *take-make-dispose* logic further depletes resources and increases pollution via the excessive amount of waste created. In all, the increasingly noticeable environmental and social costs of this linear economy, but also a sharp rise in material prices and vulnerable supplies, have induced governments, companies and consumers, albeit rather slowly, to

consider an alternative industrial system which is in greater harmony with nature and humans (Meadows, Meadows, Randers & Behrens 1972; Franco, 2017).

The current linear economic thinking and its subsequent problems are uniquely visible in today's fashion industry and it is precisely this reason that creates the imperative for new economic paradigms. A CE is almost nowhere demanded more than in the fashion industry (Hvass, 2016).

### 2.2.2 Circular Economy

The CE represents a new systemic approach that it is hoped will cure the prevailing pitfalls caused by a linear system (Franco, 2017). It is intended to further drive sustainable development in terms of economic, environmental and human wellbeing (Ghisellini, Cialani & Ulgiati (2016), which Elkington (1994) refers to as the triple bottom line of sustainability. Although there are a variety of definitions, compiled and analyzed by Kirchherr, Reike & Hekkert (2017), the majority of authors affirm that “a circular economy is an industrial system that is restorative or regenerative by intention and design” (EMF, 2017, p.7; Franco 2018). According to EMF, (EMF - schools of thought, 2017), the development of the CE concept does not go back to a single person or date but has rather been influenced and stimulated by several previous schools of thought such as Cradle to Cradle (C2C) (Braungart & McDonough, 2002), Performance Economy (Stahel, 2010), Biomimicry (Benyus, 1997), Industrial Ecology (Erkman, 1997), Natural Capitalism (Hawken et al., 1999), Blue Economy (Pauli, 2010) and Regenerative Design (Lyle, 1996).

In contrast to the linear model, a CE follows a *take-make-use* approach (EMF, 2017). Natural resources are removed (*take*), converted into products (*make*) and thereafter turned into resources again (*use*). This is illustrated by the *butterfly diagram* (figure 1) (EMF - in detail, 2017). Although building on several schools of thought, the cycling of materials as a key characteristic of a CE is often associated with the C2C concept. It was inspired by the two existing metabolisms of the planet: the biosphere and the technosphere (Braungart & McDonough, 2002). Respectively, the butterfly diagram distinguishes a biological and technological cycle. In a CE, the biological cycle is concerned with the flow of biological materials, which, after they have been cascading, are safely brought back into nature, where they serve as ‘food’ for microorganisms and animals (Braungart & McDonough, 2002; EMF- in detail, 2017). The technological cycle, instead, is envisioned to keep technical materials such as plastics, chemicals in the cycle to capture and recapture the material's value over and over. The closer the cycle, the higher the maintained value of the materials. With the recurrent cycling of materials, CE seeks to decouple economic growth from natural resource depletion (Hvass, 2016; Murray et al., 2017; Cooper, 1999).

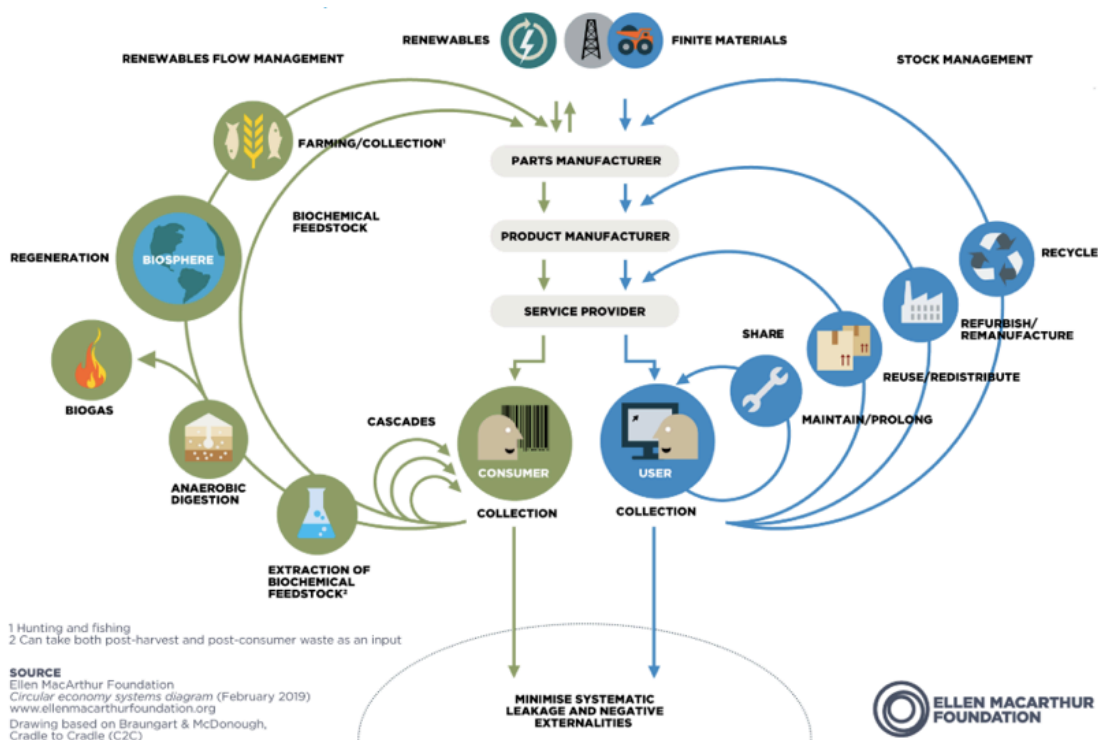


Figure 1. Butterfly Diagram (EMF in detail, 2017).

According to EMF (2017, p.7), “it (a CE) replaces the ‘end-of-life’ concept with restoration, shifts towards the use of renewable energy, eliminates the use of toxic chemicals, which impair reuse, and aims for the elimination of waste through the superior design of materials, products, systems, and, within this, business models.” Building on this model, three core principles of CE are identified: *designing out waste and pollution*, *keeping products and materials in use* as well as *restoring natural systems* (EMF - in detail, 2017). First, designing out waste and pollution means to eliminate the very concept of waste by conceptualizing products with the end of life in mind (EMF, 2017). Second, keeping products and materials in use implies recurrent cycling of products, components and materials in the respective loops. Third, the CE aims to regenerate natural systems by using materials that are not only not harmful but rather beneficial for the environment e.g. through releasing valuable nutrients (EMF - in detail, 2017). However, building a CE requires not only a theoretical concept but also the implementation of circular thinking into products and BMs (Hvass, 2016). For this reason, CEBMs, by *creating value from waste* with a particular focus on waste materials, has become the object of this study’s investigation.

Although CE is becoming more and more popular, it is often controversially discussed. Some of its limitations, as mentioned in the predominant literature, are outlined below.

### 2.2.3 Limitations of CE

The CE has been increasingly critiqued for being ‘old wine in new bottles’, e.g. providing a new name to a concept that has existed for many decades (Korhonen et al., 2018).

Moreover, Korhonen et al. (2018) and Kirchherr et al., (2017) miss a common and clear definition. They also lament the concept’s insufficient scientific foundation, as it is mainly driven by practitioners. Kirchherr et al. (2017) even claim that the blurriness between related concepts and the non-existence of a clear definition might lead to the breakdown of the entire concept in the future.

More problematic still, the limited and often not-scientific data available makes it difficult to measure and predict CE’s impact on sustainability. As mentioned above, CE is concerned with the recurrent cycling of products and materials, but “a cyclic flow does not secure a sustainable outcome.” (Korhonen et al., 2018, p. 42). To truly assess the successful contribution of CE towards sustainable development, the net sustainability has to be determined. This means that advantages gained through circular practices in one part of the system have to be reduced by the disadvantages caused in another part of the system (Korhonen et al., 2018). This is especially crucial since sustainable actions might have unintended negative effects (Murray et al., 2017). However, given the scientifically underdeveloped nature of the CE, calculating the net sustainability is considered a significant challenge (Korhonen et al., 2018).

Finally, the CE has been criticized for its lack of attention to social issues. In fact, sustainability, as understood by Elkington (1994), comprises social, ecological and economic goals. Since CE aims to contribute to sustainable development, it has been astonishing, that “the Circular Economy, however, is virtually silent on the social dimension (...)” (Murray et al., 2017, p. 376). In the CE, social issues are mainly addressed implicitly as a consequence of environmental and economic gains.

Despite the limitations of CE, several businesses have already implemented circular practices into their products and BMs. The following section outlines, in line with the research question, strategies to design products for circularity and the status quo of waste materials turned into waste products.

## 2.3 Waste Products

To avoid ambiguities, this study defines waste products, as products that are made from materials that otherwise would have been discarded. While in colloquial language, the terms waste products and circular products are used interchangeably, a distinction needs to be made for the sake of precision. In this study, waste products are thus limited to products made of waste materials, which have been generated at different points of the value chain (e.g. post-production level) and brought back to life in the same or in another industry than the original waste material. Hence, renewable materials (e.g. cork, algae), which are considered circular according to the CE definition but are not based on waste materials, are not included in this examination.

In the EU, waste is defined as “any substance or object which the holder discards or intends or is required to discard” (Eurostat, 2019). In 2016, a total of 2.538 million tons of waste had been generated in the EU,

accounting for the highest number measured in the past years. Considering the positive correlation between income and amount of waste created (Porter, 2002), future forecasts predict even higher figures. For this reason, the Circular Economy Action Plan was launched. Its aim is to encourage businesses to translate the CE principles into products and BMs to not only contribute to the wellbeing of the planet but also to unlock growth potential (EMF, 2017).

Designing a product always marks the beginning of a product's life cycle. Implementing circular thinking at this very first stage is crucial to drive CE (EU - action plan, 2019), "[...] especially because it is difficult to make changes, once resources, infrastructures and activities have been committed to a certain product design" (Bocken et al., 2016, p. 310). Product design that is in line with the regenerative and restorative purpose of the CE is strongly tied to the C2C design approach in which products are designed with their end of life in mind (Braungart & McDonough, 2002). Hence, it is impossible to consider the design of a product without thinking of its materials and vice versa. To truly promote CE, it is necessary to create a closed-loop system in which the principle of "waste equals food" prevails, meaning that "waste" becomes the resource for something else (Braungart & McDonough, 2002). Stahel (1994) differentiates between two distinct resource loops within a closed-loop system: re-use of goods and recycling materials (Bocken et al., 2016). Holding on to these concepts, Bocken et. al., (2016) established a framework of product design strategies for CE, which will be described in the following.

### 2.3.1 Product Design Strategies

In general, there are three strategies for circular product design, namely *slowing*, *closing* and *narrowing the resource loop* (Stahel, 2010). While slowing and closing the resource loop support CE, narrowing down the loop (e.g. minimizing resources) is a strategy still rooted in a linear system. As this study is about CE, the subsequent section is only concerned with design strategies to slow (e.g. re-use) and close (e.g. recycling) the resources loop (Bocken et al., 2016). The difference between re-use and recycling is distinct. Re-use is understood as keeping products or components longer in the cycle by re-using them for the same or different purposes as they were originally developed for. This slows down the resource loop. Recycling of goods, on the other hand, involves breaking down a product to its material level to then create either the same product or another product. This closes the resource loop (EMF, 2017). Strategies for *slowing the loop* comprise design for longevity and product-life extension (Bocken et al., 2016). Both aim to use products longer and thus decrease the need to generate new products (EMF - in detail, 2017). They pursue this aim in several ways:

First, design for longevity refers not only to physical durability and reliability, such as high quality and expected performance but also to emotional durability, which entails a unique relationship based on feelings such as trust and attachment between the user and the used item (Chapman, 2005; Bocken et al., 2016). Second,

product life extension is about increasing the life span of a product. This can be accomplished through maintenance, repair, upgradability and adaptability, standardization and compatibility as well as disassembly and reassembly. Maintenance is concerned with upkeeping the condition of a product through e.g. regular service while repairing is about fixing broken parts of a product. Upgradability and adaptability describe the potential of products to be applied in other settings and thereby even increasing in value, such as second-hand products (Bocken et al., 2016; Linton, 2005). Standardization and compatibility are about re-using parts of products for the creation of other products (e.g. re-using removable zippers and buttons for new items). Lastly, design for dis-and reassembly focuses on a product's ability to be taken apart and put together again. The latter is particularly crucial to enhance the level of both reused materials to slow down the loop, and recycled materials to close the loop (Bocken et al. 2016; Bakker, den Hollander, van Hinte & Zijlstra, 2014; Crowther, 1999). This can be considered a circular product design strategy that fits both purposes: slowing and closing the loop.

Strategies to *close resource loops* as proposed in the framework of Bocken et al. (2016) build on Braungart and McDonough's (2002) two-cycle system. Products designed for a technological cycle include products of use (e.g. a pullover) rather than products of consumption (e.g. detergent). The basic idea is to make products whose materials can be turned into technical nutrients after the end of use. As a technical nutrient, it serves as a resource for new products while trying to maintain the same level of quality. Necessary to that end is the primary and tertiary recycling of materials since only those processes allow to keep the material quality (Bocken et al. 2016; Braungart & McDonough, 2002). When it comes to recycling, a distinction is made between upcycling and downcycling (Braungart & McDonough, 2002). The former refers to materials from waste products that are turned into new products of equal or better quality as the previous waste product (e.g. from wasted PET bottles to new PET bottles), whilst the latter is defined as materials of waste products transformed into products of lower quality (from wasted PET bottles to shoes).

When designing products that fit with the biological cycle, it has to be ensured that materials are in harmony with nature (i.e. no toxic, but safe and healthy materials) so that they become biological nutrients to serve as 'food' for microorganisms in the soil or for animals through processes such as composting or digestion. Composting is also considered an example of recycling (Hopewell, Dvorak & Kosior, 2009; Bocken et al., 2016). However, when materials of different cycles are blended, the respective cycle will become contaminated and thus cannot be recycled due to the lack of affordable and large-scale recycling technology (Zamani et al., 2014). These "Monstrous Hybrids" (Braungart & McDonough, 2002, p. 98) result in the material's loss of value, waste and potentially damaging effects on nature and society.



### 2.3.2 Non-fashion related Waste Products

Although change is gradual and slow (Hvass, 2016), there are already numerous businesses, which translate waste into new products by slowing and closing the loop. This is particularly important since “[...] improvements in materials can have an immediate environmental and social impact without interfering directly in supply chain operations.” (Pulse, 2018). The following products are examples of how linear thinking can be overcome by applying circular design strategies.

Tackling food waste, for instance, comes in many different forms. While the Japanese entrepreneur Kosuke Araki (2019) turns carbonized vegetables and offcuts from meat production into tableware, Babolat (2019) uses natural gut strings, a by-product of meat production for their tennis racquet strings. Moreover, several agricultural waste streams can be transformed into compostable packaging materials (Ecovative, 2019), for example, leftover rice straws can even be used to build furniture (IKEA, n.d.). Post-consumer waste such as bread, one of the most discarded food products worldwide, becomes the basis for Toast Ale, a beer brewed from bread leftovers (Toast Ale, 2019). Coffee ground, a by-product of coffee brewing, has proven yet another waste source to create value from. It has been turned into coffee cups (Kaffeeform, 2019), fertilizer (Greencup, 2019), 3D-printing filament (3Dom, 2017) or even furniture (Starbucks, 2019) to name only a few areas of application. Also, plastics are one of the biggest contributors to the existing global waste problem, can be both recycled and used for the production of surfboards (joinfiveoceans, n.d.). Another plastic-based waste generator is cigarette butts. Innovatively, they are given new value by turning them into jewelry (Pentatonic, 2019) or park benches (Terracycle, 2019).

### 2.3.3 Fashion related Waste Products

Due to the density of environmental and social problems in the fashion industry and the increasing willingness to engage with circular business practices, especially in terms of design and raw-material (Pulse, 2018), a large number of groundbreaking waste materials have been developed for use in the fashion industry. Accelerator programs, such as the ones from Fashion For Good (FFG) and H&M Global Change Award scout, accelerate and scale innovative material solutions to be adopted by both smaller and larger brands (Pulse, 2018). While this study aims to identify the opportunities and challenges for fashion SMEs in using waste materials, it is first necessary to gain insights into the state-of-the-art of waste materials used in the fashion industry.<sup>1</sup>

A pioneering example of how to close the loop is Tencel’s development of the Refibra technology, which turns textile waste such as cotton scraps (20%) combined with wood pulp (80%) into new lyocell fibers. Refibra has

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<sup>1</sup> This thesis does not aim to describe the technical process of turning waste into new resources. First, the technical manufacturing process is often kept confidentially and second, it does not necessarily seem a prerequisite for understanding the perceived potential of waste materials for fashion brands.

become a widespread waste material and is already used by a large number of fashion brands, including sustainability leader Patagonia (Tencel, 2018; Patagonia, n.d.).

