



UPPSALA  
UNIVERSITET

Master thesis in Sustainable Development 2021/II  
Examensarbete i Hållbar utveckling

# **Recycled fibers for circular economy**

## **The case of the fashion industry**

Estelle Golay

Master thesis in Sustainable Development 2021/11

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# Recycled fibers for circular economy – The case of the fashion industry

GOLAY ESTELLE

Golay, E., 2021: Recycled fibers for circular economy – The case of the fashion industry. *Master thesis in Sustainable Development at Uppsala University*, No. 2021/11, 52 pp, 30 ECTS/hp

## **Abstract:**

Some fashion companies have started to use recycled fibers to improve their sustainability practices, as it is a way to implement circularity into their business. By combining the theoretical frameworks of stakeholder theory, socio-technical (ST) systems and sustainable business models (SBM), this study discusses how the current business models of fashion companies relate to the concept of circular economy and what fashion companies' future perspectives are. Based on a case study approach, empirical data was collected on six Nordic fashion companies: Acne Studios, Filippa K, Ganni, House of Dagmar, Gina Tricot and Pure Waste. Both fast-fashion and high-fashion companies are reviewed, as their approach to business and sustainability differ. Drivers, challenges, partnerships, future perspectives to recycled fibers are discussed for each company and put in relation with the concept of circular economy. Additional circular initiatives from the companies are considered. The key findings indicate that fashion companies are motivated to use recycled fibers because of their sense of responsibility and wish to continue doing their business. Their future goals, collaborations and additional circular initiatives depicts a forward-looking attitude hopeful about the potential of sustainability. This study contributes to the understanding of implementation of circularity elements from a corporate perspective in the fashion sector, and what is needed to further implement and develop the use recycled fibers.

**Keywords: Fast-Fashion, Socio-Technical (ST) Systems, Stakeholder Theory, Sustainable Business Models (SBM), Sustainable Development**

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## Summary:

Fashion is a highly unsustainable industry, as it is the second most polluting industry after aviation (Niinimäki *et al.*, 2020). It is criticized for consuming huge amounts of resources and generates a lot of waste through the fast-paced renewal of its collections. To improve their sustainability practices, some fashion companies have thus started incorporating recycled fibers into their garments. This innovative process relates to the concept of circular economy, which aims to decouple resource use and economic growth. Recycled fibers show promising potential to increase the sustainability of the fashion sector, but the implementation process remain challenging and highly depend on the companies' business model. Indeed, fast-fashion companies aim to maximize the profitability of their products, which is suggested to be incompatible with increased sustainability. On the other hand, more luxurious fashion companies, here referred to as high-fashion, are suggested to be able to reconcile fashion and sustainability. Understanding the challenges that those different kind of fashion companies face has the potential to accelerate the transition towards a more sustainable fashion industry, which could have a great positive impact on several environmental aspects.

This project combines several theoretical frameworks to discuss how the current business models of fashion companies relate to the notion of circular economy, and what fashion companies' future perspectives are. It makes use of the stakeholder theory, which acknowledge the important role that all stakeholders play in a firm's business, in addition to the concept of socio-technical (ST) systems, which allows to identify the functional links between the relevant stakeholders and how they relate to each other. In addition, the concept of sustainable business models (SBM) enables a discussion of the companies' business models and innovative approach to sustainability through the use of recycled fibers. Those theoretical concepts were used to discuss empirical data collected on six Nordic fashion companies: Acne Studios, Filippa K, Ganni, House of Dagmar, Gina Tricot and Pure Waste. Relevant aspects considered for each company were drivers, challenges, partnerships, and future perspectives regarding the use of recycled fibers. Additional initiatives that promote circularity were also discussed.

The main findings indicate that both fast-fashion and high-fashion companies are motivated to use recycled fibers because of their sense of responsibility and wish to continue doing their business. Their future goals, collaborations and additional circular initiatives depicts a forward-looking attitude hopeful about the potential of sustainability. Their use of recycled fibers, despite being sometime in its infancy and slowed down by various barriers, is aimed to increase in the future. In addition, innovative sustainable business models also give promising results. This study contributes to the understanding of implementation of circularity elements from a corporate perspective in the fashion sector, and what is needed to further implement and develop the use recycled fibers.

**Keywords: Fast-Fashion, Socio-Technical (ST) Systems, Stakeholder Theory, Sustainable Business Models (SBM), Sustainable Development**

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# 1 Introduction

*This section provides information about the problem background and its relevance to the actuality of sustainability, the problem statement, and the aim of the study. Research questions are described as a way to answer the problem. Lastly, the delimitations of the study are specified.*

## 1.1 Problem background

The fashion sector is currently a highly unsustainable industry. It is characterized by a fast production and consumption of products designed for obsolescence (Ozdamar Ertekin and Atik, 2015) in a highly competitive context which continuously pushes its actors to increase their rates of production and sales (Bhardwaj and Fairhurst, 2010). This fast-paced rhythm is problematic, as a lot of resources are used for products that become quickly outdated and generate a lot of waste (Cimatti *et al.*, 2017). It is indeed estimated that \$400 billion worth of clothing end up to waste each year globally (Ellen MacArthur Foundation, 2017a, p. 132). It is a huge waste of resources, as the production processes of garments uses considerable amounts of chemical products and natural resources, which have a large impact on the environment (de Brito *et al.*, 2008). In total, the industry is suggested to be responsible for 8 to 10% of the global CO<sub>2</sub> emissions (Niinimäki *et al.*, 2020, p. 189). In addition, it is estimated that around 200 tons of water are polluted for each ton of fabric produced (Nagurney and Yu, 2012), and that 79 trillion liters of water are consumed by the industry every year (Niinimäki *et al.*, 2020, p. 189).

This mindless use of resources is a dangerous and unstainable path. Indeed, climate change is a threat that is deeply affecting all levels of the society (Urry, 2015). Some researchers thus have started “mapping” the impact that humans have on the environment and have estimated the natural limits that must be respected on our planet (Steffen *et al.*, 2015). Their conclusion was that Earth cannot sustain much more anthropogenic pressure and that many biophysical processes are already destabilized, or close to be. The researchers thus strongly called for action, a call which concerns the society as a whole, the fashion sector included. And fashion is not a model pupil when it comes to sustainability: with its high consumption of energy, water and other natural resources (Shirvanimoghaddam *et al.*, 2020), it is the second most polluting industry after aviation (Niinimäki *et al.*, 2020).

To address this issue and reduce their use of natural resources, some clothing companies are now using recycled fibers to increase the sustainability of their products (Ekström and Salomonson, 2014; Sandvik and Stubbs, 2019). The recycled materials can be generated from various waste sources such as old garments, fabric scraps, PET bottles and many more. This initiative is central to the 12<sup>th</sup> Sustainable Development Goals of the United Nations, which advocates for responsible consumption and production (United Nations, 2020).

Additionally, this innovative process of using waste material, relates to the concept of circular economy, which aim is to decouple resource use and economic growth (Ellen MacArthur Foundation, 2017b; Preston, 2012). Indeed, using recycled material to create new garments allows to partially close the resource loop (Bocken *et al.*, 2016) and thus represents a possibility to implement circular economy in the fashion industry. This process seems to be of the highest importance today, as scholars suggest that circular economy will be a necessity to make the fashion industry sustainable (Jawahir and Bradley, 2016).

Furthermore, the use of recycled materials can be seen as a form of ethical sourcing, which can add a luxurious character to a brand identity (Holmsten-Carrizo and Mark-Herbert, 2014). This perspective seems to be the base of several brands’ business strategy in the European Nordic countries, who highlight their use of recycled fibers to their customers. Those brands also usually have a higher price range than other fast-fashion labels, which are mainly characterized by their low prices (Joy *et al.*, 2012). However, it is also possible to find several fast-fashion brands from the Nordic Countries with recycled materials in their products.

## 1.2 Problem statement

Recycled fibers show a promising potential to increase the sustainability of the fashion sector (Ekström and Salomonson, 2014; Sandvik and Stubbs, 2019). Further research needs to be done (Sandvik and Stubbs, 2019) but many scholars suggest that textile recycling is usually more beneficial to the environment than landfilling and incineration, as it uses less energy and raw resources (Sandin and Peters, 2018). Textile recycling also aligns with the principles of circular economy (Sandvik and Stubbs, 2019), which has the potential to decrease the use of natural resources and thus lower the burden that the industry has on the environment (European Commission, 2015; Moorhouse and Moorhouse, 2017). Consequently, various brands are investing in this innovative concept and many companies have been inspired by the circular economy approach (Bakker *et al.*, 2010; Yang *et al.*, 2017).

Unfortunately, several problems persist. First and foremost, even though recycled fibers seem to play an increasingly important role in the garment sector, the implementation process remains challenging. Indeed, the firms business models play an essential role in the feasibility of such an innovative process (Chesbrough, 2010) and changes are difficult to implement (Teece, 2010). Those difficulties are problematic, as many environmental aspects of our planet cannot sustain much more pressure, while some have even already reached their limit (Steffen *et al.*, 2015). The fashion sector thus urgently needs to become more sustainable and reduce its environmental impact.

Moreover, the approach between fast-fashion and high-fashion companies to recycled fibers varies because of how they differ in their approach to business (Bhardwaj and Fairhurst, 2010; Joy *et al.*, 2012). Indeed, fast-fashion companies are known to outsource their production in eastern countries to lower costs (Macchion *et al.*, 2018) and increasing the sustainability of the fast-fashion supply may enter in conflict with the profitability of the products (Shen, 2014). Using recycled fibers, which suggest a redesign of the production process (Todeschini *et al.*, 2017), may thus imply extra-costs and efforts that do not fit the business strategy of fast-fashion companies. On the other hand, luxury brands are suggested to have the potential of reconciling fashion and sustainability (Joy *et al.*, 2012), and recycled fibers could be a great tool for higher-end and pricier brands. This aspect seems even more promising when one learns that the amount of consumers interested in luxury goods has increased over the last years (Fionda and Moore, 2009).

Using recycled fibers is thus innovative but implementation barriers can depend from the companies' business model, as do firms' motivations to implement changes (Caniato *et al.*, 2012). Thus, a discussion of both high-fashion and fast-fashion companies allows a better understanding of the firms' business models and values regarding sustainability, and how sustainable innovations are implemented into their business. Understanding the challenges they face has the potential to accelerate the transition towards a more sustainable fashion industry, which could have a great positive impact on several environmental aspects. Those issues have however not been studied extensively and let alone linked extensively to the concept of circular economy concept (see section 4.1 for further details). So recycled fibers are found in the sustainability strategies of both fast-fashion and high-fashion brands, but are they a part of the answer to sustainable fashion or is it just another green-washing marketing argument?

## 1.3 Aim

The aim of this project is to identify how the business models of fashion companies relates to the concept of circular economy, and what future perspectives could be expected. The choice to limit the study to the Nordic countries is motivated by several aspects, such as Scandinavia's reputation in sustainability (Strand *et al.*, 2015) and context similarities (Duran and Bajo, 2014). Further details about the choice of case companies can be found in section 2.3.1. The aim will thus be addressed through the following research questions:

What are the communicated drivers that supports the development of recycling fibers by fashion companies?

What are the communicated challenges for sustainability regarding fiber recycling?

What are the communicated future perspectives of fashion companies regarding their use of recycled fibers?

Which communicated collaborations related to recycled fibers have fashion companies undertaken?

## 1.4 Delimitations

Delimitations are made on three grounds. Starting with theoretical delimitations that set the perspective for the study, followed by empirical delimitations in terms of geographical markets and last empirical delimitations concerning how data has been collected.

The concept of circular economy can be applied to many fields (Ellen MacArthur Foundation, 2017b), but this project explicitly focuses on the fashion industry and the use of recycled fibers in clothing apparels. It is pertinent to mention that the specific issue of micro-plastics released from PET bottles' fibers falls beyond the scope of this project and will not be considered in detail. Furthermore, other approaches about circular economy in the fashion sector exists, such as collection systems or reparation services, (Globescan and C&A Foundation, 2019; Moorhouse and Moorhouse, 2017; Pal *et al.*, 2019; Shirvanimoghaddam *et al.*, 2020) but this project does not intend to cover them in detail. The boundaries of the analysis and discussion are also limited by the choice of theoretical framework, which includes stakeholder's theory and socio-technical systems. A different choice of theoretical approach could bring another perspective to the subject.

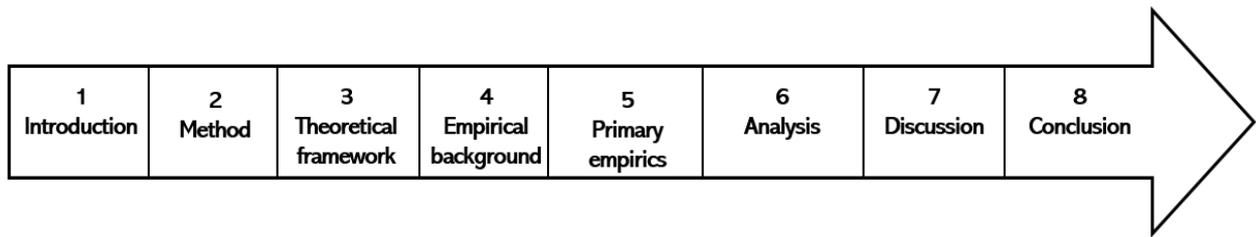
Additionally, sustainability is a broad concept that encompasses social, economic and environmental aspects (Rogers *et al.*, 2008). This project is focusing on the environmental impact of the fashion industry and how it relates to a circular economy, and social aspects are thus not covered in this work. They remain however an important aspect of sustainability and all the case-brands have taken social initiatives into their sustainability programs.

Furthermore, the project has been delimited to the level of clothing companies in European Nordic Countries, with case brands from Sweden, Denmark, and Finland. The decision to focus on those specific countries has been taken because Scandinavia is renowned for its sustainability efforts (Strand *et al.*, 2015), which makes them (and the neighbor Finland) an interesting subject for analysis. Additionally, the author is familiar with the culture and context of Northern Europe, which facilitates the discussion. There are many other brands and companies using recycled fibers in the rest of the world, but they will not be considered in this particular project due to the limited time available.