Plenty of innovative startups have developed the idea of converting agricultural and food waste into a resource for the fashion industry. For instance, Frumat turns apple skin, a by-product of apple juice production, into vegan leather. Also, Vegea (n.d.) develops biomaterials based on agricultural waste from wine production. The grape marc, including discarded grape skins, stalks and seeds, is given new value by being processed into different kinds of yarns and fabrics. Vegea (n.d.) developed a prototype of wine leather-based shoes and bags for &other stories, a fashion brand owned by H&M (Vegea, n.d.). Moreover, the Italian company Orange Fiber uses the peel of citrus fruits to make a silk-like cellulose yarn that has already been used by H&M and Ferragamo. Another innovative solution to agricultural waste is offered by Ananas Anam (2017). Its founder Dr. Carmen Hijosa invented the fabric Pinatex, which is made from pineapple leaf fibers, a by-product of the pineapple harvest. Pinatex has already been widely applied. H&M used it in its latest conscious exclusive collection and Hugo Boss sourced the material for its vegan sneaker line (Ananas Anam, 2017). Another material innovation to substitute leather is fish skin, a by-product of the fishing industry. The Icelandic company Atlantic Leather turns discarded fish skin into resistant, thin, flexible and even waterproofed leather-like fabric, which has already been employed by brands such as Prada, Dior, Gucci and Nike (Atlantic leather, n.d.). Yet another example is the Taiwanese firm Singtex, which transforms coffee ground together with a polymer into the S. Cafe yarn and S. Cafe fabric. Due to its performance, it is mainly applied by outdoor and activewear clothing companies such as Vaude, Asics and Schöffel (S. Cafe, 2015).

One of the global leaders of turning waste into value is Aquafil. Aquafil invented a process of transforming waste such as fishing nets, scrap materials, carpet flooring, as well as industrial plastics from landfills and oceans into regenerated nylon, called Econyl. Recycling plastics is particularly significant since between 1.8 and 5 million tons of microplastics are released into the environment, including drinking water, every year. It is projected that by 2050, this number will exceed 22 million tons annually, meaning there will be more plastics than fish in the ocean when measured by weight (Pulse, 2018). Econyl is mainly applied for swim- and activewear. While Aquafil claims that Econyl contributes positively to the environment by avoiding crude oil and Co2 emissions and reducing waste on landfills and in the oceans, it is, however, a material that continues to release microplastics. This serves as a reminder that “just because a material is recycled does not automatically make it ecologically benign [...]” (McDonough & Braungart, 2002, p. 59).

This chapter outlined circular design strategies to develop products for CE. Additionally, examples of waste materials and their applications have been surveyed.

## **2.4 The Path to Circular Economy Business Models**

As exemplified above, many companies have already engaged with circular practices not only to make a positive social and environmental impact but also to gain the economic advantages (EMF, 2017). Several new BMs have been employed to seize these opportunities and accelerate the shift towards a sustainable transformation (Hvass, 2016). In the following chapter CEBMs are introduced by drawing on BMs, Business Model Innovation (BMI) and Sustainable Business Models (SBMs) as proposed by Hvass (2016).

### **2.4.1 Business Models**

“A business model is a conceptual tool to help understand how a firm does business [...]” (Bocken et al. 2014, p. 43). Although the term is widely used both in theory and in practice (Hvass, 2016; Zott & Amit 2010), there is hardly any consensus on what a BM is. The absence of a common definition has allowed for the term’s misuse by simply replacing it with closely related concepts such as strategy, revenue models, business concept and economic concept (Morris, Schindehutte & Allen, 2005). Often referred to as the fathers of BM theory, Teece (2010) and Chesbrough (2007) are convinced that every company has a BM, whether explicitly stated or not. According to Teece (2010, p. 172) a BM “[...] describes the design or architecture of the value creation, delivery and capture mechanisms it employs.” This notion of a BM being linked to the value creation of a firm is also supported by Richardson (2008) and Osterwalder & Pigneur (2010). Richardson (2008) established a value-centered BM framework consisting of three elements: the value proposition (e.g. what product/service is offered and to whom), value creation and delivery (e.g. how is the product/service created and distributed to the target customer) as well as value capture (e.g. how are revenues generated). With these three elements at the core, Osterwalder & Pigneur (2010) developed the well-known Business Model Canvas (BMC). It is based on nine building blocks, including customer segments, value propositions, channels, customer relationships, revenue streams, key resources, key activities, key partnerships and cost structure. The BMC is not only a valuable tool to assess these three elements and their relationship with each other, but also to rethink the way business is done (Margretta, 2002).

### **2.4.2 Business Model Innovation**

Reconsidering the way we do business is intrinsically linked to the field of entrepreneurship (Morris et al., 2005). Schumpeter (1983), the pioneer of entrepreneurship research, states that innovation is crucial for a company’s long-term growth and existence in the marketplace. This is particularly true in highly competitive and complex markets characterized by fast and frequent changes, such as the fashion industry (Freeman, 1994). Innovation can be based on products, services, processes, distribution or entire BMs (Carr, 1999). The latter became a worthwhile object of investigation, especially once Chesbrough (2006) stated that every successful innovation requires an innovative BM. The BM can either function as a commercial vehicle to boost innovative solutions concerning processes, products, services, or it can be the innovation itself (Boons & Lüdeke-Freund,

2013; Pieroni, Mcaloone & Pigosso, 2019). BMI drives transformation by reconceiving the purpose of the business, redesigning the way it creates value and even rethinking what is perceived as value (Bocken et al., 2014; Boons & Lüdeke-Freund, 2013). Having recognized this potential, the concept of BMI has been recently applied to specific domains in need of fundamental change, such as sustainability and CE (Pieroni et al., 2019). Given this study's research questions, BMI for CE is emphasized. However, due to the novelty of this area and the strong interconnection between sustainability and CE, it is valuable to draw on the existing research on BM and BMI in the context of sustainability (Hvass, 2016; Geissdoerfer, Bocken & Hultink, 2017).

### **2.4.3 Sustainable Business Models**

The increasing number of articles published on BMs in the context of sustainability indicates a growing interest in this topic. However, the term 'sustainability' is ambiguous regarding. There are 300 different definitions of sustainability, varying in their emphasis on ecological, economic or human welfare (Geissdoerfer et al., 2017). In this study, the notion of sustainability is closely related to sustainable development and thus in line with the most widely accepted definition of sustainability as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987, as cited in Geissdoerfer, 2017, p. 758). Drawing on Elkington (1994), Bocken et al. (2014, p. 42) states that "sustainable business models (SBM) incorporate a triple bottom line approach and consider a wide range of stakeholder interests, including environment and society. They are important in driving and implementing corporate innovation for sustainability, can help embed sustainability into business purpose and processes, and serve as a key driver of competitive advantage." The notion of recognizing environment and society as a company's direct stakeholders in a sustainable BM is also supported by Joyce & Paquin (2016), who established a triple-layered BM Canvas by adding environmental and social layers to the economic value-oriented BMC (Hvass, 2016). This points to an SBM's potential to exceed a firm-level perspective, establish long-lasting relationships and create system-level change (Pieroni et al., 2019; Boons & Lüdeke-Freund, 2013; Bocken, Short, Rana & Evans, 2013).

Due to the detailed and comprehensive overview of the different types of SBMs, the framework provided by Bocken et al. (2014) is appropriate for this study. The framework provides for a broader perspective on sustainability but at the same time, allows for closer inspection when dealing with the individual archetypes such as the *Create value from waste*, which includes CEBMs. In total, eight SBM archetypes were identified (figure 2).

Technological			Social			Organisational	
Maximise material and energy efficiency	Create value from waste	Substitute with renewables and natural processes	Deliver functionality rather than ownership	Adopt a stewardship role	Encourage sufficiency	Repurpose for society/environment	Develop scale up solutions
Low carbon manufacturing/ solutions	Circular economy, closed loop	Move from non-renewable to renewable energy sources	Product-oriented PSS - maintenance, extended warrantee	Biodiversity protection	Consumer Education (models); communication and awareness	Not for profit	Collaborative approaches (sourcing, production, lobbying)
Lean manufacturing	Cradle-2-Cradle	Solar and wind-power based energy innovations	Use oriented PSS- Rental, lease, shared	Consumer care - promote consumer health and well-being	Demand management (including cap & trade)	Hybrid businesses, Social enterprise (for profit)	Incubators and Entrepreneur support models
Additive manufacturing	Industrial symbiosis			Ethical trade (fair trade)			
De-materialisation (of products/ packaging)	Reuse, recycle, re-manufacture	Zero emissions initiative	Result-oriented PSS- Pay per use	Choice editing by retailers	Slow fashion	Alternative ownership: cooperative, mutual, (farmers) collectives	Licensing, Franchising
Increased functionality (to reduce total number of products required)	Take back management	Blue Economy	Private Finance Initiative (PFI)	Radical transparency about environmental/ societal impacts	Product longevity	Social and biodiversity regeneration initiatives ('net positive')	Open innovation (platforms)
	Use excess capacity	Biomimicry	Design, Build, Finance, Operate (DBFO)		Premium branding/ limited availability		Crowd sourcing/ funding
	Sharing assets (shared ownership and collaborative consumption)	The Natural Step	Chemical Management Services (CMS)	Resource stewardship	Frugal business	Base of pyramid solutions	"Patient / slow capital" collaborations
	Extended producer responsibility	Slow manufacturing			Responsible product distribution/ promotion	Localisation	
		Green chemistry				Home based, flexible working	

Figure 2. Sustainable Business Model Archetypes (Bocken et al., 2014)

The first archetype, *Maximize material and energy efficiency*, aims to decrease the number of resources for products to consequently reduce waste and pollution and thus costs. Examples in the fashion industry are additive manufacturing illustrated by a 3D knitting machine (Kniterate, 2019) or a 3D printed sole (Adidas, n.d.) committed to zero-waste production. Second, *Create value from waste* means that “the concept of ‘waste’ is eliminated by turning waste streams into useful and valuable input to other production and making better use of under-utilised capacity.” (Bocken et al., 2014, p. 49). The *Create value from waste* encompasses C2C, recycle, reuse, remanufacture, industrial symbiosis, take-back management, sharing assets and closed-loop BMs. Sharing assets include shared ownership and collaborative consumption, such as peer-to-peer clothing rental called Wardrobe (Wardrobe, 2019). Industrial symbiosis is a “process orientated solution turning waste outputs from one process into feedstock for another process or product line” (Bocken et al., 2014, p. 49). It usually requires partners and is understood as the epitome of “accelerating green transition through partnership” (EMF - symbiosis, 2017). Take-back-systems are increasingly adopted by fashion brands to establish a closed-loop BM. For this purpose, H&M partnered with I:CO to collect all returned clothes and shoes from their own brands and from others to enable reuse and recycle (Pulse, 2017). From an environmental and social perspective, value is captured by reducing waste, pollution and the use of virgin materials.

Third, *Substitute with renewables and natural processes*, is about decreasing the environmental impact while at the same time enhancing the resilience of enterprises by tackling existing resource shortages through renewable or natural materials and processes (Bocken et al., 2014). For instance, Algalife developed natural and renewable dyes from Algae (Algalife, 2018). The fourth archetype *Deliver functionality rather than ownership* refers to how companies shift their BMs from selling ownership of products to providing services. By minimizing the need to own products, it seeks to change consumption patterns (Bocken et al., 2014). A common example of shifting from ownership to usage are clothing rental services such as Rent the Runway (RtR, 2018). The archetype *Adopt a steward role* is concerned with collaboration across all stakeholders, including environment and society, to ensure long-term wellbeing for actors. This archetype creates social prosperity and thus fosters systemic change (Jackson, 2009). However, to unfold its full potential, it must be combined with other archetypes. The sixth archetype is *Encourage sufficiency*. It is specifically useful to address overconsumption and hence resource volumes by promoting design for durability (e.g. Patagonia) and longevity (e.g. Vestiaire Collective). *Repurpose for society/environment* is about employing a BM that prioritizes social and environmental objectives over economic ones. This archetype aims to fundamentally transform the underlying rationale of businesses as it currently exists. Finally, *Develop scale up solutions* advances the impact of SBMs through franchising, licensing or collaborative models (e.g. crowd-sourcing, open-innovation) (Bocken et al., 2014). It is believed that sustainability is achieved when several approaches are combined. For this reason, the above-mentioned archetypes increase their contribution to a sustainable transition, especially when several of them are pursued at the same time. It is emphasized that the combination of *Adopt stewardship* and *Create value from waste* is particularly powerful (Bocken et al., 2014).

#### 2.4.4 Circular Economy Business Models

Pieroni et al. (2019, p. 200) point out that “(...) there is no such a thing as an absolute SBM or CBM. Instead, principles/practices that enable a fit with the vision of sustainable development or CE can be incorporated in BMs.” This highlights the fact there is no prescribed rule of what SBM or CEBM consists of and thus lines between them blur (Nußholz, 2017). This is not least due to the many definitions of sustainability and CE as well as to the novelty of CEBM as an academic field. Therefore, most academic papers, like this study, build on SBMs and BMI for sustainability to explain what CEBMs are (Bocken et al. 2014, Bakker et al., 2014). The difficulty in grasping the concept of CEBMs is also reflected in the variety of definitions, components and models that Lewandowski (2016) summarized. Yet, most refer to the value-based understanding of BMs. In this manner, Nußholz (2017, p. 12) suggests the following CEBM definition:

“A circular business model is how a company creates, captures, and delivers value with the value creation logic designed to improve resource efficiency through contributing to extending useful life of products and parts (e.g., through long-life design, repair and remanufacturing) and closing material loops.”

Despite the many attempts to cluster CEBMs into specific types independent of SBMs (Bocken et al. (2016); Bakker et al. (2014); Moreno, De los Rios, Rowe and Charnley (2016) and Accenture (2014)), this study follows Bocken et al. (2014) who sees CEBMs as part of SBMs and thus prefers a more cohesive view on CEBMs.

## 2.5 The role of SMEs in a Sustainable Transformation of the Fashion Industry

Both the product as well as BM design strategies have been outlined above, as they are conjointly needed to pave the way towards a circular transition (Bocken et al., 2016). However, transforming industries for CE demands system-level change (EMF, 2017). According to Meadows & Wright (2009, p.2), “A system is a set of things – people, cells, molecules or whatever – interconnected in such a way that they produce their own pattern of behavior over time.”

### 2.5.1 The Characteristics of System Change

A system is constituted by its elements, their interrelation as well as its purpose. Examples of a system range from digestion, a football team or a national economy to the entire earth. A key aspect of a system is that it can be responsible for outcomes that no one within the system ever intended to (Meadows & Wright, 2009). This often results in highly complex problems, which need system thinking to bring about a system change (EMF, 2017). A system change, however, “(...) entails shifting to an entirely new system.” (EMF, 2017, p. 26). Concerning the research question, a transition from a linear to a circular economic model is considered a sustainable transformation, a system change.<sup>2</sup> As described below, EMF (2017) has identified five aspects that reinforce system change.

First, *Alignment on the case for change* is about finding a consensus that a system change is even needed. Applied to the Fashion industry, this means identifying and possibly measuring the manifold environmental and social issues caused by the current system. Second, *A positive vision for a new system* refers to conceiving an alternative system. Declaring the aim to move towards a circular economy can be a powerful tool as it sets a clear goal. To achieve this new system, however, a *Broad stakeholder buy-in and time-bound commitments to a vision-led transformation* are required, as a system-change is always a collaborative effort. No actor can drive a system-level change alone. Once GFA, for example, established the 2020 Circular Fashion System Commitment, several brands around the world decided to adhere to it. Fourth, *Demonstration that the vision is possible, with large-scale, pre-competitive, cross- value-chain collaboration*. A system cannot be changed quickly, which is why collaborative short-term wins along the way are essential to sustain the motivation over

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<sup>2</sup> In this thesis, the terms system change, system-level change, systemic change, (sustainable) transformation and (green) transition are used interchangeably.



a longer period of time. Therefore, fifth, *Unprecedented levels of collaboration and alignment on areas of action* are needed to orchestrate several collaborative initiatives to achieve system level change (EMF, 2017). These five key characteristics of system change show that collaboration is the key to transforming the prevailing system. However, the extent and mode of contribution depend on individual industry actors. Usually, the key industry players include educational institutions, policymakers, other organizations (e.g. NGOs) as well as businesses. Educational institutions are not only crucial to teach people how to develop system-level thinking but also to provide scientific evidence on the current and the envisioned system as well as on how to accomplish the transition. Policymakers are pivotal in system change. Without the enabling laws or incentives, large-scale transformation is unlikely to be reached (EMF, 2017). Other institutions are mainly concerned with facilitating cooperation and sharing industry-specific knowledge. Businesses generally take on a pioneering position in a system-level change.