Finally, difficulties were encountered to book interview with case-brands, which limited the access to relevant data. This relates to the ethical aspects of this project, as no representatives from the concerned corporations were able to comment on this project. All relevant data was thus collected through publicly available documents.

## 1.5 Structure of the report

This thesis contains eight chapters, as depicted in figure 1.



*Figure 1: Structure of the report.*

The first chapter provides an introduction to the thesis subject, the problem, the aim, the research questions through which it will be addressed and the delimitations of the study. Chapter two introduces the chosen methods and research process, which includes the conduction of the literature review, the choice of case companies, the data collection and the data analysis. The third chapter covers the relevant theories and concepts related to this project, which begins with the notion of circular economy. It is followed by a description of the stakeholder theory and socio-technical systems, which are then succeeded by the concept of business models and its sub-category of sustainable business models, and finally by a description of the sustainability drivers for companies. Chapter four then gives a broad empirical background about the sustainability of the fashion industry, differences between the concepts of fast-fashion and high-fashion, as well as the use of recycled fibers in garments. The following chapter five introduces the primary empirics of the project, with a detailed description of what has been found for each case company. The analysis of the empirical data is then conducted in chapter six, which is followed by a discussion of the results in chapter seven. The final chapter eight gives a conclusion about the project and suggestions for future research. Acknowledgements can be found at the end of the document, after the conclusion chapter.

## 2 Method

*This second chapter aims to explain the chosen methodology for this study. It first discusses the qualitative approach chosen for this project, which is followed by a description of the literature review that has been conducted. This is followed by a description of the case companies selected for this project and how data was collected and subsequently analyzed.*

### 2.1 Qualitative approach

As the research area of this project is complex and influenced by personal beliefs and context, a qualitative approach has been chosen (Gummesson, 2006). Furthermore, as this project aims to gain understanding of contemporary events, a methodology based on multiple case studies of the relevant stakeholders seems to be appropriate (Yin, 2009). In addition, because a brand's name are close to the people's consciousness and are thus subject to pressure to adopt more sustainable practices (Seuring and Müller, 2008), a corporate perspective has been chosen with the clothing brands as unit of analysis.

### 2.2 Literature review

A literature review of the academic literature about the subject was conducted as the starting point of the study. This generated a deep understanding of the subject, which is suggested to be a prerequisite for internal validity of the study (Kvale, 1996). The search focused on the combination of the terms *circular economy*, *recycled fibers*, *fashion*, *luxury* and *sustainability* in Google Scholar, Web of Science and Scopus. Pertinent articles for the research subject were selected and examined. No specific time frame was set up for the literature review, but the most recent studies available about the topic were preferred if available. Additional papers were added by looking at the reference cited in previously reviewed articles or were forwarded by reviewers after feedback. Furthermore, in addition to the scientific literature, brands' websites and sustainability reports, if available, of each chosen brand were examined to gather supplementary background information.

### 2.3 Case study approach

This section covers the choice of case companies relevant to this work, and on which criteria they were selected. Furthermore, methods used for data collection are described, as well as the ones for data analysis.

#### 2.3.1 Choice of case companies and unit of analysis

Scandinavian countries have a reputation to be leaders in sustainability (Strand *et al.*, 2015) and are thus an interesting choice of subject for analysis. Additionally, it is meaningful to keep the companies in the same context as business strategies from firms are influenced by the institutional context of their country of origin, legally and informally (Duran and Bajo, 2014). Furthermore, there is a need for more innovative and sustainable business models to increase the recycling of textiles and thus reduce the environmental impact and resource use in the Nordic region (Ekvall *et al.*, 2015). Nevertheless, the geographical context of the study has been expanded from Scandinavia to European Nordic countries, after the finding of an innovating Finnish brand. Despite this small naming adjustment, it seems safe to assume that all countries included in this study have a similar context. Finally, as no brand representatives were available for interviews, documents about the sustainability strategies of the companies needed to be available publicly.

Thus, selection criteria for the case companies are:

- i) Apparel enterprise all listed as companies, suggesting that they are active in a capital market.
- ii) Similar geographical location, as they are all founded in the European Nordic countries (Sweden, Denmark, and Finland) and have their headquarters there.
- iii) Present mainly in the Nordic countries clothing retail market.
- iv) Use of recycled fibers in clothing products.
- v) Publicly available sustainability report or similar document.

Based on those criteria, a global online research about Nordic fashion companies was conducted. This was done by searching for terms such as *Scandinavia, Nordic, fashion, clothes, recycled and sustainable* in Google. A list of potential case-companies was done by compiling the companies appearing in the research results, as well as firms cited in newspaper articles, blog post and other informational platforms. Companies cited in academic articles from the literature review were also considered. The potential companies were then assessed one by one to see if they fit the selection criteria, and a final list of a total of six case companies was established. Highly international Scandinavian companies, such as H&M, were not considered to be relevant for this work because of their high level of globalization. The context of their sustainability reports was indeed uncertain, and there was a risk that their sustainability strategy and efforts not focused enough on Scandinavia.

Companies were then subsequently categorized in “high-fashion” and “fast-fashion” companies based on several criteria, the main one being the price range of their clothing products. This main division criterion is based on the academic literature, which argues that one of the important aspect of fast-fashion clothing is its low retail price (Fletcher, 2010; Joy *et al.*, 2012). Consequently, the websites of each selected companies were visited and the product prices for women’s dresses were compared. A net difference was noted between fast-fashion retailers, for which prices for a single dress mostly fluctuated between 50 and 600 SEK, and high-fashion companies for which dresses were sold from and above 1500 SEK. Furthermore, an additional criterion for the division of companies was the rate of new products, which is usually high for fast-fashion, with garments following standardized designs (Fletcher, 2010). Information about the style and pace of collections were thus collected from the different companies and considered for the division. Further details about considered aspects for all firms are available in the first section of chapter 5. Based on those observations, the companies were thus classified in the following table (Table 1).

*Table 1. Case study companies*

<b>High-fashion companies</b>	<b>Fast-fashion companies</b>
Acne studio	Gina Tricot
Filippa K	
Ganni	
House of Dagmar	
Pure Waste	

The high-fashion companies thus include Acne Studio, Filippa K, Ganni and House of Dagmar. The fast-fashion firms comprise only Gina Tricot. Pure Waste is a special case which has characteristics

both of fast-fashion and high-fashion companies.

Additionally, the term *high-fashion* is here preferred to word *luxury*, which lacks definition (Fionda and Moore, 2009). Furthermore, the latter can be understood as “rare, extravagant and expensive” (Holmsten-Carrizo and Mark-Herbert, 2014, p. 44), which does not represent the products of the pricier companies selected here, as most of their products are far from what could one consider “extravagant” in the fashion world. Their products are also far from being “rare”, as they remain ready-to-wear clothes widely available to the public. The term *high-fashion*, as an antagonistic concept to the well-defined notion of *fast-fashion*, thus seems appropriate for this work.

### 2.3.2 Data collection

Documents are an appropriate source of information for case studies, as they provide an easy source of both qualitative and quantitative data (Yin, 2013). Several types of documents have been used in this work, depending on what was available from the clothing companies. Sustainability reports from 2019 have been found for Acne Studios (Acne Studios, 2019), Filippa K (Filippa K, 2019), Gina Tricot (Gina Tricot, 2019) and Pure Waste (Pure Waste, 2019). Additionally, the website of two high-fashion brands, House of Dagmar and Ganni, contain extensive information about their sustainability strategies and their use of recycled fibers (Ganni, 2019; House of Dagmar, 2019). Additional information about the size, history and relevant facts about the brands were also collected on the websites of all brands (Acne Studios, 2021a; Filippa K, 2021c; Ganni, 2020; Gina Tricot, 2021a; House of Dagmar, 2021c, 2021b; Pure Waste, 2021a, 2021c).

It may also be important to note here that larger companies are more prone to release sustainability reports than smaller firms, mostly because they have more important management and statistical resources at their disposition (Caniato *et al.*, 2012). This introduces a difficulty in the data collection, as it may be more difficult to gather information for the smaller selected corporations such as Pure Waste or House of Dagmar (See section 5 for more details about the size of each company).

### 2.3.3 Data analysis

In a qualitative research process, one does not focus on numbers like in a quantitative approach but rather on text and words (Miles *et al.*, 2014). For this project, an indirect quantitative method has been chosen, that is a thematic content analysis (Robson and McCartan, 2016). It is defined as the “systematic, objective, quantitative analysis of message characteristics” (Neuendorf, 2017, p. 1).

As detailed in section 1.3 There is limited knowledge about the subject area of this project, which suggests that an inductive approach is fruitful. This is supported by method understandings and recommendations by Elo and Kyngäs (2008): the tree main phases for an inductive research process are: preparation, organization, and reporting, as depicted in Figure 2.

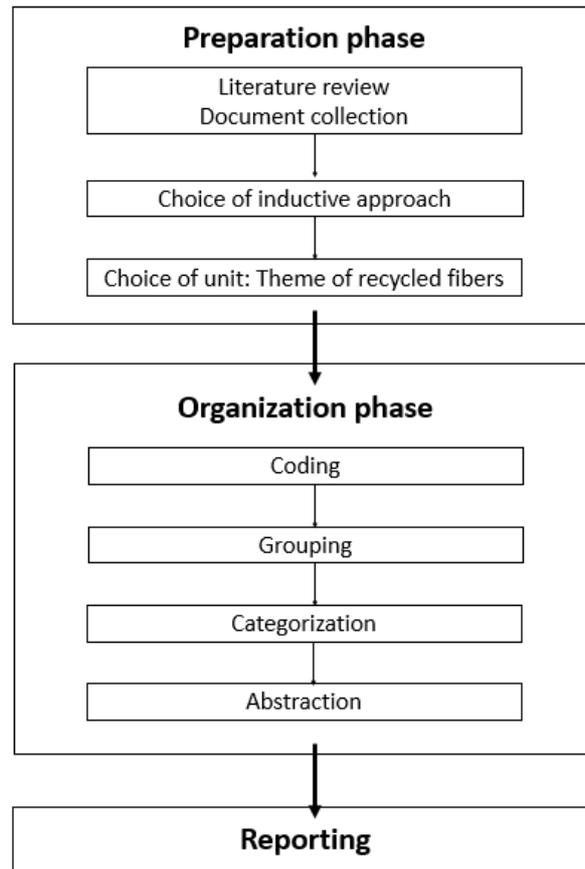


Figure 2: The main phases of the inductive research process for this project (Elo and Kyngäs, 2008, p. 110, with minor modifications).

First, the preparation phase included an extensive literature review of the relevant academic literature (see section 2.2 for more details), in addition to the collection of sustainability reports and online documents from the case companies. For the scope of this project, the theme of recycled fiber theme is the unit for analysis. This subject is a subunit of the bigger theme of sustainability, which allows an analysis of the brands' strategies regarding recycled fibers. Pertinent questions to ask oneself when reading a document can be (Elo and Kyngäs, 2008; Robson and McCartan, 2016):

- i) Who is the document produced for?
- ii) What is the purpose of the document?
- iii) From which perspectives and mindsets were the document produced?
- iv) Who is the document produced by?
- v) When did it happen?
- vi) Why?

In a second time, the collected data is organized through coding and grouping (Elo and Kyngäs, 2008). It can then be analyzed with the help of table categorization, examination and abstraction (Elo and Kyngäs, 2008; Yin, 2013). Categories of interest for this study are:

- i) Drivers that led case companies to the decision of producing and selling garments made of recycled fibers.
- ii) Challenges and difficulties that arise from the use of recycled fibers.
- iii) Future plans, hopes and perspectives for the use of recycled fibers.
- iv) Additional circular initiatives that the cases companies have taken.

This categorization allows the creation of themes relating to motivating drivers and issues for every chosen company. Relevant themes and codes can then be selected based on their relevance to the research questions and allow an analysis and comparison of the case companies. Once the data has been organized, it is possible to analyze the content of the fast-fashion and high-fashion companies, which then allows a discussion of the firms' values regarding recycled fibers and sustainability. This analysis can then be linked to the concepts of business models and circular economy. Lastly, one reports findings in sufficient details.

Besides, one should stay aware that an issue of using case studies to explore a phenomenon is precipitated conclusion (Eisenhardt, 1989). Indeed, the limited amount of case studies used in this work limit the results application and more research should be conducted if results wish to be generalized. Furthermore, subjectivity bias can be present in case studies (Yin, 2013). In this case, there is a possible bias in the selection of cases, which were selected based on the knowledge of the author and extensive online research. Additionally, the content of the sustainability reports that have been analyzed come from the brands themselves, which is not an objective source. Those documents have also not been produced for the aim of this study, which can potentially bring concerns about the accuracy and bias of its content (Robson and McCartan, 2016). However, flexible research design and abductive reasoning allow the researcher to counteract those bias by enabling continuous reflection on the research question and conceptual framework of the study (Dubois and Gadde, 2002).

## 2.4 Quality assurance and ethical consideration

Is it important to perform research in a reliable way which allows validity of the results (Robson and McCartan, 2016), especially because case studies have especially been subject to extensive investigation by academics (Flyvbjerg, 2006). Riege (2003) suggests ways of implementing validity and reliability into one's work, as summarized in Table 2.

Table 2. How the concepts of validity and reliability have been implemented in this project (Riege, 2003, pp. 78–79, with adaptations to this project in the last column)

Case study design tests	Phase of research	Techniques example	How it has been done in this project
Construct validity	Data collection	Use multiple sources of evidence	Empirical data put in relation to other sources by collection and analysis of academic literature, newspaper articles and sustainability reports
	Continuously	Review of report by an external informant	Continuous review of the project by the supervisor and occasionally by the subject reviewer
Internal validity	Data analysis	First do an analysis within a case and then across cases	Individual analysis of each report before cross-comparison
	Research design to data analysis	Use of illustrations and diagrams	Section 3.2 and 6.3
External validity	Research design	Define boundaries and scope of results	Limitations clearly stated in section 1.4
		Use of multiple case studies	Several brands analyzed both for fast-fashion and high-fashion
	Data analysis	Compare results with the literature	Chapter 6 and 7
Reliability	Research design to data analysis	Explain all theories and ideas	Extensive theoretical framework and empirical background in chapters 3 and 4
		Peer-reviewing	Feedbacks from supervisor, reviewer, and student peers. Opposition during oral presentation

In this project, collecting data from different sources enables triangulation, which gives more comprehensive results and improve their empirical validity (Saldaña, 2013; Yin, 2009). In this case, both relevant academic literature about the subject and reports from the case brands have been used. Attempts have been made to book interviews with brands representatives, which would have allowed a more in-depth analysis, but unfortunately without success. Nevertheless, using several case brands improve external validity and thus a better comparison with the literature. Finally, a continuous review of the project has been conducted by the supervisor, in addition to occasional review from the reviewers and other students.

Furthermore, it is important to take into account ethical considerations throughout the research process (Guillemin and Gillam, 2004). As there was no possibility to conduct interviews for this project, concerned brands did not have the possibility to give their opinion about what is written in this project. Nevertheless, efforts have been made to remain factual in empirical presentations and analysis processes in this work and excessive speculations have been avoided.

### 3 Theoretical framework

*This chapter defines the theories and terms used in this work. It begins with a broad approach about the concept of circular economy, which is then connected to the concept of business models. Additionally, the notion of innovation for sustainability allows to introduce sustainable business models and their importance for sustainability.*

#### 3.1 Circular economy

The concept of circular economy (CE) is an innovative approach which has the potential to improve global sustainability (Ellen MacArthur Foundation, 2015; European Commission, 2015). Its main aim is to decouple economic growth and resource use (Preston, 2012). It is an important process for sustainability, as the existing natural resources are not infinite, and the boundaries of ecological systems on our planet cannot be stretched indefinitely (Steffen *et al.*, 2015). It thus has the potential to reconcile economic growth and sustainability.

The concept is defined by the Ellen MacArthur Foundation, a pioneer in this field, as “restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles” (2015, p. 2). It is based on the “cradle-to-cradle” products life-cycle, rather than the usual “cradle-to-grave” (McDonough and Braungart, 2002, p. 27), and its three core principles are (Ellen MacArthur Foundation, 2017b):

- i) Design out waste and pollution.
- ii) Keep products and materials in use.
- iii) Regenerate natural systems.

Those three principles relate here to the use of recycled fibers by clothing companies, as it allows to use waste as a resource and thus reduce pollution, keeping the same flow of material in a loop and reducing the burden put by the fashion industry on the environment.

In a nutshell, the main characteristic of a circular economy is the presence of a circulatory system, which enables an internal cycle of materials (Allenby, 1994), but there are different ways of implementing the concept. Several circular economy models exist based on different approaches, which usually include slowing, closing and/or narrowing resources loops (Bocken *et al.*, 2016). However, only narrowing the resource loops (using less resources to produce something) does not imply a slowing down of production and consumption, which can in turn potentially not bring that many benefits (*Ibid.*). The dimension of time thus needs to be acknowledged, which is studied in this project through the discussion of the concepts of fast-fashion and high-fashion. Considering this aspect thus allows to take into account the slowing down of resource loops, which has the potential to improve the sustainability of clothes production and consumption (*Ibid.*).

Nevertheless, in this project the closing resource loops (using waste as a resource for virgin material) through recycling of textile and fibers the approach that relates the most to the concept of circular economy and is thus the main aspect that is studied. Indeed, using recycled fibers relates directly to the two first core principles of circular economy (i) Design out waste and pollution and ii) Keep products and materials in use) and is thus highly relevant from a sustainability perspective.

In addition, other ways to implement circularity exist and it is important to take a holistic approach for a sustainable circular business model (Antikainen and Valkokari, 2016; Bocken *et al.*, 2014). It is thus interesting to take a look at additional circular initiatives that can be taken by companies. For example, the cycling process can also happen through the reuse of products (Stahel, 2010), which

will be discussed in this project through the additional circular initiatives that the company have launches, such as second hand shops. An alternative strategy to recycling to close loops include ensuring that the products are designed to be easily disassembled and reassembled for further use (Bocken *et al.*, 2016). Furthermore, an additional strategy used by clothing companies to slow down resource loops includes extending the life of products through repair or higher quality (*Ibid.*). This also includes design that aim to produce products that will be liked and trusted for a long time, and/or that are durable and will not fall apart quickly. Those aspects are here considered through the division between fast-fashion and high-fashion companies, for which the approach to design and quality differs, as stated in section 2.3.2. All those additional initiatives for sustainability will be summarized in chapter 6 and further discussed in section 7.

## 3.2 Stakeholder theory

Using recycled fibers is one way to improve a firm's sustainability and thus reputation (Macchion *et al.*, 2018). More precisely, corporate reputation can be defined "in terms of the opinion that those with an interest in the company (stakeholders) hold about the company" (Roberts, 2003, p. 160). It is an interesting aspect to take into account here, as a business may have an excellent sustainability reputation from some stakeholders' perspective but may still be found guilty of green washing. Indeed, an holistic approach needs to be taken if production processes wish to be improved, especially if the aim is to reach a circular economy (Bocken *et al.*, 2016).

It thus seems appropriate here to make use of the stakeholder theory, which is a contemporary interpretation of stakeholder theory that acknowledges the role of all stakeholders, not only its shareholders (Freeman *et al.*, 2007). The main principle of that theory is that it recognizes that a company needs more than just its management core to thrive, and that firms should use their business to co-create sustainable value (*Ibid.*). Stakeholders can be all types of entities, such as people, associations, institution, or even environmental aspects (Mitchell *et al.*, 1997). From a sustainability perspective it is particularly important here to take a broad perspective of related stakeholders, as climate change is an issue which affects our world at several levels (Steffen *et al.*, 2015). It is thus important to acknowledge that companies affect more than just their core business and actors as well (Mitchell *et al.*, 1997). The need for a broad perspective has already been emphasized by Ekström and Salomonson (2014), who sketched out a network of relevant stakeholders for sustainability in a study.

Furthermore, cooperation is an essential aspect of sustainability (Todeschini *et al.*, 2017) and thus of the recycled fibers industry (Bocken *et al.*, 2016). Indeed, many clothing brands collaborate with other stakeholders, such as associations, producers and recycling firms, to increase and facilitate the use of recycled fibers in their products (Acne Studios, 2019; Filippa K, 2019; Globescan and C&A Foundation, 2019). Cooperation is especially important if one wishes to shift towards a circular economy (Globescan and C&A Foundation, 2019; Pal *et al.*, 2019). As the stakeholder theory aims to find a common ground which satisfies all its stakeholders rather than maximize only one aspect (Freeman *et al.*, 2007), it seems to be an appropriate theory for this work.

Thus, based on the previously stated delimitations of this work and on the framework of Roberts (2003), relevant stakeholders for this project are represented in the figure below (Figure 3).

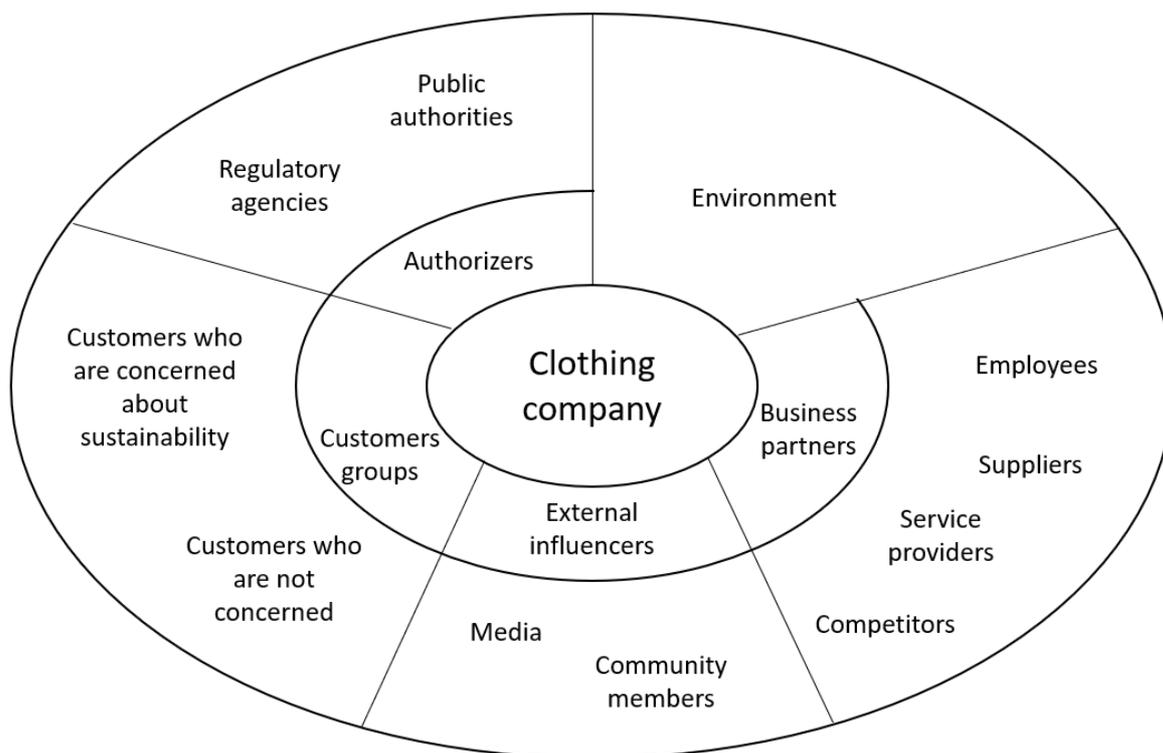


Figure 3: Relevant stakeholders for this project (Roberts, 2003, p. 162, with minor modifications).

In this case, the core connecting all stakeholders is the clothing company. The stakeholders can then be divided into four categories. The first one includes the so-called authorizers, which have some kind of authority on the company, and which include public authorities and regulatory agencies. Customers represent the second category, in which both concerned and unconcerned about sustainability customers are present. The third section includes external influencers such as media and community members. The fourth category finally encompasses the business partners of the company, which includes employees, suppliers, service providers and competitors. An important addition to the original framework is considering the environment as a stakeholder, which is here represented as an additional fifth category. This includes several types of natural elements, such as water, soil, living organisms, plants, and other natural resources.

Identifying the key stakeholders is the first step to understand the limits of the system in which the clothing company finds itself. The next step is to present a framework for understanding the contextual system that these stakeholders operate in, in terms of socio-technical systems and the dynamic relationships that connect them.

### 3.3 Socio-technical systems

Socio-technical (ST) systems is a theoretical framework which includes production, diffusion and use of technology (Geels, 2004). It thus considers the functionality and links of elements which are needed to carry out societal functions. For the scope of this project, recycled fibers can be considered as an innovative technology (Jawahir and Bradley, 2016) which is applied in the context of the clothing industry. This innovation must then be integrated in practice, which requires an adaptation effort from its users, in a mutually adaptive process (Geels, 2004).

Indeed, ST system are not autonomous and humans remain an essential component (*Ibid.*). Relevant

actors can be different types of social groups, such as firms, industry, public authorities, institutions, etc. They are interdependent but relatively autonomous from one another and can communicate and interact in various ways through a dynamic network. It is also important keep in mind that they are influenced and regulated by institutions and rules. Thus, the three main dimensions considered for analysis are: i) ST-systems ii) human actors, organizations, and social groups iii) rules and institutions.

For the scope of this project, it is complementary to the previously cited stakeholder theory, as Geels (2004, *Ibid.*) reminds that many scholars have identified the need to consider innovations and users simultaneously. The focus is thus put at the level of co-evolution of technology and societal actors. To fully analyze the transition process data should be collected from different time points, which is unfortunately not the case in this work. The framework remains nonetheless useful to discuss the future perspectives and strategies that the companies have regarding recycled fibers and analyze the links that connect their various stakeholders. An introduction to the relevant stakeholders for the systems has been given in section 3.2 and will be further discussed in section 6. Those stakeholders and their relationships can then be integrated in the ST framework in relation to recycled fibers.

### 3.4 Business models and sustainable business models

In addition to ST systems and their relevant stakeholders, one should also consider the business model of the companies in an analysis. Indeed, business models are an important aspect of sustainability in the fashion sector, as they can be considered as transformative agents (Pal and Gander, 2018) and are thus important for innovation. Many scholars agree on that point and emphasize the importance of business models for sustainability (Bocken *et al.*, 2014; Boons *et al.*, 2013). Furthermore, they are a good conceptual tool which allows to analyze firms and how they run their business (Osterwalder *et al.*, 2005).

In a nutshell, a business model describes the strategy that a company adopts in its business in order to create value (Magretta, 2002). More precisely, the concept is defined by Sousa-Zomer and Cauchick-Miguel (2017, p. 569) as a “representation of the underlying core logic of a firm and the strategic choices for creating and capturing value within a value network”. The main elements of a business model are (Bocken *et al.*, 2014; Osterwalder *et al.*, 2005):

- i) Value proposition: What is offered by a company in a service and/or product.
- ii) Value creation and delivery: How does a firm create value and delivers it.
- iii) Value capture: How is revenue for the company generated through profit.

Furthermore, business model innovation is a closely related concept and is defined as a way of implementing new types of business models (Geissdoerfer *et al.*, 2018). It is an important concept here as it can be difficult to implement sustainability in a firm (Teece, 2010). As innovations are playing an important role in the fashion industry, the established unsustainability of the sector has thus motivated the development of more sustainable business models (Pal and Gander, 2018). However, research about sustainable models for the fashion industry is still in its infancy, where the desired characteristics of the model are vague (Todeschini *et al.*, 2017).

Nevertheless, business models and innovations are both important aspects of sustainable development (Boons *et al.*, 2013). Business model innovation for sustainability can be defined as an “innovations that create significant positive and/or significantly reduced negative impacts for the environment and/or society, through changes in the way the organization and its value-network create, deliver value and capture value (i.e. create economic value) or change their value propositions” (Bocken *et al.*, 2014, p. 44). Some applied interpretation of this concept include large well-established companies adding more “green” products to their assortments, while some smaller firms have taken

the opportunity to develop their business in the new niche market of sustainability and have adopted drastically new business models (Caniato *et al.*, 2012).

Furthermore, for the scope of this project, the innovational concept can be linked to the sustainable business model (SBM) archetype “Create value from waste” described by Bocken *et al.* (2014, p. 49). The authors suggest the following description of the three main aspects of this SBM:

- i) Value proposition: “Waste” becomes a valuable resource and is used for production.
- ii) Value creation and delivery: Cross-sectoral cooperation and partnership between stakeholders to close resource loops and reduce waste.
- iii) Value capture: Minimizing waste reduces monetary and environmental costs while creating new value.