In the fashion industry, the role of businesses, in particular brands and retailers, is vital to driving systemic change as they are the ones designing and distributing the fashion items. Hence, they contribute to a transition due to their influential position in the market as well as their outreach through exposure and global production/distribution network. EMF (2017) claims that fashion brands can enhance a transformation by changing their value proposition and consequently affecting the customer's buying decisions. However, while companies of all sizes can make a significant contribution to systemic change, the following section is dedicated to SMEs<sup>3</sup> and their role in a sustainable transformation.

### **2.5.2 The Role of SMEs in a Sustainable Transformation**

A sustainable transformation is understood as changing systems for sustainable development. This can be achieved through sustainable entrepreneurship, which is widely acknowledged as a process of recognizing, developing and exploiting opportunities to pursue economic, social and ecological goals (Belz & Binder, 2017) "In a process of Schumpeterian (Schumpeter, 1934), creative destruction, sustainable entrepreneurship disrupts (purposefully or coincidentally) conventional production methods, products, market structures and consumption patterns by replacing them with superior, more sustainable (or substantially less unsustainable) products and services." (Schaltegger, Lüdeke-Freund & Hansen, 2016, p. 268). For this reason, sustainable entrepreneurship is closely linked to innovation. Accordingly, sustainable entrepreneurship has the potential to create sustainable transformation. As reported by Hockerts & Wüstenhagen (2010), there are two different types of businesses that pursue sustainable entrepreneurship and thus drive system-level change: pioneering, rather small, sustainable firms serving niche markets (*emerging Davids*) and large, economic driven incumbents providing products/services to the mass market (*greening Goliaths*). According to Schaltegger et al. (2016), a

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<sup>3</sup> According to the EU, SMEs are specified as businesses with less than 250 employees and less than 50 million euros in turnover or a balance sheet below 43 million euros. In the OECD countries, SMEs account for 99,7% of all businesses and 50-60% of the value creation. However, definitions vary not only depending on the literature but also on geography and thus the respective laws.



distinction between these two market players is beneficial to understand their respective roles in a sustainable transformation as well as their influence on each other.

Small firms can implement sustainability at their core right from the beginning. By doing so, they show that the firm is brought into existence “(...) to be part of the solution not the problem (..)” (Hockerts & Wüstenhagen, 2010, p. 487). This is why they are considered highly authentic. To ensure high performance, they often focus on a few social or environmental issues which they try to solve with high ambition, whereas larger corporates pursue several issues simultaneously, albeit less profoundly. Due to their age and size, *David*s often show an entrepreneurial spirit and adapt to changes more dynamically than their large counterparts (Hockerts & Wüstenhagen, 2010). According to the *OECD Green Growth Report* (Koirala, 2019), small firms are also able to increase job satisfaction and show high productivity, commitment and motivation on the part of the employees. Moreover, serving a small ‘green’ niche means entering untapped markets and gaining a competitive advantage. However, *David*s also encounter various challenges. For instance, they are more vulnerable to large corporates because incumbents have more financial and market power while the small firms are financially restricted and lack access to R&D (Hockerts & Wüstenhagen, 2010). For this purpose, *David*s are urged to collaborate with other companies or institutions to gain knowledge. Building up this kind of infrastructure not only regarding intangible but also tangible assets is more difficult for *David*s, as they are often locally rather than globally embedded (Koirala, 2019). As company size and competition for market shares grow, *David*s are challenged to keep up with large incumbents without compromising their sustainability quality (Schaltegger et al., 2016). In comparison to large corporates, small firms are subject to much greater uncertainty regarding market expansion, policy development or market creation e.g. developing a product that has never existed before (Koirala, 2019).

Besides all existing opportunities and challenges, *David*s lay the foundation for sustainable transformation by enhancing sustainable innovation in the early stages. While some *David*s grow and thus increase their impact, *Goliaths* are affected by the pioneer’s market success, leading them to adopt sustainability efforts. Due to incumbents’ high market reach, their sustainability initiatives can gain more traction and spur the transition. These two developments foster a co-evolution of *emerging David*s and *greening Goliaths*, whereby both advance the sustainable transformation. In doing so, positive externalities are achieved, such as shrinking external costs and a growing number of sustainable products in the market (Hockerts & Wüstenhagen, 2010).

This chapter provided a general overview of CE, the design strategies of products and BMs as well as of a sustainable transformation and the role of various actors in it. In particular, it has highlighted the role of businesses in a sustainable transformation of the fashion industry. Before these insights can be applied to the research question at hand, it is apt to reflect on the methodology of this study.

### 3. Methodology

To facilitate an understanding of the research process, as well as to guarantee its necessary transparency and scientific soundness, this chapter outlines the methodological decisions that have been made to sufficiently answer the research question (Crotty, 1998).

#### 3.1 Research Onion

According to Saunders et al. (2016, p. 5), research can be defined “[...] as a process that people undertake in a systematic way in order to find out things, thereby increasing knowledge” in a particular field. The *research onion* (figure 3) illustrates this systematic way as well as the different layers that researchers need to undergo to develop knowledge. The *research onion* encompasses – moving from its outer layers towards its core – research philosophy, approach to theory development, methodological choice, strategies, time horizon as well as techniques and procedures to collect and analyze data. The *research onion* provides not only theoretical and practical guidance for doing research, but also a clear structure for this chapter. The following sub-chapters will address each of its layers and its overall relevance for the design of this study.

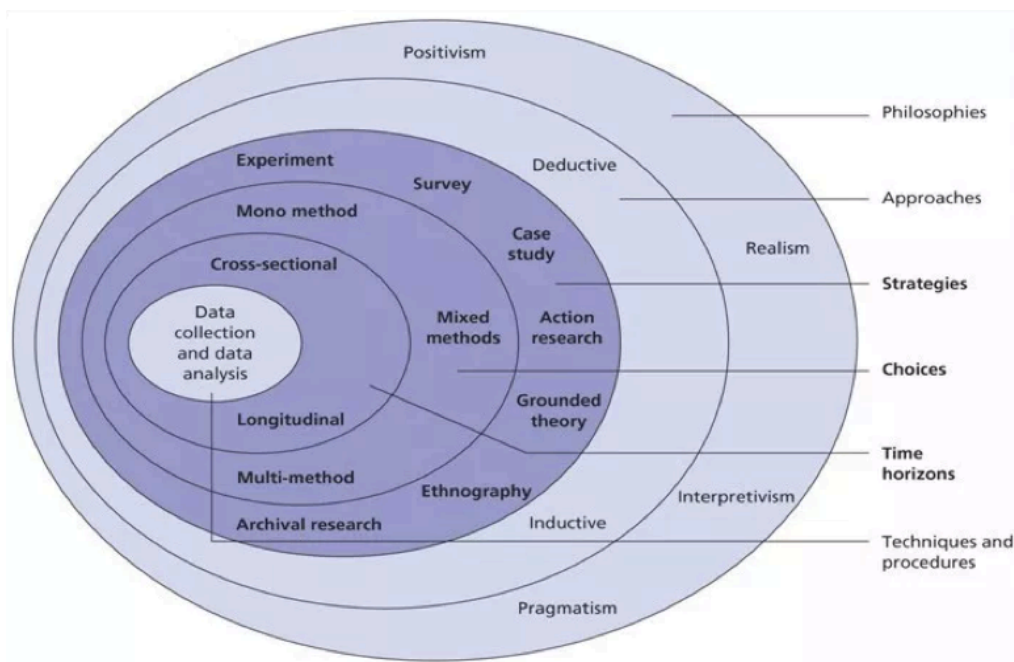


Figure 3. Research Onion (Saunders et al., 2009).

### 3.2 Research Philosophy

The research philosophy is “[...] the basic belief system or worldview that guides the investigator, not only in choices of method but in ontologically and epistemologically fundamental ways.” (Guba and Lincoln, 1994, p. 105).

The ontology describes the assumptions a researcher holds regarding the nature of social entities and reality (Creswell & Creswell, 2018). It provides insights into how the researcher thinks reality is constituted (Saunders et al., 2016). There are two main ontological stances: objectivism and subjectivism. In an objectivist worldview, reality exists independent of social actors and their influence. Hence, due to the fact that reality is detached from social interaction, the human mind and meaning, reality is considered as objective, implying the existence of one absolute truth (Saunders et al., 2016; Bryman & Bell, 2011). In contrast, subjectivism, which is linked to the concept of social constructivism (Saunders et al., 2016), sees reality as “[...] socially constructed and given meaning by people [...]” (Easterby-Smith, 2018, p. 70). Therefore, social constructivism underpins the existence of manifold realities created by individuals (Guba and Lincoln, 1994). The constructivist assumes that “[...] different people of different cultural backgrounds, under different circumstances and at different times make different meanings, and so create and experience different social realities [...]” (Saunders et al., 2016, p. 140). The researcher’s task is to observe, understand and make sense of the subjective behavior and reality (Saunders et al., 2016), of which the researcher is part (Easterby-Smith, 2018).

The epistemology explores how knowledge about this reality is generated and which of the sources of knowledge creation is suitable for conducting research. It also poses the question of whether knowledge can be acquired at all or has to be experienced by the researcher (Bryman & Bell, 2011)? Disregarding the wide spectrum of existing epistemological branches as well as the ongoing debate about them (Easterby-Smith, 2018), this research follows Bryman & Bell’s (2011) acceptance of three major research philosophies in the field of business and management research: positivism, realism and interpretivism. Positivism is often associated with the philosophical assumptions made by natural scientists. Positivist research investigates the social world by proposing hypotheses, testing them, and deriving law-like-generalizations from them. This process is claimed to be value-free, as the researcher is deemed to remain independent of emotions and subjective perceptions. Along with positivism, realism is also linked to an objectivist understanding of reality, where social phenomena occur beyond the human mind and reach. Within the epistemological assumptions of realism, a wide spectrum of opposing views can be found (Saunders, Lewis & Thornhill, 2009). In contrast, the interpretivists are convinced that social entities and their interactions are too complex to be reduced to generalizations. While natural scientists aim to distill complex phenomena down to measurable and universally valid output, social scientists appreciate the richness of data because of the complex systems they appear in

(Saunders et al., 2009). From an interpretivist perspective, knowledge is generated through the way the researcher interprets data. Consequently, knowledge is highly dependent on the researcher and its way of comprehending data. As the world is a socially constructed place, everyone has their own understanding of people and things resulting in different knowledge about reality (Bryman & Bell, 2015). This happens not only when interacting with people such as in the case of interviews in which interviewer and interviewee co-construct knowledge by the way they ask and perceive questions (Mills, Bonner & Francis, 2006), but also when, for instance, reading reports. Concerning the latter, it is apparent that the way the reader interprets the content, his knowledge about what reality means will be shaped accordingly (Saunders et al., 2009).

The worldview that guided this study was based on subjectivism in terms of how the researcher viewed reality as well as on interpretivism in terms of how the researcher generated knowledge about this reality. In light of the research question, the researcher engaged with social entities in the sustainable fashion industry. The outcome of these interactions (e.g. interviews, questionnaires, field-configuring events) was based on both sides' individual experiences, attitudes, motivations and perceptions. Therefore, the researcher and the social entities she interacted with built an individual reality which leads to subjective results. However, through the existence of several realities constituted in the minds of all research participants, a wealth of rich data could be generated. In addition to co-creating knowledge through the interaction with individuals, the researcher also engaged in a sense-making process by interpreting information gained through existing literature. The researcher was aware that her underlying assumptions about the nature of reality and knowledge affected this investigation. In particular, how the researcher understands the world influenced not only the development of the research philosophy but also the entire research design (Saunders et al., 2016).

### **3.3 Approach to Theory Development**

Having formulated a guiding research philosophy of this study, the researcher had to decide on a suitable research approach. According to Saunders et al. (2016), the two primary approaches are deduction and induction.

Deductive research is about gaining knowledge from existing theory, deducing hypotheses, testing them on their veracity and, if possible, making generalizations about the investigated topic. Having its origin in the field of natural science, deduction is mostly associated with quantitative research. Deduction usually proceeds in a linear, reliable and repeatable manner (Saunders et al., 2016).

In contrast, inductive research follows the reverse logic by first collecting data, then identifying common themes and subsequently generating theory (Bryman & Bell, 2011). Moreover, inductive reasoning does not necessarily strive to generalize its findings, but to understand specific phenomena and their context. Therefore, it is mostly associated with qualitative studies (Saunders et al., 2016).

Over the past decades, a combination of two approaches has become increasingly popular (Saunders et al., 2016). Instead of following only one logic, a hybrid of both approaches recently acknowledged as abduction, enables the researcher to alternate between creating data from theory and theory from data (Suddaby, 2006). Commonly researchers in the tradition of abduction, use observation to identify something unusual, what Saunders et al. (2016, p. 148) call a “[...] surprising fact [...]”, which then prompts the researcher to engage more deeply with existing theory, bringing additional ‘surprising facts’ to light. Through inductive exploring, patterns and themes will be identified that ought to be integrated into an existing or new conceptual framework, then to be tested and revised repeatedly (Saunders et al., 2016). According to Blaikie (2009, p. 89), abductive reasoning “... incorporates what the inductive and deductive strategies ignore – the meanings, the interpretations, the motives and intentions that people use in their everyday lives and which direct their behavior – and elevates them to the central place in social theory and research.”

Building on Suddaby and Blaikie, this study aims to combine both inductive and deductive perspectives to go back and forth between theory and data as well as grasp what the other approaches miss (e.g. motives and perceptions of people). Hereby, inductive reasoning was mainly applied when collecting data and engaging with first-round coding to organically let themes emerge. In second-round coding, the researcher adopted a more deductive approach by understanding the existing concepts from the literature and combining it with the emerged themes. This oscillating between inductive and deductive sense-making resulted in an abductive study in which theory partly became data and data was turned into theory.

### **3.4 Methodological Choice, Research Strategies and Time Horizon**

In line with research philosophy and approach, the methodological choice can either be quantitative, qualitative or both, using one or multiple methods to describe, explore and evaluate the researched phenomena (Saunders et al., 2016). Based on this study’s research question and its underlying ontological and epistemological assumptions, the researcher conducted a mono-method qualitative study, which is explorative in nature (Saunders et al., 2016). This approach was deemed particularly appropriate because it puts social entities (SMEs) and their perceived realities (opportunities and challenges of using waste materials, roles the believe to play in a sustainable transformation) as well as the context they are embedded in (sustainable fashion) at the center of the study. A qualitative study enabled the researcher to look at the deeper aspects of sustainable fashion by identifying the perceived potential of waste materials for fashion SMEs and their roles within the industry’s transition towards sustainability that go beyond descriptive explanations. Moreover, employing a qualitative method allowed the research to unfold within a flexible framework that allowed for necessary adjustments as the research progressed (Saunders et al., 2016).

These methodological choices affected the researcher's formulation of the research strategy. According to Saunders et al. (2009, p. 136) a research strategy is "[...] the general plan of how the research will go about answering the research question(s) [...]". The main research strategies are located on a continuum between quantitative and qualitative studies, comprising experiment, survey, archival research, case study, ethnography, action research, grounded theory, narrative inquiry (Saunders et al., 2016). Elaborating on these strategies is beyond the scope of this thesis. Hence, the following section refers exclusively to the chosen research strategy: the case study. According to Robson (2002, p. 178) a case study is "[...] a strategy for doing research which involves an empirical investigation of particular contemporary phenomenon within its real life context using multiple sources of evidence.". The main characteristic of the case study is its emphasis on the context in which the studied phenomenon is examined. Exploring and understanding in depth the context enables the researcher to gain rich data and to fully comprehend the phenomenon being studied (Yin, 2003). Case studies are commonly used for qualitative, quantitative and mixed method studies to describe, test or create theory (Eisenhardt, 1989). However, case studies have also drawn strong criticism, which has been summarized in and countered by Flyvbjerg (2006). He responds to common charges that case studies are unscientific by arguing that case studies do allow generalizations depending on the individual case. Not only can they be applied in both quantitative and qualitative studies, but their context-dependency also makes them especially valuable for generating practical knowledge which is necessary to become an expert in a certain field. According to Hvass (2016) and Evans (2011), case studies are particularly fitting when little is known about the subject of investigation, including in the context of sustainability. Since the topic of CEBMs is still in its infancy, and only little is known about waste materials and their adoption by SMEs in the fashion industry, a case study method was deemed suitable for this thesis. Hereby, the scope of the case study research is the fashion industry, whereas the selected case is sustainable fashion SMEs using waste materials. The unit of analysis is the specific brands using these materials.

Due to the limited time allocated for a master's thesis at CBS, this study had to be limited to a cross-sectional study, i.e. research on a specific theme at a given point of time (Saunders et al., 2016). However, this cross-sectional study provides by necessity only a cursory view of the field of sustainable fashion during a certain period of time (May-December).

### **3.5 Data Collection**

Data can be primary or secondary. While secondary data is characterized as data that has been collected in the past for other purposes, primary data is generally gathered only for the specific research purpose (Saunders et al. 2016). To answer the research question, various types of primary and secondary data were gathered.

### 3.5.1 Primary Data

In consonance with the qualitative research approach of this study, the primary data collection included qualitative interviews, internet questionnaires as well as field configuring events (FCEs).

#### 3.5.1.1 Sampling

The participants were mainly identified through purposeful sampling, and a few times through snowball sampling (Robinson, 2014). “The logic and power of purposeful sampling lies in selecting information-rich cases for study in depth. Information rich cases are those from which one can learn a great deal about issues of central importance to the purpose of the research [...]” (Patton, 1990, p. 169). The researcher was specifically looking for fashion SMEs using waste materials without any geographical or demographic restrictions. For this reason, the researcher engaged in extensive Internet research: the researcher screened in depth the websites of the identified brands with a particular focus on their outlined materials section. If it became evident, that these brands used waste materials, the researcher contacted them via Email or LinkedIn. In all, eighty different companies were contacted online. In addition, fourteen brands were approached face to face at the FCEs. The researcher aimed to select SMEs that varied in size and geography, but also in their waste sources. This enabled the researcher to investigate the potential of waste materials for SMEs in the fashion industry from different angles.

#### 3.5.1.2 Semi-structured Interviews

A total of seven formal interviews were conducted. Of these, six were undertaken with SMEs and one with an expert. The participants came from seven different countries. In this study, experts are understood as individuals who are not directly the object of investigation (SMEs using waste materials), but who were able to make a valuable contribution to the research due to their professional experience in the field of sustainable fashion. The way the interviews were conducted ranged from face-to-face, video to telephone (depending on the individual preference of the interviewees). All interviews except one were conducted in English. The semi-structured interviews included several types of questions such as open, probing, as well as specific and closed questions (Saunders et al., 2016). Using semi-structured interviews enabled the researcher to capture what the interviewees considered to be relevant, to fully grasp their underlying worldviews and their individual perceptions on the phenomenon, while at the same time remaining sufficiently flexible about the process of data collection (Brymann & Bell, 2015). Comparable to Eric Ries’ (2011), the Lean Startup approach (build-measure-learn), the interview guide evolved over time based on the findings of previous interviews. Due to the nature of semi-constructed interviews, the previously arranged order of questions was, at times, spontaneously changed or certain areas within the interview guide were accentuated by asking follow-up questions or requesting examples depending on the interviewee’s context and responses (Brymann & Bell, 2015). The interview length varied between 30 min and 75 min. All formal interviews were carried out between



May 17 and July 11. The researcher stopped conducting semi-structured interviews when data was saturated, meaning that further interviews would have brought little to no new insights (Saunders et. al., 2016). However, despite their above-mentioned advantages, qualitative interviews may also suffer from a number of difficulties, including the quality of data, which are outlined in section 3.7.

#### *3.5.1.3 Questionnaires*

Unexpectedly, the researcher had to use an Internet questionnaire method, as two of the interviewees requested the interview to take place in written form. From a methodological perspective, this is no longer considered a qualitative interview, but rather a questionnaire. As an ethical researcher, the aim has always been to build up and maintain good relationships with the interviewees, which is why the researcher heeded the clearly expressed wish of the research participants. Due to the unexpected nature of this request, the researcher was not able to design a separate questionnaire, but rather sent the existing interview guide with some additional questions and clarifying comments. The lack of a well-constructed questionnaire (e.g. including filter questions) and the missing personal assistance regarding the questions might have negatively affected the richness of data (Saunders et al., 2016). The use of questionnaires also makes it impossible to know whether the questions were indeed answered by the intended interviewee or by someone else. Given the thesis' interpretivist approach, this uncertainty about the interviewee's identity must be regarded as unfortunate since his/her perception of reality profoundly affects the outcome of the research

However, being an ethical researcher and accepting the interviewees' wishes might have maintained and built trust within the researcher-researched relationship, leading to more truthful and hence more valuable responses. Answering questions in written form rather than face-to-face or via video call might also have minimized constraints of language proficiency and time, and thus positively affected the quality of the insights gained.

#### *3.5.1.4 Field Configuring Events*

Furthermore, FCEs contributed greatly to the primary data collection of this thesis. FCEs are described as “(...) settings where people from diverse social organizations assemble temporarily, with the conscious, collective intent to construct an organizational field.” (Meyer, Gaba & Colwell, 2005, p. 467). Fields are defined as “(...) those organizations that, in the aggregate, constitute a recognized area of institutional life (...)” (DiMaggio & Powell, 1983, p. 148) by aiming to “(...) announce new products, develop industry standards, construct social networks, recognize accomplishments, share and interpret information, and transact business.” (Lampel & Meyer, 2008, p. 1026). The Sustainable Fashion Research Agenda (SFRA) and the Copenhagen Fashion Summit (CFS), taking place in May 2019 have proven to be two particularly suitable FCEs for the data collection of this study. They enabled the researcher to fully immerse in the field. This allowed the researcher to investigate the change of an organizational field, e.g. the sustainable transformation in the fashion industry



(Meyer et al. 2015). The possibility to observe and evaluate the dynamics in the field was particularly crucial as “[...] they can be turning points in the social, economic, and political transformation of our world” (Lampel & Meyer, 2008, p. 1034).

Moreover, FCEs allowed the researcher to gain knowledge of the constructed realities on both micro and macro level. By conducting informal interviews with individual social entities during FCEs, the researcher aimed to understand their constructed realities, especially in terms of the perceived challenges and opportunities of waste materials (micro-level). Additionally, the researcher attended almost all talks and panel debates of various industry and thought leaders to obtain a broader perspective on the dynamic processes happening in the industry (macro-level).

### **3.5.2 Secondary Data**

Due to the novelty of CEBM as an academic field, this study relied heavily on collecting primary data. However, secondary data was crucial to build up the theoretical foundation of this research and offered a wide range of supplementary knowledge (Saunders et al., 2016). In this study, the researcher made use of secondary data such as books, academic journals, industry reports (e.g. the Pulse Report), government and EU publications, foundation reports (e.g. EMF) and websites of different brands.

### **3.6 Data Analysis**

The data analysis is the process of transcribing, categorizing and making sense of the collected data. According to Kvale (1996), data analysis and collection is a flexible and reciprocal process. It allows the researcher to identify themes, motifs and interrelations simultaneously to the data collection process and to go back and forth between data collection and analysis, as well as to adapt accordingly (Saunders et al., 2016, Miles & Huberman, 1994).

In qualitative research, there is no uniform method for analyzing data (Bryman & Bell, 2015). Therefore, the researcher chose the ‘thematic analysis’ due to its flexible and systematic nature. ‘Thematic analysis’ can be used in quantitative and qualitative, as well as deductive and inductive studies, and is considered a more generic process of data analysis (Saunders et al., 2016). It aims to identify themes across the collected data (Braun & Clark, 2017; Bryman & Bell, 2015). In line with the ‘thematic analysis’ a six-step process suggested by Creswell & Creswell (2018) has been applied.

The first step of analysis is organizing and preparing the collected data. Following the first step, the researcher transcribed six audio-recorded semi-structured interviews, scanned the two questionnaires and typed up all field memos taken at SFRA and CFS and further identified secondary data. The second step includes reading through these materials to acquire an overall impression (Creswell & Creswell, 2018). These first two steps align with what Saunders et. al. (2016) calls ‘familiarizing with the data gathered’. The third step is about coding the data. “Coding involves labelling each unit of data within a data item (such as a transcript or

document) with a code that symbolizes or summarizes that extract's meaning.” (Saunders et al., 2016, p. 580). A code can be one word or a group of words while the unit of data ranging from one word to a whole text passage (Saunders et. al., 2016). The aim of coding is to decrease the sheer amount of data by categorizing and attributing meaning to them (Bryman & Bell, 2015). Building on the research question, several themes such as ‘opportunities of waste materials’, ‘challenges of waste materials’, ‘the role of SMEs in the sustainable transformation’ were established prior to the analysis. However, the codes being part of these categories inductively emerged during the process of data analysis. The fourth step encompasses the derivation of themes and descriptions from the codes (Creswell & Creswell, 2018). On this account, the researcher identified common patterns, which were clustered into themes to address the research question (Saunders et al., 2018; Creswell & Creswell, 2018). Relating the identified themes to each other and interpreting their meaning by also considering existing literature did not only represent the two final steps of Creswell and Creswell’s data analysis, but also lead to a reflective discussion about the findings.

### **3.7 Data Quality**

Using reliability and validity as criteria to ensure the quality of data in qualitative research has been controversially discussed in the past decades. Since they have their origin in quantitative studies and are usually associated with a positivist research philosophy, Lincoln & Guba (1985) have identified four alternative quality criteria to ensure the trustworthiness of a study. These quality criteria are especially appropriate for the interpretivist research philosophy and qualitative research and were therefore deemed suitable for this study. They comprise credibility, transferability, dependability and confirmability (Lincoln & Guba, 1985) with the corresponding counterpart of the quality criteria rooted in natural science such as reliability, internal and external validity (Saunders et al., 2016).

#### **3.7.1 Credibility**

As a parallel criterion to reliability, credibility refers to the soundness of the data collected. Generating believable data is based on a congruent understanding of what the participants intended to express and how the researcher perceived it. Through the rich and thick description of data conducted in semi-structured interviews as well as spending time in the field (SFRA, CFS) high level of sound data was gathered. Re-assuring questions during the interviews as well as triangulation in terms of applying several data collection techniques ensured the trustworthiness (Saunders et al, 2016.). However, due to time restrictions, the method of member checking where interviewees read through the qualitative findings of their interview to double-check the accuracy of data was not applied. Moreover, due to a missing thesis partner, the researcher was not able to engage in investigator triangulation (Lincoln & Guba, 1985). Not applying the methods of member validation as well as investigator triangulation represent a shortcoming of this study.

### **3.7.2 Transferability**

Transferability is the parallel criterion for external validity (Saunders et al., 2016). Therefore, transferability is concerned with generalizing the findings and their applicability to other contexts. While data derived from case studies are often understood as non-generalizable, Flyvbjerg (2006) has shown that they can contribute to theory building. Even though the data varies in size, location, company age, materials and product portfolio (from shoes to swimwear), the researcher believes that many SMEs encounter the same opportunities and challenges when using waste material as well as take on similar roles in a sustainable transformation. Accordingly, it is possible that the findings from this study may also apply to other SMEs in both the same and in a different context.

### **3.7.3 Dependability**

Dependability is linked to reliability and is concerned with consistency and replicability of data. Questioning whether other researchers would have collected, analyzed and drawn the same conclusions as the researcher of this study lead to the issue of bias. Both researcher's and participant's bias play a crucial role in assessing the trustworthiness of a study (Saunders et al., 2016).

In this thesis, the researcher applied an interpretivist and social constructivist approach. Therefore, the findings were highly dependent on both the researcher as well as the researched. Thus, substituting the researcher or the participants of the data collection would have most likely generated different results. For example, the researcher noticed that newly established companies with founders of a similar age as the researcher were especially motivated and willing to participate in the semi-structured interviews. Their professional, social, demographic, cultural background, as well as their values and beliefs, differed from other interviewees and therefore, might have affected the findings not only in the amount of but also in the thickness of the data gathered. Furthermore, the researcher's educational background in innovation and entrepreneurship, her student position at GFA and her general passion for sustainable fashion informed her attitude towards the research topic and shaped the way she perceived insights gained throughout the study. Further, the interviewer's influence on the interviewee's response becomes especially evident when posing the interview questions (selection of words and intonation). Additionally, language barriers (English as a second language), inexperience of making notes during FCEs and conducting interviews might have shaped the outcome of this study (Miles & Huberman, 1994).

### **3.7.4 Confirmability**

Acknowledging the above-mentioned biases also pertains to the fourth quality criterion – confirmability (Guba, 1981), which is often associated with the phenomenon of reflexivity (Saunders et al., 2016). To increase the trustworthiness of this study, the researcher aimed to consciously and critically reflect on the biases involved and on how to overcome them.

As a consequence, the researcher has sought to reduce the level of influence on the data quality by first using several data collection techniques. Second, ensuring transparency throughout the research process, but particularly in the data collection and analysis by exposing the interview guide, transcribed interviews, questionnaires and field memos. Third, cross-checking translated interviews with a bi-lingual (German/English) speaker to inhibit language-based bias. Fourth, using direct quotations throughout the analysis to reinforce the controllability and trustworthiness of this study.

## 4. Analysis

This chapter introduces the findings obtained from a thematic analysis of the collected data. It is divided into three parts: SBMs of fashion SMEs, the potential of waste materials for fashion SMEs and the role that these SMEs envision to play in enabling a sustainable transformation of the fashion industry.

### 4.1 Sustainable Business Models of Fashion SMEs

This part of the analysis is concerned with SBMs. It proceeds from the premise that all businesses ultimately strive to create value. Such value, however, is not necessarily economic, but can also be of a social and/or environmental nature. Building on the previously described framework developed by Bocken et al. (2014), this study is specifically interested in one archetype of SBMs - that which *Creates value from waste*. In the following, based on a series of interviews/questionnaires with fashion SMEs, the study reviews how value from waste is created. Accordingly, the section will first categorize the types of waste they use before, describing the value they believe to generate.

#### 4.1.1 “From Waste to Value” Approach applied

##### 4.1.1.1 Waste Products

Based on all formal interviews and questionnaires, the fashion SMEs examined in this study use eight different types of waste material that can be classified into post-production and post-consumer waste.<sup>4</sup> Some fashion SMEs such as P1, P2, P4, P5 and P8 use both post-production and post-consumer waste streams and turn them into new valuable fashion items (figure 4).

		Stage of Waste Generation	
		Post-Production Waste	Post-Consumer Waste
Waste Stream	Textile Waste	P1, P4, P5, P6	P1, P4, P5
	Non-Textile Waste	P2, P5, P8	P2, P5, P6, P7, P8

Figure 4. Types of Waste Materials used by Fashion SMEs (own figure).

<sup>4</sup> Existing literature shows a wide range of possibilities of waste stream classification. Hvass (2016), for instance, uses the distinction between post-producer, (e.g. manufacturer), pre-consumer (e.g. retailers) and post-consumers (e.g. end-consumer) waste. However, with regard to clarity, this work only differentiates between post-production and post-consumer waste.

In this study, post-production waste refers to all waste created before reaching the consumer level (P1, P2, P4, P5, P8). The study makes a distinction between textile waste (e.g. scrap materials generated during production) and non-textile waste (e.g. by-products from the food production). Developing fashion items from post-production textile waste is exemplified by P1, P4, P5 and P6. For instance, P1 turns wasted or broken nylon into new hosiery products, P4 re-uses scrap materials from jeans fabric for the upper part of its produced shoes and P5 creates unique capsule collections from any kind of waste material. P6 re-uses only its self-produced offcuts, which become either “... some small design features that help use up scraps of fabric ...” (P6, 108f.) or “... kind of a patchwork of a bikini ...(as) it turns into this beautiful piece, that otherwise wouldn’t have existed.” (P6, 122f.). Regarding post-producer non-textile waste, P2 uses apple skin, a by-product of the apple-juice production to substitute animal-based leather for their sneakers. P8 turns fibers made from coffee ground into sports- and activewear. Lastly, P2 and P5 use Jacroki, a material predominately made from recycled waste paper to design leather-like accessories.

In contrast to post-production waste, post-consumer waste refers to the waste created at the consumer level (P1, P2, P4, P5, P6, P7 and P8) which includes any kind of product that consumers discard. Also, post-consumer waste can be further categorized into textile and non-textile waste. For instance, P1 turns recycled nylon waste into new hosiery products, P4 re-uses parts of discarded jeans for shoes and P5 works with recycled polyester for its clothing collections. Non-textile waste at the consumer stage is re-imagined by P2, P5, P6, P7 and P8 and thus limited to plastic waste. While P5, P6 and P7 use Econyl to create sustainable swimwear, P2 and P8 turn a fabric made from 100% plastic bottles into new shoes and sportswear.

#### **4.1.1.2 Value Creation**

One of the respondents accentuated confidently: “... I think we’re contributing with a lot of value...” (P4, 193). Yet, what type of value do the selected fashion SMEs intend to create by using waste materials? The data give insights into the different types of value that they believe to create by using waste materials. In the following, these are grouped into economic, environmental and social value.

##### **4.1.1.2.1 Economic Value**

Not surprisingly, many of the interviewees aim to generate economic value as it is necessary to keep their companies afloat. However, the data shows that such economic value is not mentioned as a primary goal. P2 demonstrates this by stating “We are not interested in making quickly a lot of money but we want to trace a new code for conscious consumers to choose brands and products that take care of the environment and the society.” (P2, 163-165). P6 supports this vision and clearly indicates the prioritization of value creation, in which economic value comes last when saying “I don’t pay myself. It’s a very very very small margin that we work with because I want to put back into the brand and into the environment, before I want to put back into

my own pocket.” (P6, 510f). P7 confirms this subordinate role of economic value, stating: “If you are like me, it’s more about the purpose and the passion, because I honestly don’t think about the money.” (P7, 895f.). P7 takes it even further and appoints someone else to monitor the brand’s financial situation to ensure that creating economic value will remain secondary in the future. Even if profit-making is not identified as their first priority, the importance of economic value creation is implicitly evident in many of the respondents’ frustration about their lack of financial resources and the dearth of outside investments (P6, P5). Rather than generating economic value, all participants explicitly see the value they create as environmental value.