Other types of SBM exist, such as renting services, energy optimization, ethical trade, and many more (*Ibid.*). In our case however, the delimitations of the project relate well to the “Create value from waste” model, and the other additional sustainability aspects will not be considered as much. It is however important to keep in mind that those other aspects exist.

Consequently, the use of fibers made from recycled material can be applied to this previously cited business model archetype, as waste is transformed to create new garments with economic value. Fibers can be made of PET bottles (Shirvanimoghaddam *et al.*, 2020), old fabric and clothes (Ütebay *et al.*, 2019), plant waste (Rana *et al.*, 2014) and many more (Bhatia *et al.*, 2014). Those materials are usually regarded as waste but are here considered as a resource. Additionally, using recycled fibers can be facilitated by collaboration between actors, such as recycling facilities, suppliers, designers, retailers, and other relevant actors.

While being beneficial to the economy and the environment, introducing sustainable aspects into a brand management strategy is also profitable to companies themselves (Grubor and Milovanov, 2017). Particularly, sustainability is a way to reach consumers who are worried about environmental issues and enhance a company’s image (Nishat Faisal, 2010). Ideally, sustainability should be at the core of the business strategies, and not only to counterbalance the negative aspects that a company could have (Bocken *et al.*, 2014). It should also consider the human component of their business and ensure that every employee and related worker works in decent conditions (Boons *et al.*, 2013; Todeschini *et al.*, 2017). Firms thus need to encompass both holistic, social and financial aspects in their strategy if they want sustainability to be at their core (Bonn and Fisher, 2011).

Furthermore, the concept of circular business models can be considered as a subunit of the SBM framework (Kant, 2012). More specifically, one business model archetype who allows to close resource loops is the extending resource value model, which uses waste as a resource and turns it into a new products (Bocken *et al.*, 2016). Its sustainability aspect has the potential to attract new customers, while reducing material costs and thus potentially the final product price. Another sustainable business model is the industrial symbiosis, in which residues from one process are turned into a resource for another process through collaboration and collection systems (*Ibid.*).

Additionally, high-fashion and more luxurious clothing products can be considered as part of the classic long-life business model, which allows to slow down resource loops (Bocken *et al.*, 2016). This model is characterized by products of higher quality that are durable and repairable, with a high level of service, and thus promote higher sustainability. It also does not promote consumption through promotions as intensively as in fast-fashion and has fewer sales at higher rates. Those aspects will be further discussed through the concept of high-fashion and fast-fashion.

### 3.5 Drivers for sustainability

As discussed previously, sustainability is not an easy thing to implement in a business and it can require significant amounts of efforts. Nevertheless, the academic literature suggests several aspects which can motivate companies to do it. First, sustainability is suggested to be a way to enhance a company's image and reach to consumers which are worried about environmental issues (Nishat Faisal, 2010). This may be especially important for companies that have had their image tarnished in the past because of accidents, such as the 2013 collapse of the Dhaka factory in Bangladesh (The New York Times, 2013). However, motivation could also come from a genuine belief in sustainability (Macchion *et al.*, 2018).

Furthermore, different studies bring up similar drivers motivating the implementation of sustainability strategies in firms of all types. One aspect that is regularly cited is that implementing sustainability strategies in a firm brings competitive advantage, which is suggested to be one of the main motivating drivers (Fraj-Andrés *et al.*, 2009). Another important suggested element is the managing commitment, also called corporate values, for sustainability (Caniato *et al.*, 2012; Fraj-Andrés *et al.*, 2009). Compliance with laws and regulations on the other hand is suggested to play little role in decisions (*Ibid.*). Additionally, companies' size (and thus capital) and age still seem to be the main factors determining business strategies regarding sustainability. The type of strategy itself, either planned or emergent, is suggested to be influenced by the context, business strategies and personalities of the management (Neugebauer *et al.*, 2016). Neugebauer *et al.* (2016, *Ibid.*) suggest that wicked problems, such as sustainability, should be addressed by emergent strategy making, which they define as being developed and adapted through practice.

Nevertheless, there is a need for further research about the drivers that motivate fashion companies to make their supply chain more sustainable (Caniato *et al.*, 2012). Scholars suggest that some motivating factors for sustainability include societal pressure, customer boredom of homogenized fashion and reduced new collections speed pressure (Neugebauer *et al.*, 2016). Furthermore, factors that influence sustainability are suggested to depend on the size of the company: large ones are suggested to be motivated mostly by corporate values, while cost reduction and regulation play little role (Caniato *et al.*, 2012). On the other side, smaller firms are suggested to be influenced by corporate values, cost minimization and cultural context (Caniato *et al.*, 2012).

Furthermore, Macchion *et al.* (2018) suggest the following classification of fashion companies based on their business strategies regarding sustainability:

- i) **Reactive strategy:** Invest the bare minimum to respect regulations and other external pressure, such as potential attacks from the media and NGOs. They mainly consider sustainability as a mean to save money and do not perceive additional benefits such as competitive advantage. This strategy is usually more present in old and medium-sized companies, which can display a lack of managerial commitment and lack of resources for implementation. Those firms' want to put more efforts providing a high-quality product to their final customers rather than improving their sustainability impact.
- ii) **Proactive strategy:** Make more efforts for sustainability than just catch up on regulations and are willing to make some changes. Those can be old company from all sizes, with or without a high internationalization structure, or small new firms. The top management has a high level of commitment regarding their corporate strategy improvements and wishes to defend the company from media attack. Much effort is made to improve sustainability of the supply chain, despite usually encountering adjustment difficulties from the suppliers' side.
- iii) **Value-seeker strategy:** Excel in both social and environmental sustainability, with a top management who strongly believes in the value sustainability creates. The company is suggested to usually be big, old, and highly international, and always in search of new ways

to improve itself. It is trying to be as transparent as possible about its practices, release sustainability reports and adopt third-parties' certifications. Customers are also encouraged to participate in the efforts through recovering systems, which allows the firm to increase its use of recycled materials. Some of the main problems that can be encountered are the high costs associated with sustainability improvements and difficulties to find suppliers.

Those different strategies give a glimpse of the different aspects that can be relevant when looking at a company sustainability strategy, such as size, age, internationalization, and top management. They allow a classification of the companies based on the data collected, which is done in section 6.1.1.

However, when classifying strategies, it is important to remain critical regarding the type of strategy that it is. Indeed, according to Mintzberg, (2000) strategies can be intended, deliberate, emergent realized and unrealized (Figure 4).

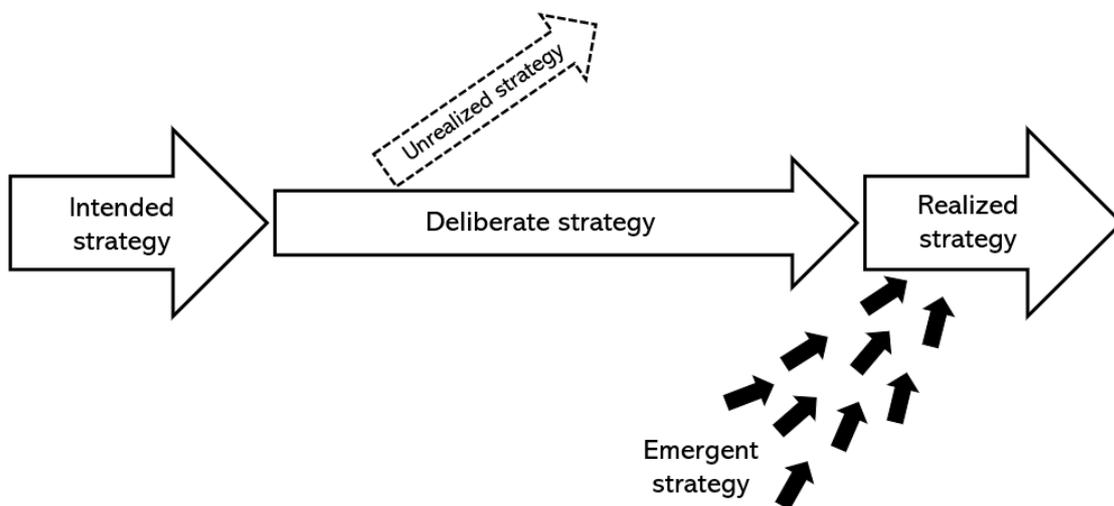


Figure 4: Types of strategies (From Mintzberg, 2000, p. 24).

A deliberate strategy happens when original intentions, the intended strategy, are fully achieved. The resulting realized strategy is thus in accordance with the primary goals. On the contrary, unachieved intentions produce an unrealized strategy, which failed and did not get accomplished. In addition, there is also a so-called emergent strategy, which consists of an accumulation of small actions that produce a realized strategy over time.

This strategy classification is the final element of the theoretical framework that will allow a contextual comprehension of the empirical background and primary empirics in the next chapters. It gave an extensive overview of the concept of circular economy, which is at the core of the research question of this project. In addition, the stakeholder and ST systems theories will allow a clearer understanding of the relevant stakeholders and their relations. A comprehensive overview of business models and relevant SBMs were also provided to be able to discuss the business models of the case companies. Finally, this chapter ended with a summary of the academic literature about the drivers for sustainability, which included a description of business strategies for sustainability and a strategy classification. The concepts presented will be linked to the data collected and the research questions in the rest of this project.

## 4 Empirical background

*This section provides an informative background about the sustainability issues present in the fashion industry. It starts with a summary of previous studies about the subject, and further defines more clearly the concept of fast-fashion and high-fashion and ends with a description of the current use of recycled fibers in the clothing industry.*

### 4.1 Previous studies about sustainability of the fashion industry and use of recycled fibers

As sustainability is a recurrent problem in the fashion industry, lots of studies have already been done in this sector. The sector nonetheless remains big and complex, and much work still needs to be done.

On the theoretical side, Ekström and Salomonson (2014) emphasize the fact that many sustainability studies in the fashion sector had a narrow focus on customers (such as Park and Lin, 2020) and management practices, and that there is current need for broader research that take into account more than just a few central actors. They also stress the need for collaboration between stakeholders, which they put into action by establishing a network of relevant actors in focus groups. The decision to take a corporate perspective based on stakeholder theory and socio-technical systems thus seems like a suitable approach to the subject in this project.

Furthermore, the literature about sustainable business models remains broad (Bocken *et al.*, 2014, 2016; Teece, 2010; Wells and Seitz, 2005) and relatively few studies focus on sustainability drivers in the fashion industry (Ozdamar Ertekin and Atik, 2015; Todeschini *et al.*, 2017). Scholars thus suggest that there is a need for more research about motivating factors for sustainability in the fashion sector (Todeschini *et al.*, 2017).

Regarding the more specific subject of recycled fibers, a significant number of studies with different theoretical approaches can be found in the academic literature. Many studies are descriptive and use a literature review to describe the current use of recycled textile in a general way (Bhatia *et al.*, 2014; Sandin and Peters, 2018) or specifically in the fashion sector (Moorhouse and Moorhouse, 2017; Shirvanimoghaddam *et al.*, 2020). Some researchers have also chosen to take a quantitative approach to the subject (Ütebay *et al.*, 2019), but it seems to be rarer. Other scholars have also built up their work on the concept of circular economy by doing a life cycle-analysis of various recycled products linked to textile (Jawahir and Bradley, 2016), which is a commonly used method when discussing the subject of recycled fibers (Sandin and Peters, 2018).

The specific aspects of recycled fibers studied in the literature vary greatly. Many studies focus on the technical aspects of fibers, such as techniques and type of waste used (Bhatia *et al.*, 2014; Shirvanimoghaddam *et al.*, 2020) or technicalities of specific recycled materials such as cotton (Liu *et al.*, 2019; Ütebay *et al.*, 2019). Some also focus on the design practices and history of recycled fibers (Moorhouse and Moorhouse, 2017) or on the consumers' attitude towards recycled and upcycled fashion items (Park and Lin, 2020). Some scholars have taken a network approach to the use of recycled textile, with a broad stakeholder focus and an aim to increase the reuse and recycling of textile (Ekström and Salomonson, 2014; Ekvall *et al.*, 2015). Others have linked the concept of circular economy and recycling, but have kept a broad approach based on manufacturing of unspecific goods (Jawahir and Bradley, 2016) or have analyzed the technological elements that could facilitate it (Shirvanimoghaddam *et al.*, 2020).

Finally, studies which focus on luxury products are not very common and are mostly conducted from a consumer perspective (Fionda and Moore, 2009). Taking a corporate perspective from luxury companies in this project thus brings a novel angle. It also enables a further analysis of sustainability practices in the luxury sector, for which only broad studies have been found (Cimatti *et al.*, 2017; Joy *et al.*, 2012; Yang *et al.*, 2017).

## 4.2 Overconsumption issues in the fashion industry

Fashion is a highly unsustainable industry, as it promotes high rates of consumption and thus waste (Bhardwaj and Fairhurst, 2010; Cimatti *et al.*, 2017). Additionally, both social and environmental issues are present at the various stages of the production process (Curwen *et al.*, 2013). Many scholars therefore argue that the industry needs to acknowledge environmental issues in their supply chain and start taking more sustainability initiatives (Chung and Wee, 2008; Smith, 2003).

In Europe especially, the high rate of clothes consumption is problematic. The consumption of clothes there is suggested to be much bigger today than two decades ago, as the volume of clothing purchased increased by 40% between 1996 and 2012 (European Environment Agency, 2014, p. 107). This can partially be explained by business models promoting an increased production and consumption of clothes (Niinimäki and Hassi, 2011). Globally, 73% of the clothing waste ends up in landfills or are incinerated, and a little bit less than 13% is recycled (Ellen MacArthur Foundation, 2017a, p. 20). There is thus a huge potential for improvement both from the business model perspective and from the recycling perspective to improve the sustainability of the industry.

Unfortunately, making fashion more sustainable is not an easy task. Many barriers suggest that fashion and sustainability are incompatible concepts, such as lack of transparency, having economic growth as a goal, lack of knowledge and trust from outside stakeholders, consumer behavior and aesthetic concerns (Ozdamar Ertekin and Atik, 2015). Moreover, a fashion product can be considered sustainable only if both the environmental and social aspects from the production processes are considered (Karaosman *et al.*, 2016), which is not an easy task.

## 4.3 Fast-fashion and high-fashion

In the fashion world, all clothes are not created equal. On one side, it is possible to buy extremely cheap clothes from well-known retailers, with collections being renewed every other week. Those items are the product of fast-fashion brands, who are characterized by their low prices (Joy *et al.*, 2012) and produce standardized clothing designed to be quickly mass produced and consumed (Fletcher, 2010). On another hand, it is also possible to find clothes of higher quality if one is willing to pay a higher price. That second category is here defined as high-fashion and encompasses clothing brands that do not fit into the fast-fashion category (low price and mass produced). The term “luxury fashion” could also be applied to this pricier category.

The interesting aspect here is that luxury brands are suggested to have the potential of reuniting fashion and sustainability (Joy *et al.*, 2012). Indeed, they have both the potential to slow down resource loops, through a classic long-life model, and simultaneously closing down loops through extending resource value (Bocken *et al.*, 2016). Consequently, an increasing amount of luxury brands have increased their sustainability practice (Moorhouse and Moorhouse, 2017; Yang *et al.*, 2017).

In general, the fashion industry has started shifting from fast fashion to a more sustainable production and consumption. That trend has been motivated by several factors (Todeschini *et al.*, 2017):

- i) Higher consumer awareness about sustainability causes a decrease in sales.
- ii) The concept of circular economy promotes innovative design practices and collection system.
- iii) Corporate social responsibility is increasingly adopted in the fashion industry.
- iv) Promotion of sharing economy and collaborative consumption.
- v) Technological innovations such as innovative fibers.

Recycled fibers relate here to several of those points, as they promote circular economy, collection system and are a technological innovation. Furthermore, they are also a marketing argument to reach consumers that are more concerned about sustainability. Additionally, the difference between fast-fashion and high-fashion becomes important because of the time dimension. Indeed, reducing the amount of resource used to produce a product (also called narrowing) does not imply a slowing down of production and consumption (Bocken *et al.*, 2016). Thus, using recycled fibers in fast-fashion companies that still promote high consumption through cheap prices may bring very little environmental benefits. There is therefore also a need to slow down the resource loop through various means such as design, quality and repair, which may be more present in high-fashion companies that are based on a classic long-life model (*Ibid.*). Additionally, the efficiency of the recycling process to create fibers and the recyclability of the final products have to be taken into account if the goal is to ensure a true circularity (*Ibid.*).

#### 4.4 Use of recycled fibers in the fashion industry

Textile production is one of the most polluting industry in the world (Ütebay *et al.*, 2019) and the problem is not going to disappear by itself anytime soon, as the global consumption of fibers is increasing (Dahlbo *et al.*, 2017; Ütebay *et al.*, 2019). Recycling waste into new fibers thus seems like a promising alternative to the usual manufacturing processes. Indeed, using recycled material by fashion firms is suggested to be one of most important criteria for sustainability, and using recycled fibers is a common strategy to improve sustainability (Caniato *et al.*, 2012). Recycling thus has several benefits, but drawbacks and challenges also exist, as summarized in Table 3.

Table 3: Reported benefits and challenges of textile recycling

Benefits	Challenges
More environmental friendly than incineration and landfilling (Sandin and Peters, 2018)	Less good than reuse (Sandin and Peters, 2018)
Increased profit through reduced material and disposal costs (Bhatia <i>et al.</i> , 2014)	Creation of a new market instead of compensating for new production (Dahlbo <i>et al.</i> , 2017)
Reduced use of energy and chemicals ( <i>Ibid.</i> )	Insufficient research about chemical processes used ( <i>Ibid.</i> )
	Potentially powered by fossil fuels (Sandin and Peters, 2018)
	Avoided production is already environmentally friendly ( <i>Ibid.</i> )

Recycling is not always the perfect option, as it suggested to have less environmental benefits than the reuse of clothes, but is still better than incineration and landfilling (Sandin and Peters, 2018). Thus, to reduce environmental impact, both reuse and recycling of textiles is important (Dahlbo *et al.*, 2017; Shirvanimoghaddam *et al.*, 2020). Recycling textile waste can have many benefits both at the environmental level and at the business level, such as reduced costs of material and waste disposal, increase in profit, decreased environmental impact, less energy and chemical used (Bhatia *et al.*, 2014). The interest for recycling in developed countries has also increased in the past decade (Szaky, 2014), mostly because of the marketing potential and lower costs of material (Sung, 2015).

However, it is unclear how much of the reuse of textile compensate for new production, or if it just creates a new market, and further research is needed regarding the chemical processes used in the manufacturing of recycled fibers (Dahlbo *et al.*, 2017). Also, recycling may not be beneficial if the processes are powered by fossil fuel or if the avoided production of virgin product has little environmental impact (Sandin and Peters, 2018).

Using recycled fibers in clothes can be considered as part of the shift towards circular economy. Indeed, some of the suggestions to try to reach zero waste are increasing recycling and reducing losses of material that could still be of value, among others (European Commission, 2015). Creating new fibers out of waste can thus be considered part of this process. Furthermore, the first approach to sustainable design in fashion focuses on the choice of materials (Ozdamar Ertekin and Atik, 2015). Many firms have therefore started using more recycled fibers in their clothing products (Ekström and Salomonson, 2014; Sandvik and Stubbs, 2019), which is one way to close the fabric resource loop and thus promote circular economy (Bocken *et al.*, 2016; Preston, 2012). H&M launching his latest “Loop” clothes recycling system in Stockholm is one example of the many sustainability initiatives that have been initiated by clothing companies recently (H&M, 2020).

In this particular project, the focus is put on closing the resource loop through recycled fibers. An important aspect is that, in theory, materials should be able to be continuously recycled into new products without any of the properties lost in the process (Bocken *et al.*, 2016). Otherwise, it would be considered as “downcycling” into a lower value product or material (Lee *et al.*, 2001), which does not fit the concept of circular economy as it only postpones the time at which the product will be considered as waste (McDonough and Braungart, 2002). Ideally, the entire life cycle of the product must be taken into account designing a product to minimize its negative impact (Karaosman *et al.*, 2016).

However, the decision of using recycled fibers is still not considered a priority by the industry (Todeschini *et al.*, 2017). It poses production challenges, as there is still a lack of choices and availability regarding materials, and redesigning products with recycled fibers is thus a much more difficult process than for traditional products (*Ibid.*). It is thus a system bound problem in which it is difficult for companies to be innovative by themselves, as they are dependent from the support that the system offers.

## 5 Primary empirics

*This chapter describes the case companies in more details and presents the primary findings for each of them. It summarizes the content of the sustainability reports and other relevant documents about the use of recycled fibers by the case companies.*

### 5.1 Acne Studios

Acne studios is a fashion company founded in 1996 and based in Stockholm, Sweden (Acne Studios, 2019, 2021a). It owns additional offices in Europe, North America and Asia, for a total of more than 800 employees and 60 stores worldwide (Acne Studios, 2019, p. 3). The company produces various kind of fashion products, from ready to-wear, footwear, and denim to leather goods.

For this project, it is defined as a high-fashion company as their dresses sell on their website from 1600 to 5000 SEK (Acne Studios, 2021b). An additional criteria that makes the company fall into this category is the high quality of their products, which are carefully designed for long term use through the techniques and material employed (Acne Studios, 2019). The firm also stores spare parts from old collections to facilitate the repair capacity of damaged products and offers to assist customer in the repair process (*Ibid.*).

One of their motivation regarding sustainability is the “urgency of environmental risks on especially loss of biodiversity and climate change that will directly impact our business operations” (*Ibid.*, p. 4). In their 2018-2019 sustainability report, the company further emphasize its ambition to take full responsibility for the current social, environmental, and ethical issues that their products can have. It is however not an easy task, as the firm reminds that supply chains in the fashion industry are long and complex (*Ibid.*).

Nevertheless, they thus have started to put more efforts into the design and production of their products, which includes the use of more sustainable fibers. They have been using recycled cotton in some of their past denim collection and wish to incorporate more recycled fibers into their garments, such as recycled wool, down, polyamide and polyester (*Ibid.*). In the financial year 2018-2019, 9% of their garments were produced with more sustainable materials, which encompasses among others recycled cotton, wool, down, polyamide and polyester (*Ibid.*, p. 10). It is however unclear how much those recycled fibers account in total for the 9%, as other types of textiles are considered sustainable by the company, such as organic and responsible fibers, and other more technological materials. They nonetheless wish to increase substantially the amount of recycled fibers in their product in the future. Indeed, their aim is to use 100% sustainable materials by 2030, whereof 40% should be recycled fibers (*Ibid.*, p. 8). Targets for each products and seasons have thus been implemented in order to reach those figures.

Furthermore, the company stresses the importance of cooperation when it comes to sustainability. They outline the various stakeholders with whom they are in contact with, such as other brands, academic institutions, unions, associations, media, and policy makers. They also have a noteworthy collaboration with the firm Renewcell, an innovative Swedish company which uses leftover cotton clothes for the production of recycled lyocell and viscose fibers (*Ibid.*). The own fabric and material leftovers from Acne Studios are donated to design schools in Sweden.

### 5.2 Filippa K

Filippa K is a Swedish brand founded in 1993 which focus on timeless design, longevity and mindful consumption (Filippa K, 2021c). Their range of product include men and woman ready-to-wear and sport clothing, which can be found in one of their 50 stores worldwide, 700 retailers and online

website (Filippa K, 2019, p. 9). For the scope of this project, the company is also considered as high-fashion because of its strong commitment to timeless and high-quality design, as well as its higher price-range as their dresses sell online from 800 to 3900 SEK (Filippa K, 2021a).

As sustainability is a big part of its corporate identity, the company aims to slow down the fashion industry perspective and encourage customers to value their clothes for longer (Filippa K, 2019). This mindset is present at every stage of the company, and circularity is an important pillar of their business: “Everything we do at Filippa K [...] follows the four Rs: Reduce, Repair, Reuse, and Recycle” (*Ibid.*, p. 15). The company however states that it is not an easy task to induce a change in mindset and behavior in the industry, and that many environmental and social issues are found beyond their control in the supply chain (*Ibid.*). The textile industry is especially pointed out in the report, as “the absolute biggest impact on both climate change and eco toxicity during a product’s lifetime lies within fabric production and therefore is out of our direct control” (*Ibid.*, p. 13). Some financial challenges have also emerged for Filippa K in their quest for circularity (*Ibid.*).

Nevertheless, the company strives to use recycled materials in its garments. It emphasize its use of various kind of recycled fibers on its website, which encompasses recycled cotton, polyamide, polyester, wool and cashmere (Filippa K, 2021b). It also favors other more sustainable materials in its garments, include organic, fairly sourced and recycled materials. In 2019, more sustainable fibers accounted for a total of 69% of the fibers used in products from the company (Filippa K, 2019, p. 27). More specifically, recycled fibers were used in 5% of their products (*Ibid.*, p. 30). Recycled polyester is especially employed, as 78% of the polyester used by the company was recycled (*Ibid.*, p. 30). They aim to increase their use of more sustainable fibers and reach 100% by 2030 (*Ibid.*, p. 27).

Furthermore, Filippa K collaborates with several partners. As they wish to increase the traceability of their products and want to be able to fully trace fibers back from their very beginning, they have started a partnership with TrusTrace, a company that helps tracking fibers back to their production (*Ibid.*). They have also partnered with Ax International through the initiative *From Waste to Fashion*, which aims to use wasted polyester products from the industry as a resource in the fashion sector. The company is also in contact with additional stakeholders such as NGOs, suppliers, and other brands, with whom they try to find new solutions to sustainability issues.

Finally, the company has also launched several circular initiatives. They have opened their own secondhand store in Stockholm and have launched a collection program for customers in 2015 (*Ibid.*). They also promote the repair of their products through a well-trained staff and customer service who can assist customers if reparation is needed on a product.

### 5.3 Ganni

The Danish fashion company Ganni, founded in 2000 (Ganni, 2019), features collections with audacious and colorful designs. The prices for dresses, which range from 1200 to 5900 SEK (Ganni, 2021), as well as the high quality of the garments, makes the company fall into the high-fashion category. It emphasize its efforts for a more sustainable fashion production and consumption in its reports, and has made a lot of efforts to use more recycled cotton, polyester, wool and leather in its garments (Ganni, 2019, 2020).

Their wish is to produce collections with a neutral, or even positive, impact and acknowledge that they are responsible to find new solutions and minimize their harm (Ganni, 2019). However, they also state that it is not sure that fashion consumption could ever become sustainable, even though they are working hard on it (*Ibid.*). One of the main challenges they are facing is the traceability of their supply chain and they are unsure about how to tackle the issue (*Ibid.*). Additionally, the company

stresses the need for more investment in the fashion industry in order to be able to make more sustainable decisions (*Ibid.*).

The company launched a *Fabric for the future* initiative in order to find new innovative materials through a research and development team (*Ibid.*). However, they acknowledge that there is a big gap between what can be found and what is realistic commercially. The textile market is also in constant evolution and it is unclear which materials the company will be using in the future, but they are constantly reviewing new options (*Ibid.*).

Nevertheless, despite some challenges to face, Ganni has plans for the future. Indeed, the company wish to increase the amount of products that uses post-consumer textile waste (Ganni, 2020). It is also planning to invest in fibers recycling trial programs (*Ibid.*). By 2022, the company wishes to upcycle 100% of its cotton deadstock into new furniture and interior (Ganni, 2019). It is also implementing four new concepts projects every year to make use of fabric deadstock and wastes and trains its design, technical and production employees about circular design (*Ibid.*). In addition, they have several goals for the forthcoming years (*Ibid.*):

- By 2021, source 100% of the wool from certified and organic sources or use certified recycled wool.
- By 2022, reach 20% of styles based on circulatory principles.
- By 2023, the totally of the cotton, viscose and polyester used will have to be more sustainable (which here means either organic, certified or recycled).

In order to reach those goals, they have partnered with I:CO, a company which helps collect post-consumers garments and textile waste in stores (Ganni, 2020). They are also collaborating with SOEX, a German firm which re-sells unsold stock if it has not been upcycled already (*Ibid.*). If re-selling the items fails, the products are recycled into fibers, and research is currently being made to be able to create new fashion items out of them.