#### **4.1.1.2.2 Environmental Value**

The environmental value that fashion SMEs believe to create by using waste materials is through reducing the amount of existing waste, saving resources and thus lowering and/or offsetting Co2 emissions.

##### *Reducing the Amount of Existing Waste*

P8, for instance, sees its environmental value in reducing the amount of plastic waste they generate. This is affirmed through its statement: “Our Eco Core collection is made from recycled plastic bottles which are helping to reduce the global plastic pollution crisis by giving this waste material a new life” (P8, 64-66). This motivation is shared by the fashion brands using Econyl to clean the oceans of plastics (P5, P6, P7). During the interview, P7 explained that “... 46% of the plastic in the oceans are old fishing nets ... “ (P7, 40f.), which destroy the entire ecosystem in the ocean. By using Econyl, that “... takes these nets and make it into granulate ... and then kind of contracts all the nylon ... and makes it into fiber again.” (P7, 56-64), P3, P5, P6 and P7 are convinced this method create environmental value.

This logic applies to all brands using waste materials, as it prevents material from being disposed of. The founder of P6, for instance, turned her desperation about “... racks and racks of clothing that just goes to waste” (P6, 62) into a force for good, as she started her business using offcuts of bigger swimwear brands to prevent additional waste. In the interview, she reinforced this by saying: “... if it doesn’t get sold to someone like me, it ends up in landfill anyway, or they burn it ...” (P6, 284f). When asked how P4 creates value, the answer was “... we’re trying to solve like a waste problem.” (P4, 188). P4 further stressed its environmental mission as “... giving textile waste a second chance and transform it into upcycled shoes.” (P4, 29). The value creation starts when “... we’re having this waste that we’re using for something better than it just going to waste ... And at the same time ... we’re preventing the use of new material.” (P4, 189-191).

##### *Saving Resources*

The saving of resources represents another facet of creating environmental value. P1 believes they are able to contribute positively to the environment by turning recycled nylon into new hosiery products. In this way, the company prevents the extraction of new raw materials such as oil, because the products “... are actually made

from petroleum.” (P1, 64). According to P1, oil products such as hosiery are especially bad for the environment as the extraction of petroleum “... releases greenhouse gases...” (P1, 64.). Similar concerns also apply to textile waste. By using discarded textile scraps instead of new textiles, resources such as energy, water and land-use can be saved (P4). In addition, by making the waste materials more durable, they last longer and once again save resources. P1 elaborated: “They (the hosiery) don’t last very long. So you wear (them) maybe once or twice and then they will break, and then you throw it out in the garbage. And (in) most places around the world garbage ends up in landfills or they get incinerated ...” (P1, 67-70). A solution is to use toe reinforcements, which are 3D-printed and therefore “... more tightly wound...” (P1, 139), enabling P1 to decrease the hosiery’s fragility, making them last longer and as a result save resources.

#### *Lowering and/or Offsetting Co2 Emissions*

Reducing the amount of existing waste and preventing the usage of new raw materials go hand in hand with the reduction of Co2 emissions. But, some brands go a step further, claiming not only to reduce Co2 emissions during the production process but also during the use phase of the waste product. P8, for example, stated that “our clothing ... is made from high quality materials so it doesn’t need to be washed as often ...” (P8, 51f.) and “... it (the coffee ground material) does not require the high-temperature treatment that other materials require which reduces CO2 emissions.” (P8, 63f.). In contrast, P2 argued: “The only 100% sustainable shoe is the one that you don’t buy and that you don’t produce.” (P2, 179f.) Hence, claiming to cut Co2 emissions when producing fashion items is a contradiction in terms as each manufacturing process produces Co2 emissions. It is for this reason that P2 rather believes in offsetting its Co2 emissions. To illustrate this point, P2 said: “We respect the planet because we compensate all the Co2 produced in the entire life of the shoes by plantations of trees and preservation of square meters of growing forest ...” (P2, 151-153).

#### **4.1.1.2.3 Social Value**

Besides economic and environmental value, all brands believe that they also create social value. While for some of the brands, this is also true in terms of production, most of them see their social contribution in raising awareness of, in fostering critical thinking about and in generating appreciation for fashion items.

Value creation at the production level is mainly related to their locally developed supply chains and non-exploitative work. P8 stated: “... (We) make sure that everyone in our supply chain from source to sale is treated and paid fairly which is also reflected in our prices.” (P8, 177-179). The importance of social wellbeing for workers is also underlined by P7, saying: “... on a social plan I also got them [producers] to raise their [employees’] salary so they were above (...) minimum wage ...” (P7, 104f.). Additionally, wages in December are doubled and 5% of all monthly profits are divided between employees (P7).



At a consumer level, interviewees mainly see themselves as counteracting ‘fast fashion’. A large part of their social value lies in informing people about the problems of the fashion industry and in encouraging them to change their consumption patterns accordingly. This is confirmed by P7, who emphasized that consumers need to become “...responsible in (their) choices ...” (P7, 530) “... because that is really what ... the sustainable fashion movement is about...” (P1, 284f).

The attention these companies receive due to their waste materials can be used to generate awareness and knowledge and thereby to facilitate more critical thinking about the fashion industry and consumer choices. It might improve consumers’ ability to detect ‘greenwashing’ or to question materials that seem sustainable at first glance, but which perform badly in terms of net sustainability. Regarding the latter, P4 gave an example of a company that is “... making soles from actually waste algae water” (P4, 260f.). To make the sole more durable the brand mixed the algae material with plastics leading to the contamination of the natural cycle and thus preventing sole from being recycled in the future. This goes back to the importance of design when talking about sustainability, however, “... the consumers are not aware of this.” (P4, 804). By educating consumers on questions of sustainability and the fashion industry, these brands hope to facilitate smarter consumer choices. In this way, the educational aspect of their work is not only part of the social value creation but also their environmental value.

Further, a large part of the social value creation is linked to the esteem of fashion items that SMEs try to inspire in consumers. P6 believes that ‘fast fashion’ is responsible for the current culture of not valuing our clothes. P6 said: “... We do not put enough value on the clothes that we have. If people actually valued their clothes, cared for their clothes, then they would keep them for longer, they would wear them more, they would pass them down to friends and family, instead of, well that cost me \$5 so I don’t really care, I am going to wear it once...” (P6, 139-143). Therefore, one of P6’s key objectives is to reintroduce an emotional connection to fashion items. To this end, some of the interviewees introduce the *make-to-order* model (P6), adapt premium pricing (P5, P6, P7, P8), organize do-it-yourself design workshop (P4), design for longevity by using “... classic styles ...” (P7, 141), high quality materials (P2, P4, P5, P6, P8) and make the process of clothing production more transparent (P1, P4, P5, P6). By enhancing transparency, as P6 explained: “... they [people] see the value of it because they see the hands behind it and the time and the effort behind it ... and putting a face to that process...” (P6, 153-156) and reminding people that “... Every single piece of clothing is made by hand.” (P6, 705). Creating emotional attachment is not only an essential part of social value creation but also has an impact on the environment, because “.... if you don’t love it, you’re not going to wear it” (P6, 241) and throw it out more easily. This illustrates that social value creation cannot be understood in isolation from broader environmental objectives, which all of the interviewees pursue. As they themselves realize, only a broader societal transition will ultimately foster systemic change towards sustainability.

#### 4.1.2 The Combination of Sustainable Practices

Although the use of waste materials is one aspect of fashion SMEs' strategy to create economic, environmental and social value, it is by no means the only one. In fact, all fashion SMEs studied use (or are planning to use) a wide range of other methods to achieve sustainability. These include closed-loop-system, slow fashion, premium pricing, localization, clean energy, transparency and communications.

P1, P4, P6, P7 are committed to establishing a CEBM, which is not only based on waste materials but aims to close the material loop. This is achieved by implementing a take-back system to collect and then recycle the waste products at the end of their life. P6 confirmed: "I would like to develop that returns program more than anything I just think ... that's where my headspace needs to be in terms of becoming sustainable." (P6, 664-666). However, taking back the products requires a well-planned logistics and recycling system. For this reason, some respondents start by aiming for an interim solution to function as long as infrastructure and technological innovation are not yet mature. In the meantime, P7, for instance, wants to build up "... a marketplace inside of the web shop." (P7, 118f.) where used products can be re-sold. Another example of an interim solution is provided by P1, which uses the returned products as input material for other products until mass-produced recycling technologies exist. While P1 decided to use its collected products to create fiberglass tanks, P2 uses the sole of its returned shoes "... to produce the floor for children playground ..." (P2, 190) and the upper part as "... isolating material for building panels" (P2, 191).

Besides using waste materials, SMEs apply the C2C principles. The aim is to avoid waste by designing products with their end of life in mind. P4 exemplified this by saying: "If you design a garment that has like 1000 zippers, and is completely, like impossible to ... take apart, nothing good can happen in the end. You have to throw it away..." (P4, 797f.) This is also the case for the material mix as P3 elucidated: "... the issue is that most of these materials are blended materials and that's where they dilute their value because it's so difficult to separate." (P3, 288f.). Therefore, P4 designed its shoes for disassembly by using an innovative glue to hold the upper part and the sole together, however, when put in the microwave, the thread can be dissolved and hence dismantled into its components.

Another method to achieve sustainability besides using waste materials is being "... a low waste company" (P6,105). To prevent waste, P6 established a make-to-order policy, which allows the brand to save time and fabric. P6 emphasized: "... I think the fundamental principle that the business comes back down to and one of the reasons that we can call ourselves sustainable, is that we make-to-order..." (P6, 54-56). P7 is also fond of introducing the pre-order system in the future. By referring to a Danish fashion brand called Carcel, P7 declared: "I just love the fact, that they never have stock, like they make it by order ... and I think that is so sustainable ...." (P7, 981-986).

P7's approach of becoming sustainable is also rooted in slow fashion by using only "classic styles" (P7, 141). P7 confirmed its decisions by stating: "I don't believe in seasons anymore like people travel all the time." (P7, 145). Besides abolishing seasonal collections, the above-mentioned make-to-order policy helps to drive slow fashion, as it forces consumers to patiently wait for their products. P6 reminded: "You know, you don't need a dress in 24 hours, you can wait." (P6, 654f.). Moreover, this study found that most interviewees offer their goods at premium prices (P6, P7, P8). In that respect, P8 clarified: "... our prices are fairly premium because we want people to respect our products and to keep them for a long time." (P8, 172f.) Additionally, P1, P2, and P5 revealed that using clean energy, purifying wastewater and localization are substantial parts of their sustainability strategy. Proudly, they reported: "Our factory ... (is) powered with green energy" (P2, 276) or "So, our production process is completely emission free, because we use renewable energy." (P1, 876f.)

During CFS, Designer Charlotte Eskildsen noted, that both communications and transparency are essential for a designer's sustainability journey (CFS). This was affirmed by all formal responses from interviews/questionnaires in this study. Transparency, when communicated well, enables consumers to receive valuable information and to help them make informed purchase decisions. P6 mentioned that consumers need that guidance to be able to make more knowledgeable choices as "... we grow up with no understanding of where our clothes came from ..." (P6, 669f.). P6 further emphasized that social media and in particular, Instagram has been "an absolute game changer" (P6, 183) in terms of enabling transparency and communications about it.

## 4.2 The Potential of Waste Materials for Fashion SMEs

For fashion SMEs, waste materials hold both opportunities and challenges. Based on all data collected, they are clustered according to the different levels they occur in: the micro, meso and macro level (figure 5). While the micro level is related to the product and the meso level is linked to the organization itself, the macro level refers to the environment and society. Considering opportunities and challenges at all three levels provides a comprehensive overview of the potential of waste materials.

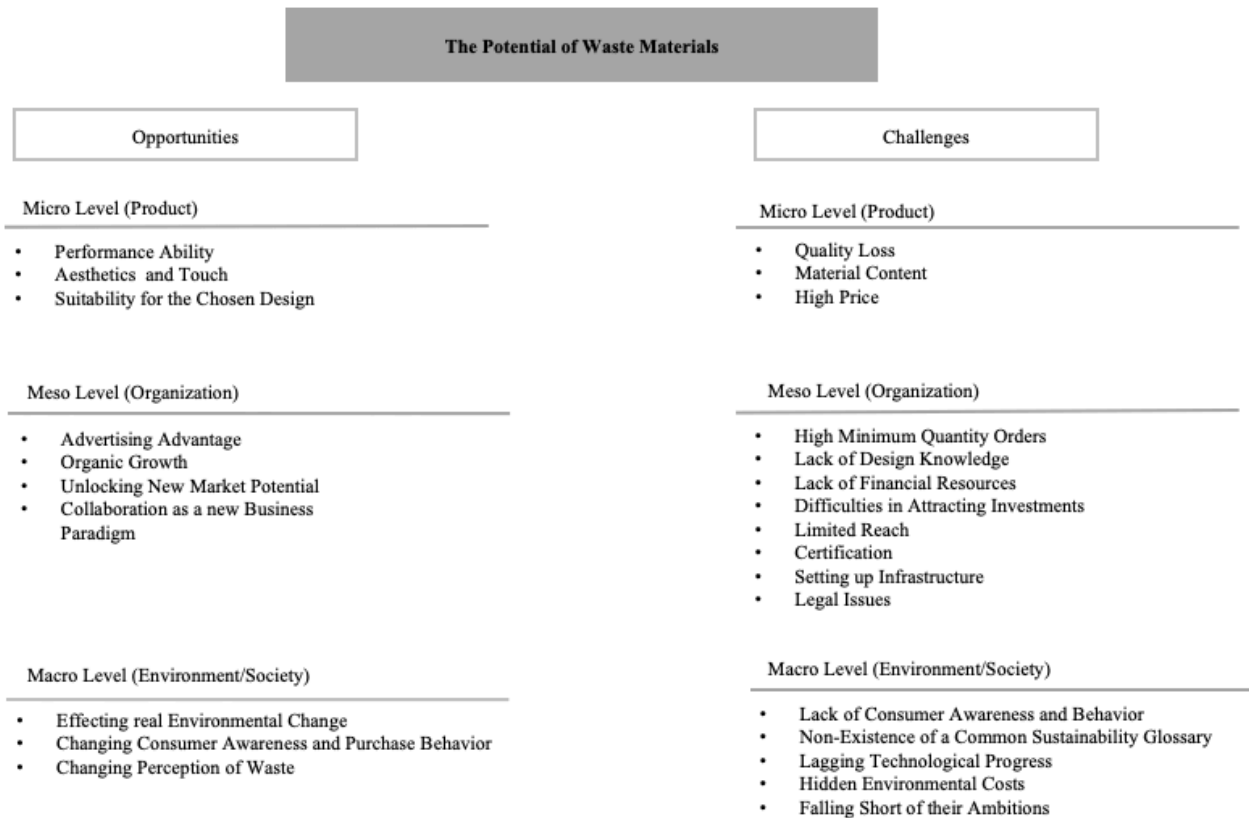


Figure 5. The Potential of Waste Materials for Fashion SMEs (own figure)

### 4.2.1 Opportunities

#### 4.2.1.1 Product-related Opportunities

The product-specific opportunities on the micro level are mainly related to the characteristics of the material such as performance ability, aesthetics and touch as well as suitability for the chosen design.

##### *Performance Ability*

P2 promotes the use of apple leather due to its durability by saying “it ... assures the same performance of leather” (P2, 199f.). On this account, R6 highlighted the numerous durability tests that waste materials undergo

to guarantee high quality. The performance ability has also been named as one of the opportunities for using ocean plastics (P5, P6, P7). P7 said: "... the good thing about nylon and plastic in all is that plastic doesn't lose its performance ability... if you can recycle it, nylon and plastic could potentially be the most sustainable material in the world because you can keep ... putting it back into the production loop without losing the performance ability." (P7, 661-666). P7 reported ocean plastics' quality of being "... 40% more resistant ... also to salt water and UV radiation sensors..." (P7, 708f.). P5 added: "... the fabrics are extremely well developed and durable." (P5, 66), which is why they have become the standard.

#### *Aesthetics and Touch*

Regarding the aesthetics and the touch of waste materials, P5 exemplified that the waste material Jacroki is well suited as a substitute for leather, since it has a leather-like look and "... an incredibly beautiful feel/touch and comes very close to leather..." (P5, 74-76). Regarding ocean plastics, P6 also mentioned: "... it's a beautiful fabric to work with, it comes in amazing colors ... (and) it prints beautifully..." (P6, 271f.).