Additional circular initiatives from the brand include strategies to increase the volume of collected post-consumer garments and footwear and rental services, called Ganni Repeat, launched in 2019 (Ganni, 2019, 2020).

## 5.4 House of Dagmar

House of Dagmar is a Swedish fashion company founded in 2005 with a strong sustainability commitment, as it bases its strategy on three sustainable pillars: high quality in fabrics, production processes and design (House of Dagmar, 2021c). Because of the high quality of its garments, the timeless designs and the high price range of their products, with dresses on their website ranging from 3000 to 4000 SEK (House of Dagmar, 2021a), the company is here considered as high-fashion.

Sustainability is at the core of their business and the firm wishes to take responsibility about the impact that fashion has on the environment and inspire change (House of Dagmar, 2019). Their aim is to be able to produce carbon neutral garments with 100% sustainable collections by 2025, but they acknowledge that there is still a long way to go (House of Dagmar, 2018, 2019). Some of their current efforts to reach this goal are (House of Dagmar, 2018):

- Create new partnerships to improve data collection about their products lifecycles.
- Achieve a fully transparent supply chain.
- Only use sustainable fibers.
- Increase their use of recycled fibers.

- Establish a strategy to reach a zero-waste production.

Furthermore, the company is also planning to implement repair and collection services into their stores to increase the circularity of their products (House of Dagmar, 2019).

In addition to those future goals, the firm already selects the material for its garments carefully and uses regenerated wool and cashmere, as well as recycled polyester, cotton and linen (House of Dagmar, 2021b). In 2019, the company used a total of 25% of more sustainable fibers in their products, which includes recycled fibers (House of Dagmar, 2019). All of their knitted viscose dresses are already made of recycled yarn but they wish to improve this share. Indeed, increasing the use of recycled fibers is important to them, as they found out that fiber's production is responsible for 71% of their carbon dioxide footprint (*Ibid.*).

## 5.5 Gina Tricot

Gina Tricot is a Swedish fashion company founded in 1997 in Borås, where the headquarters are still located to this day (Gina Tricot, 2021a). It has more than 160 stores in Northern Europe, an e-commerce platform and around 1900 employees in total (Gina Tricot, 2019, 2021a).

It is an example of a fast-fashion company which focuses on low prices, as the company puts it itself on its website: “lots of fashion for the money ” (Gina Tricot, 2021a). Indeed, dresses are sold online between 20 EUR (~200 SEK) and 99 EUR (~1000 SEK), with sales prices as low as 6 EUR (~60 SEK) (Gina Tricot, 2021b). Their price range thus seems to follow their initial concept which was “[...] in 1997, the core idea behind Gina Tricot was to give female customers a happy surprise each time they saw the price tag on items sold in Gina Tricot stores” (Gina Tricot, 2021a). Furthermore, fast-fashion is characterized by the high speed of mass-produced collections (Fletcher, 2010) which is also the case for this company who is “able to get our unique collections into stores as quickly as two weeks after the designs have been created” (Gina Tricot, 2021a). Gina Tricot is classified as a fast-fashion company.

Nevertheless, despite the bad reputation that fast-fashion has regarding sustainability, Gina Tricot releases a yearly sustainability report. They want to take their responsibility and promote change in the fashion industry through goal settings and continuous efforts toward a more sustainable production (Gina Tricot, 2019). They are also committed to become more sustainable as they want to ensure that they can continue to do their business (Gina Tricot, 2021c).

Gina Tricot uses several types of sustainable materials, which includes organic, fairly sourced and recycled textiles. The main type of recycled fiber that the company uses its products is recycled cotton (Gina Tricot, 2021c), with recycled materials accounting in total for 1.3% of the share of more sustainable fibers used in garments (Gina Tricot, 2019, p. 29). The other types of more sustainable fibers include organic and responsible textile, which account in total of 57% of the fibers used in the products in 2019 (*Ibid.*, p. 5).

The company strongly believes in the benefits of redesigning their products with more sustainable materials such as leftovers and recycled materials, as it allows to create more design with what has already produced and thus increase profit, while lowering their environmental impact (*Ibid.*). They thus wish to increase their use of sustainable materials and hope to increase the recyclability of their product (*Ibid.*). They hope to join forces with other companies, experts, and scientists to be able to reduce their use of virgin fibers. They have thus started a partnership with the company Renewcell in 2018, which aims to use cotton waste and leftovers to create new fibers for garments, and with the Swedish brand Aéryne, with which they launched a collection made entirely from leftover fabrics (*Ibid.*).

Nevertheless, several challenges remain in that transition process. The company states that it is currently trying to figure out how to use only recycled polyester in their products, but that it is a daunting task (Gina Tricot, 2021c). It is thus important to stay informed about the latest research about sustainable and recycled materials. On another hand, the transparency of the supply chain is also an issue that is difficult to improve, not only for Gina Tricot but in the fashion sector in general (*Ibid.*). Partnerships and close collaboration with related stakeholders are therefore important aspect that should not be neglected if one wishes to reduce their environmental impact (Gina Tricot, 2019). All those aspects would help create products which promote circularity and which have been designed with a mindset considering the end of their life (*Ibid.*).

Additional circular initiatives by the brand include upcycled collections from customers returns, in-store repair and customization services, collection points in stores and cloth renting services since 2012 (*Ibid.*). Those initiatives are still a work in progress, as the company wished to increase the collection from post-consumers garments by 50% by 2020 (*Ibid.*, p. 36).

## 5.6 Pure Waste

Founded in 2013, Pure Waste is a Finnish clothing company which only uses 100% recycled materials to create their products (Pure Waste, 2021a). Sustainability is at the core of the firm, as its mission statement is “to create recycled products that inspire change towards a world without textile waste” (Pure Waste, 2021c). It thus collects textile waste in India and manufactures it into new products, and never uses virgin materials (Pure Waste, 2021a).

This company is an interesting case study and seems to have developed a new business model, as it does not fully fit in the fast-fashion or the high-fashion category. Indeed, if only based on the low price of the only dress sold on the company’s website, which costs 45 EUR (~460 SEK) (Pure Waste, 2021b), it would fall into the fast-fashion category when compared to the previously cited fashion firms. However, the company does not seem to renew their design and collections at a high rate, which is one of the usual criteria for fast-fashion companies (Fletcher, 2010). Their designs are also quite simple and timeless, which does not promote consumption to consumers. Furthermore, the quality of the product remains uncertain. The firm thus does not fit in either of the definition definitions of high- or fast-fashion businesses and seem to have launched a new business model based on the SBM “create value from waste” (Bocken *et al.*, 2016).

This innovative company is a strong believer in sustainability and wishes to promote change in the fashion sector. Their motivation seem to have been the high unsustainability of the fashion industry, which play an important role in innovations and the development of new SBMs (Pal and Gander, 2018). They wish to take a responsibility as leader and example for other clothing companies and thus help reduce the impact that the fashion industry has on the environment in a global perspective (Pure Waste, 2021c). They want to show to the world that even a small company can achieve great things and be sustainable (Pure Waste, 2019). Their strategy seems to be successful, as demand exceed their production capacity for several years (*Ibid.*).

Nevertheless, their achievement in using recycled fibers is the result of a lot of efforts. They first tried to source recycled materials in 2009 through an initial company called Costo but without success, and thus started to developed their own fabrics in 2010 (Pure Waste, 2021a). In addition, the value of collaboration and partnerships quickly emerged, as well as the importance of research and development (Pure Waste, 2021c). Challenging aspects nonetheless remain, such as the search for a more sustainable alternative to the polyester used in their fiber blend, which they aim to achieve by 2025 (Pure Waste, 2019, p. 38). The company also wishes to find longer cotton fibers to increase the recyclability of their products, as they want to further improve the end of their product life by using them as raw materials for other projects with the aim of using the fibers four times through recycling

(*Ibid.*, p. 35). It is presently not possible to make new clothes out of old garments, but the company nonetheless promotes the collection of post-consumer products since 2019 to recycle them into composite materials.

Furthermore, partnerships play an important role for Pure Waste. The company indeed believes that collaboration is an essential aspect if sustainable changes wish to be achieved, and are thus continuously in discussion with partners, suppliers, and stakeholders. They also manufacture products for other brands (Pure Waste, 2019). In addition, they are closely involved in several Finnish and international projects (*Ibid.*).

## 6 Analysis

*This chapter gives a synthesis of the use of recycled fibers by the case companies. It identifies the drivers and the challenges for fiber recycling, as well as the future perspectives present in the analyzed documents. It is followed by a general report of the various existing collaborations which relates to the use of recycled fibers and circularity. After that, an outline of the additional circular initiatives which allows to slow down resource loops by case company is given. Finally, a depiction of the socio-technical systems of the fashion industry is illustrated in the last section.*

### 6.1 Sustainability and use of recycled fibers

*Data collected about the strategies, drivers, challenges, future perspectives and collaboration are summarized for all case companies and linked to the theoretical framework from chapter 3.*

#### 6.1.1 Strategies and motivations

Before diving into the analysis of the drivers, it is important to note that a lot of the content analyzed from the case companies touched to the general subject of sustainability and less to the specific subject of recycled fibers. It remains nonetheless to discuss it and consider it throughout the discussion, as it is an incentive that can motivate the use of recycled fibers.

As explained in chapter 3.6, drivers for sustainability can depend on many factors. In that section, a classification of the different sustainability strategies adopted by fashion companies was introduced from the work of Macchion *et al.* (2018). It is important to remember that characteristics of sustainable business models remain quite vague (Todeschini *et al.*, 2017) and thus that everything is far from being set in stone.

With this in mind, based on this theoretical work, no case companies seem to fit the description of a reactive company. Indeed, they all already have implemented recycled fibers in their products and state that they are making many efforts in for sustainability at several levels. Furthermore, all cases companies seem to show a minimum of managerial commitment for sustainability, as they all either released a sustainability reports or have extensively written about sustainability on their website. The next category they can thus fit into is the proactive strategy class, which seems to fit quite well for Acne Studio, Ganni and Gina Tricot. Being proactive means that those firms are motivated by further incentives than the simple need to meet regulations, but still have room for improvement regarding sustainability. Those aspects are reflected through the facts that all the case companies are doing significant efforts regarding various sustainability aspects, in addition to stating that they are trying to improve their use of recycled fibers into their products. However, those three companies do not seem to put sustainability as much at the core of their business as Filippa K, House of Dagmar, and Pure Waste. Those firms seem to have followed a business strategy based on sustainability from the very beginning and seem to make every decision based on sustainability. This strong managerial commitment thus makes them seem to fall into the value-seeker strategy, as they are always trying to find ways of improving themselves. Their detailed sustainability reports and transparency about their practices further reinforces this choice of classification. The only aspect advanced by Macchion *et al.* (2018) that is not found in those companies is the high internationalization, as those three firms are quite small and almost exclusively present in Scandinavia. However, their small size does not seem to be disqualifying criterion here, but more an aspect that could increase the challenges that the companies face. Those challenges are further discussed in section 6.1.2.

Furthermore, the classification of case companies is based on secondary empirical material and reflects what is being communicated. It means that what is done might not entirely correlate with what is communicated. Indeed, as it is based on publicly available documents, it is only possible to make an assessment on what has chosen to be communicated by the brand. Additional initiatives are maybe being taken in this very moment by the companies, but people outside the firms are not aware

of it. It nonetheless remains a helpful tool to broadly analyze the content of the companies' documents.

Nevertheless, this classification does not allow to identify the firm's motivations for sustainability and recycled fibers in much further details, and it is thus necessary to go back to the companies' sustainability reports and documents to further dig up their motivations. The motivating factors that are suggested by the companies' document are all quite similar and generally relate to sustainability at a general level. The more specific theme of recycled fiber is only one part of their efforts in this domain and very little clear drivers are stated by the companies. It is however possible to define some general themes that are found in several of the documents analyzed, which are summarized in Table 4.

*Table 4: Summary of the motivating factors for sustainability mentioned by the case companies. An "X" means that this aspect has not been mentioned by the brand based on the content of the documents analyzed.*

Company	Motivating factors				
	Promote change in the fashion industry	Take responsibility	Be a leader	Want to continue doing their business	Increase profit
Acne Studios	X	Yes	X	Yes	X
Filippa K	Yes	X	Yes	X	X
Ganni	X	Yes	X	X	X
House of Dagmar	Yes	Yes	X	Yes	X
Gina Tricot	Yes	X	X	Yes	Yes
Pure Waste	Yes	Yes	Yes	X	X

Regarding the high-fashion companies, some similar drivers for sustainability are found in several brands, while others are less mentioned. To start with, Acne Studios states the environmental issues related to clothes production that could impact their business motivates them to increase their sustainability, in addition to their sense of responsibility. On the other hand, Filippa K wishes to serve as an example for the fashion industry, as they wish to promote a shift in mindset in the fashion industry and aims to be as sustainable as possible. Similarly to Acne Studio, Ganni also generally feels responsible for the impact that their clothes have on the environment and wishes to reduce it. Finally, House of Dagmar also feels responsible for their environmental impact that their products have and wish to inspire change in the fashion industry.

On the fast-fashion side, Gina Tricot also wants to promote change in the fashion industry and is committed to become more sustainable to be able to continue what they are doing. Using recycled materials also allows them to produce more design with what has already been produced, which

enable them to lower their environmental impact while potentially increasing their profit. It is the only company that suggests that recycled material is beneficial to their finances, which is the idea that lies at the core of the CE concept. Indeed, the main aim of a CE is to decouple economic growth and resource use (Preston, 2012) and Gina Tricot suggests here that circularity would allow them to increase their profit while reusing materials. It is a promising statement, but unfortunately little additional details are given by the company about it. It nonetheless remains a positive aspect that suggests that the company believes that sustainability can be profitable for them, as suggested by Grubor and Milovanov (2017).

Finally, pure waste aims to promote global sustainable change in the fashion industry and aims to be a leader and an example to follow. They want to take responsibility for themselves but also for other fashion companies and show the world that it possible to produce sustainable clothing, even as a small company. They seem to be an example of a small new company which took chose to develop its business in the niche market of sustainability by developing a new business model (Caniato *et al.*, 2012).

The thematic content analysis has thus allowed us to define the main aspects regarding sustainability motivations mentioned by the companies in their documents. No clear distinction can be made between high-fashion and fast-fashion companies here, but recurrent themes encompass the desire to encourage a global mindset shift in the fashion sector, a need to take its responsibilities, the wish to be a leader in sustainability, the hope to continue being able to do their business and finally to increase profit. They all seem to consider sustainability as a way to improve their business and acknowledge that it can be beneficial for them, as Grubor and Milovanov (2017) suggest.

It is however important to note here that some additional factors may exist but were not mentioned in the selected documents. In addition, because an aspect has not been mentioned by a company does not mean that it is not considered, but only that it has not been communicated. Further discussion with the brands should be done to assess their motivations more clearly.

### 6.1.2 Future perspectives for recycled fibers

All case companies aim to improve their use of sustainable materials and recycled fibers in the future. Their current status, as well as their aims and the deadlines they fixed for themselves, are summarized in Table 5. As many of them work with percentages, the difference between their current use and aim is also depicted to give a clearer overview.

Table 5: Current situation of the case companies regarding recycled fibers and the goals they wish to reach by a certain time point, based on the content of the analyzed documents

Company	Current status	Objective	Difference	Deadline
Acne Studio	9% of garments made of more sustainable materials	60% more sustainable materials, 40% recycled fibers	+94%	2030
Filippa K	Products made of 69% sustainable fibers	100% sustainable fibers	+31%	2030
Ganni	Unknown	100% organic or recycled wool	-	2021
		20% of style based on circulatory principles		2022
		100% of cotton, viscose and polyester sustainable or recycled		2023
House of Dagmar	25% more sustainable fibers in products	100% sustainable materials with an increased share of recycled fibers	+75%	2025
Gina Tricot	Products made of 1.3% recycled fibers	Increase share of sustainable and recycled materials	-	Unknown
Pure Waste	Use of a blend of cotton and polyester	Find an alternative to the polyester fibers	-	2025

All of the brands wish to increase their use of more sustainable and recycled fibers in their products, and the deadlines for their goals are spread between 2021 and 2030, when known. The only exception is pure waste, which simply cannot increase its use of recycled fibers because it already uses 100%. The company is however still searching for ways to improve itself and reduce its impact. It can also be noted that it has unfortunately not been possible to find if Ganni has succeeded/is succeeding about its goal for wool for 2021, as this information will probably be released in next year's report.

Furthermore, if we assume that the companies started working on those goals in 2020, it is possible to estimate the pace at which some of them aim to reach their goals. The biggest increase per year is set by House of Dagmar, as they would need to increase their use of sustainable materials by 25% every year to achieve their 2025 goal. For Acne, it represents an approximate increase in use of sustainable materials of 9.4% per year until 2030. Lastly, for Filippa K this increase would only need to reach around 3,1% per year if they wish to reach their goal by 2030.

Finally, there may be discrepancies in the future between their goals and their realized strategy (Mintzberg, 2000). The numbers and other wishes that the companies are stating are all part of their intended strategies, but they may not become true. There is also the possibility that an emergent strategy will install itself over time, especially because recycled materials are such an innovative technology.

### 6.1.3 Challenges regarding sustainability and the use of recycled fibers

Initiatives to increase sustainability and use of recycled fibers come of course with their fair share of problems and challenges. Unfortunately, quite little is said about specific issues faced by the case companies in the analyzed documents, and most of cited challenges touch to the bigger them of sustainability. But once again here, similarly to section 6.1.1, those aspects remain relevant to the discussion of recycled fibers.

Challenges mentioned by the companies vary. Acne studio just states that their supply chain is long and complex, and it is not easy to improve its sustainability. Filippa K also states the difficulty to control their whole supply chain and adds that it is difficult to induce a change in mindset and behavior in the industry. It is also not always economically beneficial for them to promote sustainability and circularity. Ganni also encounters some issues in the traceability of their supply chain. In addition, they suggest that more investment would be needed to help do more sustainable decisions. The constant evolution of technologies regarding recycled fibers makes it also difficult to predict what can be used in the future, as well as ways to implement it.

Something to keep in mind here is that it is possible that the companies do not wish to communicate more about their issues. Once again, it would be interesting to further discuss the subject directly with the companies to get more insights about the present issues.

### 6.1.4 Relevant collaboration and partnerships

Sustainability efforts are notoriously difficult to drive only locally partnerships are essential to tackle sustainability issues that reach outside of the control of the company (Airike *et al.*, 2016). It is the very basis of the stakeholder theory, which suggests that firms should use their business to co-create sustainable value (Freeman *et al.*, 2007). Collaborating with various stakeholders is thus an essential aspect of finding solutions to complex sustainability problems (Airike *et al.*, 2016), promote shifts toward a circular economy (Globescan and C&A Foundation, 2019; Pal *et al.*, 2019) and to innovate in the field of recycled fibers (Bocken *et al.*, 2016). The case companies seem to have understood that, as they have launched several collaborations with various partners to improve their sustainability practices and use of recycled materials.

Most of the case companies mentioned specific partnerships aimed to increase their sustainability and facilitate their use of recycled fibers. The first of them is Acne Studios, which emphasizes its cooperation and continuous discussion with other brands, academic institutions, unions, associations, media, and policy makers. The company also collaborate with Renewcell to boost the recyclability of its leftover cotton clothes. They also have partnerships with design schools, to whom they donate

their leftover materials. In addition, Filippa K also highlights its collaboration with NGOs, suppliers, and other brands. In addition, it works together with TrusTrace to improve the traceability of their supply chain and with Ax International to increase the use of wasted polyester in fashion as a resource. Finally, Ganni states that it is partnering with I:CO to increase the collection of post-waste consumers in stores. They also collaborate with SOEX to promote the re-selling, upcycling, and recycling of unsold stocks.

However, some companies give fewer details about their partnerships. House of Dagmar does give much information about precise collaborations regarding the circularity of their textiles. However, they do state that they want to create new partnerships to improve the data collection about their product lifecycle. Gina Tricot also does not mention specific partnerships but mention the importance of collaboration with stakeholders to reduce its environmental impact.

Nevertheless, once again here, the companies may have also simply chosen to not communicate more about their collaboration and partnerships yet. They may still be in discussion with them and do not wish to disclose any information until they all are in agreement. An interview with company representatives may give further information about their collaborative strategies.

## 6.2 Slowing down resource loops

For a sustainable circular business model, it is important to take a holistic approach (Antikainen and Valkokari, 2016; Bocken *et al.*, 2014). In our case, it is thus necessary to also consider the additional circular initiatives that the case companies have taken, even though it is not the main focus of the study. Based on the analyzed documents, those initiatives include post-consumer collection, renting services, fabric leftovers donation, second-hand stores, repair services and upcycled collections. Many of those initiatives aim to slow down the resource loops, which is another way to implement circular economy (Bocken *et al.*, 2016), as stated in section 3.1. Table 6 summarizes the situation for each of the companies.

Table 6: Summary of additional circular initiatives from the case companies. An “X” means that such an initiative has not been taken by the brand based on the content of the document analyzed

Company	Circular initiative					
	Post-consumer collection	Renting services	Fabric leftovers donations	Second-hand store	Repair services	Upcycled collections
Acne Studios	X	X	Yes	X	Yes	Yes
Filippa K	Yes	X	X	Yes	Yes	X
Ganni	Yes	Yes	X	X	X	Yes
House of Dagmar	To be implemented	X	X	X	To be implemented	X
Gina Tricot	Yes	Yes	X	X	Yes	Yes
Pure Waste	Yes	X	X	X	X	Yes

It is interesting to see that many of the case companies have taken initiatives to slow down the resource loop and to increase the reuse of products. (Bocken *et al.*, 2016). This includes the renting services and second-hand stores, which allows the use of the products by several consumers. In addition, improving capacity to be repaired also allows consumers to enjoy their garments for a longer time and promotes the slowing down of the loop.

The other initiatives taken, which encompass post-consumer collection, fabric leftovers donation and upcycled collection, can all be linked to the SBM “create value from waste” (*Ibid.*) as the value proposition is that waste is considered as a resource and used to produce new products. Those initiatives are relevant to the use of recycled fibers, which aims to close the resource loop. Furthermore, this includes cross-sectoral cooperation with consumers, designers, schools, and other actors from the fashion industry, which thus plays a role in the value creation and delivery.

### 6.3 Socio-technical system and related stakeholders

Chapter 6.1 and 6.2 has allowed to gather many details and relevant information about the use of recycled fibers by the case companies and given enough material to answer individually each of the research questions. But before diving into the discussion, it remains interesting to synthesize all that information to give a better overview of the situation and relevant stakeholders through the theoretical lens of ST systems.

This outline is relevant to the study as, based on the general efforts that the case companies make towards partnerships and circular initiatives (See section 6.1.3 and 6.1.4), the firms seem to have understood that their actions impact more than just their own business, which is an important step towards sustainability (Mitchell *et al.*, 1997). This falls in line with the ground concept of the

stakeholder theory, which recognizes that a company needs more than just its management core to thrive (Freeman *et al.*, 2007).

Thus, by considering the relevant stakeholders previously mentioned in section 3.5 and the partnerships in section 6.1.4, it is possible to build a ST system for clothing companies. A schematic representation is depicted in Figure 5.

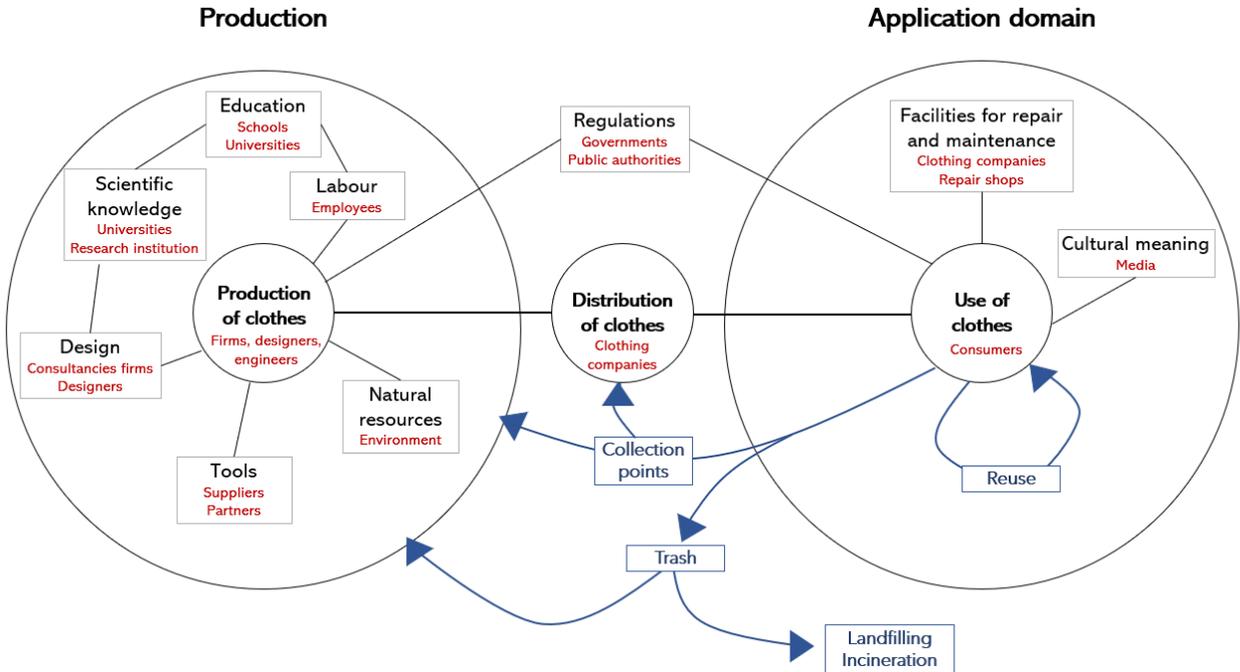


Figure 5. Elements of the socio-technical system of clothing products (in black) and their relevant stakeholders (in red). Circulatory elements are represented in blue (Based on Geels, 2004, pp. 900–901, with minor modifications).

In the left part of Figure 5, one can see the considered ST aspects of clothes production. It includes the use of natural resources, tools, design, scientific knowledge, education, and labor. The link between production and application domain is the distribution of clothes, in addition to the regulations in place for both entities. On the right side, the application domain is the use of clothes. This section also includes the facilities for repair and maintenance, as well as cultural meaning. All those elements are related to some actors and stakeholders of the system, which are outlined in red under each component.

Furthermore, to introduce circularity into the system, additional links has been pictured with the help of the blue arrows. The first possibility to implement circularity is simply to reuse the product (Stahel, 2010), which is a task that the consumers can accomplish by wearing their garments several times. If they do not want to reuse the products, the customers then have two choices: either bring back old garments to a collection point (in a clothing store, in collection bin, at a charity association, ...) or to discard the product. If recollected, the garments can either be re-sold as secondhand products through the channels of the clothing companies and charities or recycled into new products if it is in too bad condition. If discarded, the products are considered as trash and can end up in landfills or be incinerated. However, there is also the possibility to use that waste as a resource, as suggested by the SBM “Create value from waste” by Bocken *et al.* (2014), which was detailed in section 3.5. The products collected in too bad condition to be resold can also be considered as waste turned into a new resource. With that mindset, it is possible to implement a loop of resources into the system. The

schematic depiction also highlights the needs for collaboration between stakeholders if the aim is to implement circularity into the system (Pal *et al.*, 2019).

Nevertheless, some aspects need to be considered to optimize circularity in the system. One of them is the *Reuse* loop at the consumer level, which is necessary to slow down the consumption of the products. It is important, because even if the garments are made of recycled fibers, which implies that less resources have been used to produce it, it does not imply that the production and consumption have slowed down and that less resource are thus used (Bocken *et al.*, 2016). This aspect can be further discussed at the level of the design and quality. Indeed, if it is timeless and of high quality, consumers are more likely to reuse their clothes several times. This kind of products seems to be particularly represented in the clothing range of Filippa K and House of Dagmar, which are both high-fashion companies with a strong sustainability and quality focus. Pure waste also offers minimalistic and timeless garments, but no indication about the quality of the products was mentioned. The remaining two high-fashion companies, Acne Studios and Ganni, propose more colorful and “in” clothes, which are following the current fashion trends. Despite their high quality, they are thus more likely to get out of style quickly and to be disregarded by consumers. They can however still be considered as products that follow the “classic long-life model” (*Ibid.*), as they remain high-fashion and more luxurious clothes. Finally, Gina Tricot also follows the latest fashion trends and emphasize its quick renewal of collections, in addition to the quality of the garments which is inferior to the high-fashion brands.