#### *Suitability for the Chosen Design*

Concerning the suitability of materials for the intended design, waste materials such as ocean plastics are highly compelling, according to P6 and P7. The latter claimed that the fibers of recycled ocean plastics are stronger than ones from virgin plastics. For producing swimwear, this is especially beneficial as it does not only avoid see-throughs but also prevents the swimwear from losing its shape (P7). To illustrate this point, P7 said: "Women have shapes and they want to be supported in different areas. So, this fabric without adding padding or whatever, actually supports and you will never have a see through." (P7, 704f.). This contrasts with other brands' swimwear which loses its shape after few times of wearing (P7).

#### **4.2.2.2 Organization-related Opportunities**

At the meso level, the business opportunities comprise: advertising advantage, organic growth, unlocking new market potential and collaboration as a new business paradigm.

#### *Advertising Advantage*

First, one of the opportunities of using waste materials at the meso level is the possibility to achieve comparative advertising advantage over those who use virgin materials (P3, P4, P5, P6). The data revealed that "Materials [from waste] are a good marketing tool. They allow showing consumers that they [brands] care about sustainability." (R11, 148f). Although an "... authentic narrative ..." (R13, 364) is only possible if the choice of materials reflects the overall sustainable values of a brand. By using waste materials and therefore employing a CEBM, the brand gains credibility as sustainability is not only an add-on "... to make it less bad" (P4, 211) but it is rather "... the starting point of the whole product ..." (P4, 212). P3 underlined this approach

by stating: "... a lot of these smaller sustainable brands have sustainable values embedded in their core and that really drives all of their decision making and the way they expand." (P3, 231-233). "And all of them are actually getting lots of pickups." (P3, 235f.).

Paired with growing interest and awareness in environmental issues, the brand value of these fashion SMEs might increase. P5 explained the reason for an advertising advantage by saying: "... I think that people really love that idea that, you know, what was wasted is now being used. It makes them feel like an activist, it makes them feel powerful and like they're doing something about this huge huge problem ... I think it's actually a really good way of marketing it, because it makes people feel positive when they're actually consuming at the same time." (P5, 398-402). It is likely that the described advertising advantage will not only attract new customers but also new employees, as "people, and especially the young generations want to work for employers that have a bigger goal that goes beyond making profits." (CFS, 248f.)

Moreover, using waste materials can have a spill-over effect on brand perception. By using innovative waste materials, SMEs themselves also look extremely innovative (R11). P5 also explained, that by using innovative waste materials, SMEs are becoming better storytellers. It stated: "Of course, we can tell a much better story than someone who can't tell so much about the materials ..." (P5, 91f.). Therefore, fashion SMEs using waste materials that are associated with sustainable values as well as innovation can gain an advertising advantage. This, in turn, helps brands to achieve their economic, environmental and social goals.

### *Organic Growth*

In addition to the advertising advantage, organic growth is considered an opportunity when using waste materials. What might sound like a disadvantage at first can be perceived as an advantage. P5 explained that by using waste materials, which are usually more expensive than virgin materials the brand's product margin is lower. Paired with a lack of external investment, the brand is forced to grow organically. However, this allows brands to grow slowly, independently from e.g. investors and thus without the danger of sacrificing their sustainable values as "... ethics slip when you get bigger" (P6, 660f.)

### *Unlocking New Market Potential*

Offering products that are sustainable *and* aesthetic goes beyond conventional fashion business practices in a profit-driven economy. Bridging the gap between two concepts long considered contradictory – especially in an era of 'fast fashion' – can lead to a competitive advantage over those who continue doing conventional business. Reconfiguring markets by combining fashion and sustainability allows fashion SMEs to unfold great hidden potential – be it economic, social and/or environmental – as it forces them to rethink the way business is done (CFS). Additionally, bridging the gap between fashion and sustainability is not only beneficial for SMEs but also for consumers as they can engage with "... almost guilt-free-shopping ..." (P6, 407). P6 elaborated on this by stating: "It's really hard to make someone feel good about spending money these days..."

(P6, 406), but by offering products made of waste, consumers can be turned into “... ethical shopper(s) ...” (P6, 404).

#### *Collaboration as a New Business Paradigm*

The data shows that among fashion SMEs using waste materials, collaboration has become a new business paradigm (P1, P2, P4, P5, P6, P7). The environmental and social impact which fashion SMEs are seeking to create outranks the pure economic purpose of the individual brands (P1, P2, P4, P5, P6, P7, P8). Jennifer Silverman, Vice President at Corporate Sustainability at Target, put this development in the following words: “We are not just in service for our own organization, we are in service for our collective goods.” (CFS, 662f.) Silverman further explained: “Every company, every individual is just one element in a large system.” (CFS, 652) and therefore, collective effort is needed to replace the current system with a sustainable one (CFS). In this study, fashion SMEs engage in all forms of collaboration from supporting and co-creating with other sustainable fashion SMEs (P4, P6, P7), partnering with large corporates for bigger outreach (P1, P5) to staying in dialogue with customers (P4, P6, P7). The latter is especially crucial as in a circular future “your customer will become your supplier” (CFS, 779). On account of this, all kinds of joint efforts are needed to achieve the overall goal: system-level change. As a consequence, the need and opportunity to collaborate already point to the potential of using waste materials that goes beyond company boundaries.

#### **4.2.2.3 Environment/Society-related Opportunities**

The environmental and social opportunities of using waste products at the macro level largely coincide with chapter 4.1.1.2 Value Creation. By using waste materials instead of virgin raw materials, fashion SMEs can have both an environmental and social impact.

#### *Effecting real Environmental Change*

Concerning the environment, using waste materials is responsible for decreasing the amount of existing waste, saving new raw materials and therefore natural resources, while at the same time reducing Co2 emissions. P7 exemplified the latter by saying “... the process of doing a sustainable swimwear actually releases 80% less Co2 emissions” (P7, 655f.) than producing swimwear from virgin plastics. The environmental effect is even bigger when considering, that ocean plastics such as Econyl are part of a broader closed-loop system in two ways: First, by using waste that otherwise would have been thrown away and turning it into a new source for the fashion industry and second, by enabling such a closed-loop system because the material can be recycled endlessly without comprising its quality (P7).

### *Changing Consumer Awareness and Purchase Behavior*

The fashion SME's decision to create products from waste does not only have an impact on their business operations and their ecological footprint but also on society at large. Besides the social impact that derives from positive environmental change (e.g. reduced pollution and improvements in people's health), the SMEs mainly referred to social value regarding consumers. As consumers play a pivotal role in fostering change (CFS), fashion SMEs – by using waste materials - seek to raise awareness, to change people's perception of waste and consequently shift consumer's purchase behavior.

By raising awareness of the problems associated with fashion and by showing new solutions such as waste materials, SMEs can give consumers the necessary information to make conscious purchasing decisions. P6, for instance, thinks that as "... we grew up with little to no understanding of where our clothes came from." (P6, 669f.), there is a huge opportunity to "... explain them [consumers] why the fashion industry is the way it is and how it doesn't need to be that way." (P6, 671f.) If consumer awareness of waste is created by showing "... the textile waste and how good quality it is and how much we actually throw out" (P4, 326f.), then a consumer's negative perception of waste can change (P4).

### *Changing Perception of Waste*

The way waste materials are perceived is very much dependent on the individual consumer as well as on the type of waste material. Whereas there are still negative associations with textile waste as being dirty and old (P4), the perception of ocean plastics has been drastically changed in recent years. The activist work of Parley for the Oceans and Adidas' shoes made from ocean plastics have resulted in a change of perception and new purchase behavior (P3). Even though there is still "A big miss-interpretation ... (as) a lot of consumers think recycled won't be as good as virgin ... it's not impossible but it's hard to change people's perception and to change consumer behaviors." (P1, 280-284).

However, with ocean plastics serving as a successful example of how waste can be re-imagined both emotionally and materially, fashion SMEs continue to shape society because "... it's not just about the material or what the output is, it's about changing and educating the wider ecosystem." (P3, 343f.).

## **4.2.2 Challenges**

Although all participants stressed the unique promises and opportunities associated with using waste materials, it is telling how many of them elaborated in detail on the perceived challenges. Besides the pressing environmental and societal issues, they also struggle with concrete product-related and business challenges.

### **4.2.2.1 Product-related Challenges**

The product-related challenges on the micro level comprise quality loss, design constraints, material content and high price.



### *Quality Loss*

Data shows that quality loss compared to virgin materials is considered a massive challenge for fashion SMEs when using waste materials (R3, R11). The respondents mainly referred to decreased material durability, especially when it comes to innovative waste materials based on by-products. R3, for instance, sees the usage of waste materials such as S. Cafe's fabric and Piñatex's pineapple leather very problematic as they "... are just not designed for longevity" (R3, 36f.). Considering Piñatex, R3 reinforced its critique on waste materials' robustness by saying: "After 10 times you can basically throw it away." (R3, 35). With regard, to recycled polyester P5 refers to a 20% decrease in durability compared to virgin polyester. In connection with quality challenges, respondents also discussed several shortcomings of waste material, especially when being washed or recycled. For instance, S. Cafe advises its customers not to wash the material. This makes it difficult first for the brands when producing and distributing fashion items and secondly for customers when using them (R3). If this advice is not followed, the product's lifespan will decrease. In this regard, R9 specifically points to Piñatex, whose coloration increasingly disappears with every washing. To counteract low quality, material producers often add other, more durable substances to the materials. This may make products more durable, but often less recyclable (R3).

### *Material Content*

Moreover, the material content represents an often-overlooked challenge. The problem occurs when waste materials do not contain information about where they come from, what materials they are made from and whether they are made of waste at all. P4 explained, that this is often the case with textile waste, where labels that provide information on the material content tend to get lost. In this regard, P4 said: it is "... difficult to end up using a material where you don't know the content." (P4, 552f.). This is especially demanding when brands aim to create circular products. P4 exemplified this by stating: "... I want to make products that are not (only) circular, not just in the input material but also circular when it ends up, like, the end of life." (P4, 834f.).

The use of waste materials such as textile waste without a material content declaration is considered circular as input material (because waste was used) but not necessarily at the end of its life as material content from mixed fibers and/or toxic chemicals cannot be recycled. The reason for this is mainly because "... we don't have the technology yet." (P4, 843).

### *High Price*

Data shows that the main product-related challenge that fashion SMEs confront is the relatively high price of waste materials (P3, P4, P5, P6, P7, P8, R6, R8, R10, R12). According to R10, waste material is more expensive than virgin material because processing it is more time consuming and more complex (R10). Also, designers agreed that waste materials such as recycled wool could increase the fabric price by 100% (CFS). The price for Piñatex, for instance, ranges between 50 and 58 euros per square meter. R12 justifies the price

of waste materials by contrasting it with their cheap counterparts: “It is much cheaper to exploit people and devastate the planet – it is much cheaper then. Finding the alternatives is complex and expensive, whereas using chemicals is cheap.” (R12, 214-216). The fact that sustainable materials are more expensive than non-sustainable ones is an “...absurd thing, where politics must intervene...” (P5, 97). Just as P5, P7 also expressed its frustration over the high prices and its potential consequences by stating: “... It was a surprise when, when I went into the process, that it was that much more expensive ... when you are a startup, there’s so many expenses and if you have to pay 10 times the price on every part, you will at one point , have to skip your values in order to survive.” (P7, 227-230). While P5 and P7 are waiting for policymakers to make it attractive to use sustainable materials through taxation, P3, P6 and P8 rely on economic market mechanisms. The concept of economies of scale is illustrated by P8: “... as more companies wake up to the global plastic pollution crisis and the climate change problem, they [waste materials] are sure to become more widely available and we therefore hope the prices become more sustainable.” (P8, 108-110). P6 further elaborated on this by stating: “... it’s [ price] definitely dropping because more people are using it, which is fantastic and why I keep saying, the more companies, the better...” (P6, 631-633). This logic is also reflected in the price development for recycled ocean plastic over time. While a few years ago P6 paid 50% more for ocean plastics than for virgin plastics, it is now 25% and expected to further decrease in the future (P6).

#### ***4.2.2.2 Organization-related Challenges***

Fashion SMEs face a number of organizational challenges because business operations based on using waste materials differ in many ways from ones based on virgin materials. The identified challenges at the meso level include high minimum quantity orders, lack of design knowledge, lack of financial resources, difficulties in attracting investments, limited reach, certification, setting up an infrastructure and legal issues.

##### ***High Minimum Quantity Orders***

The difficulties with waste materials already start when purchasing them. This is due to the high quantities that material suppliers require (P7, R8, R10, R12, R13, R14). R10, a producer of recycled polyester fabric, reported that its clients need to buy 100.000 pieces to complete a successful order. The reason for high quantities is that many of the innovative waste material producers, which are often startups themselves, strive to become profitable as well as to scale up the production to reduce the price per unit in the long run (R13). Neither would be possible if they had to repeatedly switch production from high quantities for large companies to lower quantities for SMEs (CFS). On that account, SMEs struggle – with a few exceptions of waste materials having low minimum amounts such as R12 – to procure waste materials in the quantities they need (R12).

### *Lack of Design Knowledge*

Using waste materials complicates not only purchasing activities but also the design stage. Designing a product from waste can strongly differ from designing a product from virgin materials. As waste materials differ from others in terms of durability, texture and dyeability, designers need to be trained to use them properly. However, it is challenging to find designers that know how to implement sustainability in design (P3, P4, CFS). There are two reasons for it. On the one hand, there is a lack of systematic education at fashion schools, as sustainability has not played a conclusive role in the curriculum of design programs. On the other hand, there is, in many cases, a negative correlation between designers being educated in sustainable design and those working in the fashion industry. Elsbeth Gerner Nielsen, the director of the Design School Kolding, recognized over the past years, that the more fashion students learn about sustainability, the less they desire to work in the fashion industry (SFRA). Consequently, there is a perceptible shortage of sustainable designers who are able to turn waste materials into new products.

### *Lack of Financial Resources*

Moreover, waste materials pose a financial burden to fashion SMEs. That is first and foremost because using waste materials instead of virgin materials comes at higher economic costs (CFS). Beyond high material prices, organizations face (opportunity-) costs when switching to waste materials. This can include time and money spent on activities such as identifying and searching for the right waste materials, testing them, negotiating new sourcing conditions and changing manufacturers as some waste materials need specific machines for further processing (P3, P4, P7, R5, CFS). Therefore, Charlotte Eskildsen stated, that "... using sustainable material is an investment." (CFS, 966). Unfortunately, as Francois Pinault noted: "Many companies give up their sustainability efforts because solutions to address sustainability can be very expensive." (CFS, 273f.) Implementing sustainable practices and in particular, switching to waste materials costs all companies money but is a particular hurdle for those with limited financial resources, such as the SMEs in this study.

### *Difficulties in Attracting Investments*

To overcome the barriers of high material prices and limited financial resources, external investment is required (P5). Rachel Arthur, the co-founder and CIO at the Current Global emphasized that sustainability has become the key factor for investments nowadays. And while 39% of all investors have already invested in sustainable businesses, impact investing in the fashion industry is very limited (CFS). The difficulties in finding investors are twofold. Not only is it a challenge to attract investors, but it is also particularly difficult to attract those who share the brand's values and thus support sustainable practices such as the use of waste materials (P5, P6, P7). P5 illustrated the prevailing situation by stating: "... it [investment] becomes dangerous because most investors are simply not ethical driven or not enough and simply this economic thinking always comes first and ... that simply destroys everything." (P5, 165f.). P7 experienced this firsthand. P7 reflected

upon meeting with a potential investor by saying: “So he [the investor] was super focused on conversions. Of course, because conversions (are) sales and sales is money.” (P7, 286f.) P7 also remembered how another investor tried to convince her to expand the brand to other countries as well as to shift the production to low-cost countries even before the brand launched (P7). However, had it not been for private savings, P7 would have been forced to work with these investors and “... going into a really bad marriage...” (P7, 303), where you do not only lose control but also track on why you had started in the first place (P7).

### *Limited Reach*

The combination of limited financial resources and difficulties in attracting sustainable investors often allows fashion SMEs only to grow organically and thus rather slowly. As a logical consequence, their possible outreach is constrained. While this might also come with positive side effects such as having control, it will certainly take longer to achieve the change that the SMEs are seeking. Beyond the limited financial means, using waste material such as textile waste can make it difficult to enter the retail market also resulting in reduced reach (P4). This is illustrated by P4, which turns discarded textiles such as jeans into the upper part of new shoes. On account of this, every pair will look differently, leading to the following challenge. “... in terms of selling to retailers this is a large barrier, because retailers do not appreciate the uniqueness factor. The more standardized the items, the lower the barriers to enter the retail world.” (P4, 1014f.) P4 further admitted that for this reason: “... retailers will not consider me, which makes it hard to gain reach and make a large impact.” (P4, 1018f.)

### *Certification*

Another challenge is obtaining certifications. P7 elaborated on the barriers of becoming certified with GOTS or oeko tex 100. P7 voiced that being a small company as well as using waste materials poses various obstacles to these certifications. P7, for instance, uses fabrics that are oeko tex certified and sustainable hang tags, but because of one single thread which is not oeko tex 100 certified, the whole product created by P7 cannot be declared as oeko tex certified. This is especially critical as “a lot of people don’t want to buy from you if you don’t have it ...” (P7, 636). With regard to GOTS certification, P7 claimed, that the requirements to become certified are so high that they can often only be met by large companies, which carry out most of their activities in-house. Yet many SMEs outsource large parts of their processes and cannot assure that e.g. their suppliers’ warehouse runs on sustainable energy (P7). While certification is a challenge concerning many SMEs in general, it is particularly problematic for those using waste materials. Establishing a new business paradigm, namely the one of *creating value from waste*, requires a great deal of trust from consumers to believe in waste products as a new and real alternative for conventional products. However, without certification, consumers have no evidence of trustworthiness and hence remain skeptical.

### *Setting up Infrastructure*

Another challenge that fashion SMEs encounter when creating products from waste is setting up an unprecedented infrastructure (P2, P4, P6, P7). As the SMEs in this study are at the forefront of sustainable change, they have to find and build up supply-, production- and distribution networks from scratch. In the case of textile waste, P4 explained its difficulties in setting up all processes by itself. Since “... that is not really been done before.” (P4, 490), “... you can’t just go to a shop and say like: I want textile waste.” (P4, 482f.). Time and effort must be invested to understand where and under what conditions waste materials can be sourced (CFS, P3, P4). Setting up an infrastructure to be able to use textile waste as a resource also requires taking processes such as washing and sorting of textiles into account (P4). Another difficulty is that some of the materials are not yet commercially available (R1). Orange Fiber, for instance, is exclusively used for Salvatore Ferragamo and H&M. Besides, Vegea had not even officially launched at the time of the interviews conducted (R1, R7).

With regard to the production itself, the data revealed that not every manufacturer is able to produce items from waste materials. Concerning textile waste, P4 illuminated that some textile waste, such as jeans, does not fit the machines of the ‘conventional’ manufacturers. Therefore, P4 needed to find another production facility first, that “... cut up the pants and then make them into like a flat patchwork thingy” (P4, 489) before it can fit the machines. P4 made clear that precisely these circumstances cause brands “... to start their own little mini factory inside a factory.” (P4, 497f.).

Besides sourcing the materials and manufacturing the fashion items, the distribution of waste products is also a considerable challenge, as exemplified above when P4 was rejected by retailers due to the lack of standardization.

### *Legal Issues*

Additionally, depending on the country of operation, there can be legal concerns when using waste materials. In Turkey, for example, laws prevent the import of waste, such as post-consumer textile waste. Therefore, using or recycling these waste streams is not only difficult but illegal (R8). Lenzing also faces these barriers with its waste material Refibra (CFS). Lenzing’s CCO acknowledged: “Legislation is a big problem. In some countries, waste is considered as a product that cannot be exported. Legislation has to enable that waste can be classified as raw materials again.” (CFS, 766-768). According to P4, using waste materials can be legally challenging as brands must comply with the fact that there are no toxic substances incorporated. However, as described above, this is especially problematic when using textile waste that does not provide information on the material content (P4).

The variety of legal issues do not only represent the complexity of using waste materials in terms of product and business operations but already point to broader societal and environmental challenges.

#### *4.2.2.3 Environment/Society-related Challenges*

The key challenges in using waste materials for SMEs are societal and environmental, including a lack of consumer awareness and behavior, non-existence of a common sustainability glossary, lagging technological progress, hidden environmental costs as well as falling short of own ambitions.

##### *Lack of Consumer Awareness and Behavior*

CFS revealed that consumer awareness and behavior have significantly increased in recent years. The result of a survey conducted by GFA shows that sustainability is extremely important to 75% and has even become the main purchasing criterium for 7% of the respondents. However, when the fashion SMEs of this study were asked what challenges they face, they referred to missing consumer awareness and an insufficient number of purchases driven by sustainability (P2, P3, P4, P7, R5, R6, R10, R12). P4 and P7 believe that consumers do not know about fashion's devastating effects and thus do not understand the intention and the need to create products from waste. Others are convinced that consumers simply do not care at all (CFS) or are changing their minds too slowly (R6). Others see consumers as very much concerned with the topic of sustainability but ultimately not willing to pay for sustainable products (SFRA, R5). The result is a huge gap between consumer intention and consumer action, which represents a substantial barrier not only for fashion SMEs but also for a larger systemic change (SFRA).

##### *The Non-Existence of a Common Sustainability Glossary*

From a macro perspective, another challenge is the non-existence of a common sustainability glossary. Without a common language and definitions, promoting the use of waste materials is difficult. This is in line with Morten Lehman's speech during the CFS, where he stated: "... lasting change starts with language." (CFS, 444). As all fashion SMEs in this study are seeking change, it is surprising that there is no consensus on the language to be used. The data disclosed that there is no common understanding either on what waste, circular or sustainable materials are or on what constitutes a sustainable, circular, green or ethical brand. Even with regard to broader concepts like sustainability or CE, no consensus exists. Vanessa Friedman of the New York Times addressed the problem directly: "We still don't really know what sustainable fashion really means. Everybody has a different idea." (CFS, 1299f.). This situation was exemplified by the various statements of the data collected in this study. While some believe that sustainability and CE are really similar and "...intrinsically linked..." (P6,101), because "if you aren't circular, how can you be sustainable?" (P6, 98), others are aware of the differences but do not aim at highest accuracy in terms of the language they use. As P1 admitted: "we always use the word sustainable, but circular is more correct in describing us." (P1, 198f.) Yet others adjust their language according to their conversational partners. R11, for example, elaborated on this, saying: "It (naming the materials based on waste) is quite challenging. There are few different narratives out there: depending on whether you are talking with B2B/with more technical advanced people such as a brand

or with an individual. We don't really know how to call it." (R13, 384-387). Others still painstakingly distinguish both concepts. For P3, for instance, CE is about "... changing the inherent business infrastructure and the way that business is run." (P3, 62f.). Sustainability, on the other hand, "... can be a kind of tracking what your environmental footprint is, knowing where your material impacts are, having an understanding of what your carbon impact is, or how much waste you are using in the supply chain, or moving towards sustainable business practices, you know, paying the living wage, all of those sorts of things." (P3, 63-67).

### *Lagging Technological Progress*

The data shows that no matter how hard brands try to become circular, there is one main barrier, namely that recycling technology is not yet commercially available. The lack of a large-scale recycling technology prevents SMEs from fully closing the material cycle by turning waste into a resource. Without the necessary technology, a material revolution cannot occur and the existing choices of waste materials will by necessity, have to remain rather limited (CFS, P1, P3).

### *Hidden Environmental Costs*

One of the biggest challenges for SMEs when using waste materials is that these materials might not have the positive environmental impact they envision. According to R3, this could be the case as some of the waste products seem not as long-lasting or might not even be based on actual waste. R3 conveyed its attitude towards innovative waste materials and in particular, towards Piñatex by saying: "The idea is amazing and you get very easily excited about these materials, but the problem is that they are just not designed for longevity. At first hand you think these materials are sooo sustainable, but they are not. They might be circular – turning waste into value, but since they are not designed to last, they are for sure not sustainable" (R3, 37-40). R3 further critically questioned whether waste materials are really based on waste. R3 illustrated this by urging an inquiry into whether banana fibers are really made of banana leaves or rather out of the wood of banana trees. R3 even wondered whether all the waste materials based on ocean plastics were really made of recycled plastics collected from the ocean or rather from new plastics. While many of the interviewees are convinced that creating products from ocean plastics reduces both the amount of virgin plastics and of plastic waste in the oceans (P1, P3, P6, P7), others regard the use of ocean plastics as more environmentally problematic (P4, R2, R3, CFS, SFRA). The more skeptical position is adopted by R2, saying: "Using ocean plastics is not helping to diminish micro plastics in the ocean, it rather contributes largely to environmental issues since micro plastics is been released at every washing. Using ocean plastics as a resource does not tackle the cause of the pollution." (R2, 24-26). During SFRA, Bert van Son, the founder of Mud jeans, referred to the devastating outcome of combining recycled ocean plastics and cotton using the example of H&M's conscious collection. He called it "... an absolute disaster" (SFRA, 88), that brands are using these materials and claim to be sustainable at the same time. He clarified that these materials are not only releasing microfibers going back into the oceans, but

they are also lost for a closed-loop system, as materials cannot be separated (SFRA). These developments indicate the necessity to measure the real impact of these material innovations and to investigate just how suitable they are in the long run for a sustainable transformation of the fashion industry (SFRA).

#### *Falling Short of their Ambitions*

Another macro challenge for the SMEs examined is that they fall short of their own ambitions. Many of the fashion SMEs are determined to change the prevailing consumption patterns and to promote systemic change in the fashion industry. However, the data collected during FCEs shows divergent attitudes to this ambition. Opponents believe that fashion SMEs using waste materials are only switching to an alternative material rather than changing the basic parameters of consumption (SFRA, R2, R3). R2 went even further, saying: “Even if the sustainable or circular materials are based on waste ..., it is still used in a linear system. So even if we have these innovative, sustainable or circular materials, we will definitely not change the way we consume or dispose them. The linear will still be linear.” (R2, 11-15). The fashion industry is rooted in this linear system driven by capitalistic values (SFRA). It is for this reason that Kate Fletcher called for an entirely new system instead of improving the same one through sustainable add-ons (SFRA). She stated: “Capitalism is the main focus in fashion, but we need to seek alternatives. Not alternatives of style, but an alternative ideology, alternative value and a new imagination of the system.” (SFRA, 25f.) Therefore, the challenge is whether SMEs can meet their expectations in terms of promoting systemic change or whether they only sustain high consumption patterns through more environmentally friendly products in a linear system.

#### **4.2.3 Change of Perspectives**

Based on the interviews, a few initial observations are in order. For the sake of clarity, opportunities and challenges have been presented above in a straight-forward and hence slightly over-simplified way. However, the data has made one thing clear above all: the same phenomena can be an opportunity for one company and a challenge for another. For instance, whereas most respondents complained about the difficulty in attracting investment and saw it as stifling their growth, others saw the lack of capital investment in a positive light as it forced them to grow organically and at a pace that allowed them to stick to their initial vision of sustainable goals. In the same vein, some of the interviewees felt that the high price of waste material was not a key impediment, but rather a competitive advantage as only relatively small companies, those truly committed to sustainability, would be willing to accept relatively small profit margins. Such examples show that the opportunities and challenges ascribed to waste materials lie, at least to some extent, in the eye of the beholder.



### 4.3 The Role of Fashion SMEs in the Sustainable Transformation of the fashion industry

After reviewing the opportunities and challenges which fashion SMEs encounter, when using waste materials, this section looks at the role, they believe to play in a sustainable transformation of the fashion industry. So far, there are no detailed studies on the self-definitions of sustainable fashion SMEs, not least those using waste materials. For this reason, this study has developed a *Typology of the Roles of Fashion SMEs in a Sustainable Transformation*. It comprises the *Entrepreneurial Pioneer*, *Activist Educator*, *Connecting Orchestrator* and *Visionary Change Seeker* (figure 6).



Figure 6. *Typology of the Roles of Fashion SMEs in a Sustainable Transformation* (own figure).

#### 4.3.1 Entrepreneurial Pioneer

An *Entrepreneurial Pioneer* is characterized by its trailblazing way of creating novel products and entire infrastructures from scratch (P2). P4 referred to it by saying: “... we have to break a lot of barriers to start this, because it’s not like the norm, this is like a new thing.” (P4, 337f.). Motivated to lead the way towards a sustainable fashion industry, P1, P4, P5, P6, P7 and P8 agree with P2, when saying: “...we feel like pioneers...” (P2, 120). P2 elaborated on this by stating “... to be a pioneer is to find new ways and new processes of doing things. Think and act different to produce good changing for the society.” (P2, 297).

The term pioneer denotes the role model these fashion SMEs aspire to be. While they consider themselves an avant-garde, they are almost certain that others will follow in their steps. Their role as *Entrepreneurial Pioneers* is thus always intended to “... show [...] that it can be done” (P8, 85f., P4, P5) and to inspire others to do the same (P1, P2, P4, P5, P7). This is also reflected by P8’s spirit: “... (P8) is demonstrating that it is possible to use waste materials instead of creating new materials and, therefore, new pollution. The more small

business(es) like ours that disrupt the industry, the more the bigger players like Nike and Adidas will feel pressure to follow suit. Global retailers are already starting to offer products made from recycled materials, mostly notably H&M. We hope that by paving the way, we can encourage all fashion retailers to step away from fast fashion and start utilizing the raw materials we have available to us.” (P8, 127-132). P5 also explained its motivation by saying: “... I also want to demonstrate what’s possible, what’s possible in the area of product development, in the area of business with a sustainable business concept. And I think we prove that quite well and I guess we have already taken many smaller ones with us ... I believe that we have already encouraged people in the past to take such paths” (P5, 202f.). The wish to inspire others to follow is also expressed by P2: “I hope that this way of doing business will be soon adopted by many companies ...” (P2, 300f.). History has shown that “when it comes to fostering systemic change, typically it’s the small-medium business that ‘do’ and then the large corporates follow.” (P8, 151f.).

#### 4.3.2 Activist Educator

Besides being pioneers, the fashion SMEs of this study aspire to facilitate a sustainable transformation of the industry by acting as *Activist Educator* (P1, P4, P5, P6, P7, P8). The *Activist Educator* aims to teach people about the prevailing problems and state-of-the-art solutions in fashion, to engage them in activities that change their perception and to empower them to act upon their knowledge. Accordingly, P8 stated: “We certainly make an effort to try not only to sell to our customers but to educate them on the importance of what we are doing and why we are doing it” (P8, 141-143). The specific tool to educate people has often proven to be activism. According to P6, an activist is someone who “... is helping to change people’s perception.” (P6, 227). The meanings of activism, though, can range from setting up workshops (P4), taking people virtually behind the scenes through social media (P6), offering them a guide of how to use waste creatively (P1) to organizing volunteering projects (P7). No matter how SMEs chose to educate and change people’s perception, P6 thinks it is very much about “... trying to convince people that what we’re doing is the way of the future and how we should be doing fashion in general.” (P6, 229-231). Beyond this, the mission of an *Activist Educator* is to pass on knowledge in a way that enables people to make informed decisions. For this reason, SMEs strive to educate consumers so they can detect whether companies are truly sustainable or only greening their image (P4). Consumer education is a necessary component for systemic change, because “... once consumers become accustomed to a certain level of quality, diversity and ethics in their purchase, it will be them, in turn, putting pressure on the large corporates to start providing that same level.” (P8, 154-156). Therefore, educating the changemakers of tomorrow is a key responsibility in contributing to a sustainable transformation of the industry (P6).

### 4.3.3 Connecting Orchestrator

Another role is the *Connecting Orchestrator*. It is about bringing together different stakeholder groups to foster co-creation and collaboration for sustainability across the industry. As described below, these connections can be facilitated in various ways such as community building, being the middle man and co-designing fashion products. P7, for instance, wants to bring together like-minded consumers interested in sustainability by creating a community around its sustainable swimwear (P7). P6 built a community of different sustainable fashion brands and creative individuals to foster collaboration through sharing ideas and supporting each other (P6). Helping each other is also P4's credo when "... thinking of making like a textile waste kind of community-network ..." (P4, 344f.) in which people can build on the knowledge and experience of others when looking for specific waste materials (P4).

Besides planning a community, P4 sees its duty in closing the gap between material developers and consumers by acting as an intermediary between material innovation and aesthetic design. This is expressed in the following statement: "I think our role is kind of being the ... the middle man ... in bringing these things to market, like making products that people actually want..." (P4, 681f.) and that is why "... we're kind of the middleman (who) makes it all possible." (P4, 696). P4 compares this to the role of a chef who uses innovative materials as ingredients, but only the overall taste, which depends on the chef's (i.e. the brand's) ability, will satisfy the customers. That is why P4 thinks, that material innovators "... are very dependent on cool brands actually bringing it out to the people..." (P4, 685).

Another way to contribute to a sustainable transformation as a *Connecting Orchestrator* is to establish partnerships with larger brands. Co-designing sustainable collections together with a larger brand allows fashion SMEs not only to "... influence them from the inside" (P4, 618) but also "... getting like a larger audience" (P4, 616). In particular, collaborating with larger players enables fashion SMEs to grow and thus to increase their impact. This thinking is represented by P1 when stating: "I guess everyone needs to grow if they want to spread their message" (P1, 268), otherwise "... we can't create more change..." (P1, 264).

By doing so, these fashion SMEs had the chance to bring sustainable practices to brands like Ganni (P1) and Martin Asbjørn (P7) as well as to non-fashion-related companies such as SAS (P1) and Q-bike (P5). While some might feel like they are selling their souls and allying with the enemy, P1 sees it differently: "... there are so many things that need to change in the world we're not creating change by saying no, by shutting off others and saying, well, we refuse to even look at this, because they're not sustainable." (P1, 220-222).

### 4.3.3 Visionary Change Seeker

Finally, while the roles of the *Entrepreneurial Pioneer*, the *Activist Educator* and the *Connecting Orchestrator* are rather specific, there is one role, that is considerably more transcendental in nature: the role as *Visionary Change Seeker*. The change that SMEs are envisioning represents a common thread among all three above-mentioned roles. This is why being a *Visionary Change Seeker* entails taking on at least one of the three roles

described above. SMEs self-identifying as *Visionary Change Seekers* believe to be the driving force within the larger sustainable transformation. This is supported by P4's statement: "if we don't do that, then this is never going to end up making a change out here." (P4, 692). The *Visionary Change Seeker* underpins all of the other three roles. It is the starting point of their entrepreneurial endeavors as well as their desired endpoint. While the roads taken might differ, it is apparent that these fashion SMEs share a common mission: "... we are all fighting for the same battle: change the world and generate the fashion revolution." (P2, 324f.).

To conclude, this chapter has outlined the research findings attained from all semi-structured interviews, questionnaires and data gathered during the FCEs to answer the research question.

## 5. Discussion

This section provides the theoretical and practical implications of the findings in light of the research question.

### 5.2 Theoretical Implications

The findings of this study underline that a transition from a linear to a circular system is imperative if the future of the planet and humankind is to be guaranteed (EMF, Pulse). In line with Hvass (2016) and Bocken et al. (2016), it argues that systemic change in the fashion industry can only be achieved when circular thinking is implemented in both products and BMs. The study shows that using waste materials changes the way value is seen, created, delivered and captured. Accordingly, and in line with Teece's (2010), Richardson's (2008) and Osterwalder & Pigneur's (2010) logic of BMs, the thesis holds that in their use of waste materials fashion SMEs change the way business is done. They disrupt conventional BMs in favor of ones fostering CE. Circular thinking is incorporated into both products and BMs and, in this way, able to foster systemic change.

In particular, and put, in Bocken et al.'s (2016) and EMF's (2017) terms, the fashion SMEs of this study use strategies such as *slowing* and *closing* the resource loop to design products that support a CE. For example, they apply the strategies to *slow* down the loop by designing clothing that will inspire *attachment* and *trust*. They also aim to produce long-lasting products based on classic designs and durable materials. They are also *closing* the resource loops by designing products with their recycling in mind. This includes design for *dis- and reassembly* as well as choosing the right kind of material, such as Econyl, which can be endlessly recycled. By *slowing* as well as *closing* the resource loops, the fashion SMEs of this study aim to establish a circular system and contribute to the sustainable transformation of the fashion industry.

However, if CE concepts such as the *butterfly diagram* (EMF, 2017), *product design strategies* (Bocken et al., 2016) or *C2C* (Braungart & McDonough, 2002) are not applied when creating waste products, then true sustainability remains elusive. The findings indicate that all fashion SMEs of this study are aware of this, but not all act upon it. This is particularly evident when SMEs use waste materials that incorporate components from both cycles, and ultimately prevent recycling. To put it in Braungart & McDonough's (2002, p.28) words: they are "*built-in obsolescence*". If this is the case, then Korhonen et al.'s criticism that "a cyclic flow does not secure a sustainable outcome" (Korhonen et al., 2018, p. 42) is legitimate. Accordingly, using waste materials does not in itself contribute to a sustainable transformation. Rather this transformation strongly depends on the *net-sustainability score* of the waste material used. Partly for this reason, all fashion SMEs in this study not only use waste materials but also adopt other sustainable practices. In this regard, the results of this study support Bocken et al.'s (2014) assumption that a combination of their archetypes enhances fashion SME's potential to foster a sustainable transformation. As this study finds, this is particularly true for those companies which combine the *create value from waste* archetype (e.g. waste materials, C2C, take-back system)

with the *adopt stewardship role* archetype (e.g. education, awareness, community building, employee welfare and living wage). Linking these two archetypes supports Elkington's (1994) idea of sustainability based on a triple bottom line.

Moreover, the results of this study align with Wüstenhagen & Hockerts's (2010) theory on *emerging Davids and greening Goliaths*. While the fashion SMEs represent the *emerging Davids*, larger fashion brands can be considered as *greening Goliaths*. The fashion SMEs, by employing a CEBM in general and using waste material in particular, see themselves as pioneers serving a niche market. In contrast, larger brands, often inspired by the fashion SMEs' success, enter the market and bring sustainable products to the mass of consumers. This co-evolution of fashion SMEs and larger brands is a key factor in accelerating the sustainable transformation. However, their respective roles in a sustainable transformation have so far been examined primarily in the light of chronological order (who enters the market first), ambition (who is more committed to sustainability) and range (how many people are reached). Going beyond Wüstenhagen & Hockerts (2010), this study has developed a *Typology of the Roles of Fashion SMEs in a Sustainable Transformation* and has identified the roles of the *Entrepreneurial Pioneer*, *Activist Educator*, *Connecting Orchestrator* and *Visionary Change Seeker*.

This typology has a range of valuable implications. First, this typology reduces complexity by breaking down a wide range of diverse SMEs to four roles. Because a sustainable transformation is a collective effort, it is crucial to know each stakeholder's role in it. In doing so, transparency, appreciation and a mutual common ground can be created. Second, only when understanding the roles that SMEs play, future synergies not only among SMEs but also with other industry's stakeholders can be detected and harnessed for the sake of sustainability. Third, the typology pinpoints the power of SMEs. If the activities of the *Entrepreneurial Pioneer* bear fruit, a growing number of SMEs will begin to follow the "from waste to value" approach and other sustainable practices. Collectively, they will offer a counterweight to larger corporates, increase the SMEs' overall outreach, reduce the existing challenges of waste materials (e.g. high price), make SBMs and CEBMs a more conventional way of doing business and ultimately foster systemic change. Further, if the *Activist Educator* creates awareness of the industry's issues and solutions, consumers will make more responsible purchase decisions and hence increase the market shares of those who align their business with social and environmental purposes. This in turn will force larger corporates, which are not yet using waste materials or other sustainability practices to shift their BM to one that fosters CE. The *Connecting Orchestrator* will foster the sustainable transformation by identifying and facilitating various ways of collaboration among them. Above all, the role of the *Visionary Change Seeker* illustrates that the SMEs' role in a sustainable transformation goes beyond creating a product from waste. It ultimately intends to show that doing business and doing good go together. It is this combination that can achieve systematic change in - and for - the

environment and society. In total, the typology highlights SME's potential as an equal and in many aspects crucial actor in a sustainable transformation of the fashion industry.

Moreover, given the relatively sparse literature on the topic, this study was the first to outline the opportunities and challenges of fashion SMEs in using waste materials. This provides valuable insights not only into the current gap between the existence of innovative waste materials and their sparse use but also into the driving forces behind using waste rather than virgin materials. This is particularly essential, as barriers must first be identified before they can be overcome. Secondly, opportunities must be explicit to create incentives to embrace the challenges that come with the use of waste materials. By outlining both opportunities and challenges, the status quo of using waste materials is unveiled in an unembellished way, transparency enhanced and a foundation for future actions laid. The study also shows that even if the perceived benefits and barriers of using waste materials are roughly balanced in terms of numbers, the opportunities outweigh the challenges. This is particularly true for the social and environmental opportunities and the associated contribution to a systemic change towards sustainability in the fashion industry. This, in turn, explains why the brands continue their work towards a sustainable future despite the many challenges.

Importantly, the opportunities and challenges for *emerging Davids* described by Wüstenhagen & Hockerts (2010) overlap in part with those faced by fashion SMEs when using waste materials. Common opportunities include entering untapped markets, gaining competitive advantages and authenticity, while common challenges include financial restrictions, no access to R&D, the threat of not compromising growth for sustainability efforts. This indicates that many of the opportunities and challenges are determined not so much by the use of waste materials per se but by the size of the company. This, in turn, illustrates a unique opportunity for larger brands to switch from virgin to waste materials as they do not face the same challenges.

This study's findings disagree with Murray et al. 2017. While Murray et al. (2017) assert the absence of CE's social dimensions, this study shows that - quite the contrary -, it is above all the social aspect of CEBMs, in the form of awareness creation, changed perception of waste and action upon the gained knowledge that drives CE and thus a sustainable transformation.

Finally, the findings of this study emphasize Korhonen et al. (2018) and Kirchherr et al.'s (2017) contention that a common definition of CE is still lacking and, as a consequence, the differences between SBMs and CEBMs remain vague and underdefined. Considering Morten Lehman's words that "... lasting change starts with language" (CFS, 444) future scholarship would do well to consider and address this problem.

### 5.3 Practical Implications

In addition to the study's theoretical contribution, its findings are also useful in practice. As the main focus of this study is on fashion SMEs, it is of particular relevance to SMEs considering to adopt a CEBM based on waste materials. In a best-case scenario, this study's systematic assessment of the various opportunities and challenges of using waste materials allows SME's to ponder and address them proactively. By doing so, they can better seize opportunities, overcome challenges and thus accelerate the sustainable transformation.

While this study shows the perspective of SMEs, the results are also advantageous for other industry stakeholders such as larger companies, policy makers, educational institutions, NGOs as well as consumers in a number of ways.

For one, comparing the opportunities and challenges of SMEs when using waste materials to those of larger companies indicates that they are complementary. Factors that prevent SMEs from truly tapping their potential such as limited outreach, lack of financial resources as well as lagging technological progress can be overcome by larger companies. Therefore, strategic partnerships seem mutually beneficial and critical to achieving a sustainable transformation. While SMEs benefit from a large firm's outreach and investment in R&D (e.g. recycling technologies), larger companies gain insights into how sustainable practices – by creating value from waste - are implemented and consumer awareness raised. Once they have understood that one side possesses what the other lacks, cooperation might produce a win-win-win, namely for the larger company, the SME and the society/environment. Consequently, systemic change will be achieved much faster.

Second, the findings of this thesis should be a wake-up call for policy makers. This is particularly true concerning the relatively high prices for sustainable materials, especially given fashion SME's lack of resources and difficulties in attracting investment. SMEs require regulation that decreases their financial burden (e.g. due to high material prices) but also incentivizes others to embark on this sustainability journey. Based on the data, such incentives could take the form of tax-reductions or subsidies for CEBMs and the use of waste materials in particular. Doing so, would relieve the burden of finding investors which often increase the pressure on CEBMs due to their profit-making mentality. Policy makers should also start an international dialogue to revise the legal definitions of 'waste' and facilitate reverse logistics, including import/export of textile waste.

Moreover, this study found that waste materials also pose design problems for SMEs, as many of the fashion designers are either not sufficiently trained in sustainable design or, if they are, often leave the industry. This underlines the need for a significant shift towards sustainability training in educational institutions. Sustainability should be part of every curriculum, not just in terms of design, but also in business schools.



Once students are educated to become sustainable designers, green and social entrepreneurs or impact investors the number of purpose-driven brands will increase, spurring the transition to a new system.

In addition, the results provide valuable insights for both industry-wide (e.g. GFA) and cross-sectoral organizations (e.g. EMF) that seek to foster the transition towards sustainability. Knowing about the fashion SMEs' challenge, these organizations can assist SMEs in overcoming them by offering appropriate tools. For example, they could enable collaboration across the industry by arranging matchmaking sessions with other stakeholders, ranging from material suppliers to larger brands. Also, as high minimum quantities represent a major challenge for SMEs, organizations could consolidate collective demand for materials. Providing a circular design toolbox, a waste material supplier list or a common sustainability glossary are only a few of the ways in which they could support SMEs in a sustainable transformation.

Lastly, this study emphasized the crucial role of consumers. In addition to other stakeholders, consumers also have to take responsibility for their own actions when dealing with fashion items. In particular, consumers need to re-connect with fashion items by understanding the processes and consequences behind clothing production and by learning how to take care of their clothes (washing/repair) to re-build appreciation for clothes. This also includes reducing excessive consumption. However, if clothes are purchased, consumers should prioritize sustainable brands using waste materials over those pursuing conventional business goals. Only if consumers make well-informed and ethical purchase decisions can a sustainable transformation be achieved.

The practical implications for a great variety of actors have exemplified how complex and intertwined the fashion system is and that joint efforts are needed to change the system towards a circular - and thus sustainable - fashion industry.

## **6. Limitations and Further Research**

### **6.1 Limitations**

Despite this study's theoretical and practical contributions, it comes with certain limitations.

Restrictions of time and a lack of access to certain brands made it impossible to represent all existing types of waste. As a consequence, the study's findings hold only for the different waste materials that have been analyzed. Other materials might come with yet other opportunities and challenges. It also has to be acknowledged that despite having dedicated this study to SMEs the interviews were mainly conducted with small rather than medium-sized fashion brands. Although interview requests were sent to the whole spectrum of small to medium-sized brands, small enterprises were much more likely to agree to an interview.

Accordingly, the study's results are not necessarily representative for SMEs as a group. Just how well these findings apply to medium-sized enterprises requires further research. Moreover, the limited scholarly attention to CEBMs and to waste materials in the fashion industry have made it difficult to relate the findings to a rich theoretical basis. This study has also not been able to conduct a comparative assessment of how the opportunities and challenges of SMEs in using waste materials align with or differ from those of larger brands. Finally, while interviewing SMEs with respect to the research question produced direct insights into their perception of CEBM and the potential of waste materials, it by design narrowed the study's focus and potential findings.

## 6.2 Further Research

Considering these limitations, this study can point to several promising avenues for future research.

While this study aims to understand fashion SMEs in their use of waste materials and their role in a systemic change, further research could shed light on how other stakeholders (consumers, larger brands, policy makers, educational institutions or NGOs) evaluate the potential of waste materials. A particular promising question would be whether these other stakeholders ascribe to SMEs roles in a sustainable transformation similar to those that SMEs ascribe to themselves, e.g. whether auto- and hetero-image align. Potential discrepancies between the two should be further investigated and suggestions made on how to resolve them. Such perception studies are of particular value because understanding each stakeholder's reality is critical to establishing a successful cooperation, which a sustainable transformation depends on.

Moreover, it is essential to make innovative waste materials such as Piñatex, Vegea, Frumat, S. Cafe or Orange Fibers the object of academic inquiry, as they have so far only attracted the attention of practitioners. In particular, future research needs to assess the net sustainability score of individual waste materials. Reliable and accurately measured metrics must be developed to assess how sustainable, both environmentally and socially, these new waste materials really are. This includes, for example, monitoring the number of greenhouse emissions, assessing durability, recyclability, applicability to different designs, social manufacturing standards and other externalities, including rebound effects (like higher rates of consumption due to the assumption of "guilt free shopping"). In addition, the degree of consumer awareness and the changed perception about waste caused by the waste materials must be quantified to develop a comprehensive score. Subsequently, the materials studied need to be compared with other types of waste materials to determine the most sustainable waste materials and to make practical suggestions that actually accelerate a sustainable transformation.

Having outlined the opportunities and challenges of fashion SMEs using waste materials, further research needs to identify whether and how fashion SMEs can overcome the above-mentioned challenges and facilitate the transition to CE. In the future, it will also be necessary to pinpoint, which opportunities and challenges arise mainly from the use of waste materials and which are due more to the size of the company (e.g. certification, lack of financial resources, minimum quantity orders). On a related note, future research should also investigate whether and how the role of fashion SMEs in a sustainable transformation changes with increasing company and market size. Most pressing of all, researchers need to develop a common terminology of sustainable fashion to avoid confusion and misunderstandings. In collaboration with practitioners, academics should provide a comprehensive glossary – an ABC of sustainable fashion – to establish a common ground for sustainable fashion research and practice in the future.

## 7. Conclusion

This study aimed to answer the research question: *How can circular economy business models of fashion SMEs – by creating value from waste – contribute to a sustainable transformation of the fashion industry?* First of all, it discovered that fashion SMEs, despite the many challenges that waste materials and other sustainable practices pose, do contribute to a sustainable transformation of the fashion industry. While the environmental contribution of fashion SMEs primarily depends on the type of waste material used and its combination with other sustainable practices, its social value through consumer awareness and changing the perception of waste has a major impact on the sustainable transformation. Second, the study found that fashion SMEs contribute to a sustainable transformation by adopting at least one of four roles: *Entrepreneurial Pioneer*, *Activist Educator*, *Connecting Orchestrator* and *Visionary Change Seeker*. In doing so, it has become evident that fashion SMEs go beyond simply creating a product from waste, but rather inspire, educate and enhance collaboration to foster change. Therefore, this study has not only closed an existing gap in the academic literature but has also provided valuable insights into the often-underestimated role of SMEs and its impact on other stakeholders in a joint endeavor to bring about systemic change in the fashion industry.

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