Another aspect that is important for sustainable development transitions is to slow down resource loops (Bocken *et al.*, 2016). The slowing down of resource loops in this project is seen in capacity to repair. Three out of the six case companies, Acne Studio, Filippa K and Gina Tricot are already offering repair services to their customers, which promotes circularity. House of Dagmar is planning to implement them. Ganni does not mention specific efforts regarding repair capacity, but it is however quite fair to assume that the company would be very much inclined to help its customers if needed, as its price range is quite high. Pure Waste also does not mention any repair services, but the small size of the company may not allow them to implement such an initiative yet. There may also be the possibility to collaborate with external repair services, which has not been mentioned by the companies but that could potentially be part a future collaboration.

Furthermore, the schematic representation of the ST system for clothes allows to highlight the important role that the customers play into a circular system. They would usually be considered as the end-of-life stage of a product, but here they are the link to the new life that can be given to the garments, either through reuse or donation. Even if discarded by the consumers, the materials can still be recovered. But this process can be facilitated by the clothing companies through collection points, which is a good example of an adaptive effort through a mutually adaptive process between the companies and the consumers, which allows to integrate the innovation (the recycled fibers) in practice (Geels, 2004).

Finally, the various partnerships that the companies have started can be found on the production side, which encompasses among other suppliers, designers, researchers, and employees. They also play an important part in the loop of materials. It will be interesting to see in the future how the case companies will strengthen their relationships with their stakeholders to increase and improve their use of recycled materials, as they all aim to ameliorate their sustainability practices.

## 7 Discussion

*This chapter answers and discusses the four research questions formulated previously, respectively “What are the communicated drivers that supports the development of recycling fibers by fashion companies?”, “What are the communicated challenges for sustainability regarding fiber recycling?”, “What are the communicated future perspective of fashion companies regarding their use of recycled fibers?” and “Which communicated collaborations related to recycled fibers have fashion companies undertaken?”. To do so, the primary empirics are linked to the empirical background.*

### 7.1 Which drivers for using recycling fibers?

To answer the first research question “*What are the communicated drivers that supports the development of recycling fibers by fashion companies?*” it is necessary to consider communicated aspects touching to the bigger theme of sustainability in addition to facts about recycled fibers, as little additional empirical material could be collected about the latter. This limits the accuracy of the answer, but remains a relevant start as recycled fibers are suggested to be part of sustainability (Caniato *et al.*, 2012). Further research building up on this basis could bring some additional interesting insights.

Regarding the companies’ motivation to increase their global sustainability practices, some of the obtained results are quite similar with the drivers suggested by literature, despite being somewhat differently articulated. Indeed, the study of Todeschini *et al.* (2017) suggested that a trend motivating a shift toward a more sustainable fashion could be motivated by a higher consumer awareness about sustainability, which could cause a decrease in sales. This suggestion echoes to two of the drivers proposed in section 6.1.1, namely that the companies wish to continue doing their business and increase their profit. In addition, one could also argue that the companies wish to show the consumers that they take their responsibility, which was another suggested driver from this project, to avoid a decrease in sales.

On the other hand, opposite results have been found regarding some drivers suggested by the literature. Some studies suggested that a motivating factor regarding the use of recycled fibers included a lower cost of material (Sung, 2015) and that it was a way to reduce costs and increase profit (Bhatia *et al.* 2014). But only one company, Gina Tricot, mentioned recycled fibers as a way to increase their profit, while two others stated that it was more of a financial burden. Indeed, Filippa K stated that it had not always been economically beneficial for them to promote circularity and sustainability, and Ganni also stated that more investment was needed to pursue sustainability goals. It remains, however, unclear if that aspect has anything to do with the fact that Gina Tricot is a fast-fashion company, while the two others sell more luxurious products.

Nevertheless, this trend may change in the future and it may become profitable to use recycled fibers once the technologies have been more developed and more widely available. They remain an innovative technology (Jawahir and Bradley, 2016) part of a ST system, and adaption efforts need to be made by its users (Geels, 2004). It thus could be plausible that the costs of developing, manufacturing, and using recycled fibers will decrease over time and that it will become profitable in the future. This will also probably further motivate the shift of the fashion industry towards sustainability, as Todeschini *et al.* (2017) suggests that technological innovations such as innovative fibers can be considered as a driver for sustainability. Some technical and financial challenges need to be overcome first, which will be discussed further in the next section.

## 7.2 What challenges are to be faced?

The case companies acknowledge that many barriers need to be overcome in their quest for sustainability and increased use of recycled fibers. This allows to discuss well the research question “What are the communicated challenges for sustainability regarding fiber recycling?”.

In addition to the financial issues previously mentioned, a major struggle that several of the companies seem to face is the adaptation of their supply chain. Indeed, issues about the complexity of the supply chain and problem that fall behind the companies’ control are mentioned by Acne Studio, Filippa K and Ganni. Those are all high-fashion companies, which may suggest that they face more problems transforming their supply chain than fast-fashion firms. This would concur with the suggestion of Chesbrough (2010), who points to the importance that a firm business model can have in the achievability of implementing an innovation such as recycled fibers into the supply chain. In this case, the difference between high-fashion and fast-fashion companies may be explained by the fact that the latter can more easily introduce novel elements into their products. Fast-fashion companies are indeed used to produce new collections at a high pace (Fletcher, 2010) and are thus able to quickly react and implement innovations. This also goes in hand with the statement of Todeschini *et al.* (2017), who highlighted that introducing recycled fibers into the products implies a redesign of the production process and can thus be challenging. The high rhythm of production of fast-fashion companies may therefore be an asset regarding this aspect. This would also allow them to make profit out of their products more rapidly, which was a point that only Gina Tricot mentioned which thus reinforces this intuition.

However, being able to quickly implement recycled fibers should not be to the detriment of quality, which is an important aspect of circularity. Both the studies of Bocken *et al.* (2016) and Lee *et al.* (2001) reiterates the importance that the recyclability of the products themselves has. In addition, McDonough and Braungart (2002) also stated that the downcycling of materials only postpones the time at which the products will only be considered as waste and is thus not truly circular. It is however a very challenging problem to face that even the pioneer and innovative Pure Waste is still trying to resolve. Some solutions will have to be found in the future if one wish to truly reach a circular economy.

Finally, because recycled fibers are a relatively new field, it is difficult to source and apply it in products. This is a feasibility issue that Ganni has to face, as the company has formed a research and development team to try find and implement new recycled materials. Those struggles echoes with the study of Todeschini *et al.* (2017), which suggested that the lack of material choices and availability makes it difficult to develop new products with recycled fibers.

## 7.3 What could be expected in the future?

The theme of the future is something that fashion companies discuss extensively in their sustainability report and other documents. It thus allows to suitably discuss the research question “What are the communicated future perspective of fashion companies regarding their use of recycled fibers?”.

The study of Todeschini *et al.* (2017) suggested that the popularity of the circular economy concept was a trend motivating a shift toward a more sustainable fashion, as it promotes innovative design practices and collection system. It indeed seems to gain popularity, as several fashion companies promoting circularity were found and analyzed for this project. They all seem motivated and dedicated to improving their sustainability practices and minimize their environmental impact. Available technologies and implementation feasibility will also evolve, and even though it is difficult to predict how, it seems to have the potential to be beneficial and facilitate the use of recycled fibers. One could thus expect that the use of recycled materials, in addition to circularity initiatives, will

increase in the future as it is part of the intended strategy of all the companies. However, only time will allow to see what the realized strategy will be.

Indeed, we have seen that challenges remain. In addition to the difficulties encountered at the firms' level, additional studies suggest further obstacles that need to be overcome to improve the use of recycled fibers. Dahlbo *et al.* (2017) stresses the risk of creating a new market instead of compensating for new production, in addition to the insufficient research about chemicals used in the recycling process. Sandin and Peters (2018) make similar points, underlining that recycled fibers may not be that environmentally beneficial if the avoided production was not highly polluting and if the recycling processes are powered by fossil fuels. Finally, Bocken *et al.* (2016) highlights the fact that the efficiency of the recycling process to create fibers and the recyclability of the final products have to be taken into account. Only Pure waste stated that they were currently making efforts to improve this last aspect. That does not mean that the other companies are not concerned about the recyclability of their products, but they did not choose to communicate about it. Those are all aspects that need to be further investigated for each case companies, in order to assess the true impact that their use of recycled fibers have on the environment. More research taking a consumer perspective should also be done. If those elements are not considered, it is not possible to tell how beneficial recycled material will be in the future.

Furthermore, an additional element that needs to be considered is the social sustainability of the products, as a fashion product can be considered sustainable only if both the environmental and social aspects from the production processes are considered (Karaosman *et al.*, 2016). Bocken *et al.* (2016) also stress the necessity to take a holistic approach of the production processes of the products if the aim is to improve the circularity and sustainability. This will thus also play a role in the development of recycled materials in the future.

## 7.4 Which partnerships for recycled fibers?

As shown in section 6.3, the fashion system is complex and many actors are involved. The research question "Which communicated collaborations related to recycled fibers have fashion companies undertaken?" is thus an important one to ask.

Indeed, Ozdamar Ertekin and Atik (2015) suggest that one of the barriers to sustainability in the fashion sector is a lack of knowledge and trust from external stakeholders. Building strong partnerships and collaborate with relevant stakeholders thus seems important to improve sustainability strategies. In addition, the schematic representation of the ST system of recycled fibers also depicts the important role that the other stakeholders play in the circularity of the system. It is important to nurture and strengthen the links between them to facilitate the recycling process. It remains however challenging to fully control the whole supply chain process, as the case companies stated it.

Furthermore, the important role that the consumers play in the end-of-life stage of the product also seems to be acknowledged by the case companies. Several of them have indeed launched many initiatives aimed to increase their collaboration with their consumers, such as post-consumer collection, second-hand stores and renting services and repair services. This promotes a shared economy and collaborative consumption, which is an additional driver for sustainability that Todeschini *et al.* (2017) suggest.

It seems that the various partnerships that the companies have undertaken will play an important role in the future and in their success regarding their future perspective. It is however difficult to fully assess if additional collaborations exist but have not been mentioned. Also, the fashion system being so big and complex, it is difficult to acknowledge all stakeholder in a small project such as this one.

Further studies with a more specific focus about collaboration may bring additional interesting insights to the question.

## 7.5 Fast-fashion and high-fashion

Even though slowing down resource loops is not the main focus of this study, it remains an important aspect that should be discussed, as it complementary to the closing down of resource loops through recycled fibers (Bocken *et al.*, 2016). It thus remains relevant to discuss it, even though it does not aim to answer any specific research question.

The study of Shen (2014) suggested that increasing the sustainability of the fast-fashion supply may enters in conflict with the profitability of their products, as they sell their garments at a low price. The results of this project however enter in contradiction with this statement, as only the fast-fashion company, Gina Tricot, suggested that recycled fibers may be a way to increase their profit. In addition, several of the others high-fashion firms only stated some of their financial struggles regarding sustainability, as cited previously. One however cannot draw conclusion from the single case of Gina Tricot and more fast-fashion companies should be analyzed. It remains nonetheless an interesting result, which suggests that fast-fashion may be able to make profit even when pursuing a sustainability strategy.

On the other hand, Bocken *et al.* (2016) suggested that luxury fashion companies had good sustainability potential by simultaneously slowing and closing the resource loop of their products. Slowing down the loop is indeed here present for the high-fashion case companies, as they state that their garments are of high quality, in addition to timeless designs for Filippa K and House of Dagmar. However, they appear to struggle more with closing the loop as they are all facing different challenges in their use of recycled fibers. They nonetheless all seem to make efforts to truly achieve their future goals and it will be interesting to see their future results.

The only company that seems to thrive the best regarding the use of recycled fibers is Pure Waste, which struggle to meet the demand for their garments. This company incorporated characteristics both from the fast-fashion (low prices) and from the high-fashion sector (timeless design and slow renewal of collections). An additional high-fashion aspect that could be considered for this company is simply their use of recycled materials, as Holmsten-Carrizo and Mark-Herbert (2014) suggested that it can add a luxurious character to a brand identity. The company however had their fair share of struggles in the past, as they failed with their first company Costo in 2009. Nevertheless, the company seems prosperous today and they seem to be achieving more regarding recycled fibers than the more classical high-fashion and fast-fashion case companies. This success may partially be explained by the fact that it is difficult to change a company business model once it is established (Teece, 2010) and Pure Waste may thus have an innate advantage simply because it is a new small firm with an innovative business model (Chesbrough, 2010).

## 8 Conclusions

*This final chapter summarizes the contributions of this project. It also suggests themes for future research that would allow to gain more insights about how circular economy and fashion relate to each other.*

### 8.1 Circular economy for a more sustainable future

The aim of this project was to identify how the business models of fashion companies relates to the concept of circular economy, and what future perspectives could be expected. The contributions of this study thus relate to the implementation of circular economy elements from a corporate perspective in the fashion sector. The four research questions were answered through a discussion of the drivers, challenges, partnerships, and future perspectives that the case companies described in their public sustainability reports. The main findings are that fashion companies state that they are motivated to increase their sustainability, and among other their use recycled fibers, both because of their sense of leader and responsibility, as well by their wish to continue doing their business. It seems like a good balance, as it is not only based on financial incentives. Furthermore, their future goals, collaboration and additional circular initiatives depicts a forward-looking attitude hopeful about the potential of sustainability and recycled fibers. Their use of recycled fibers, despite being sometime in its infancy and slowed down by various barriers, is aimed to increase in the future. It is also possible to run a business based on sustainability, as the example of Pure Waste has showed.

The empirical results thus contribute to a better understanding of the current sustainability strategies of fashion companies and how they make use of recycled fibers to improve their business. The study also gives insights about what is needed in the fashion industry to further implement and develop the use of recycled fibers. In addition, the results give a great insight into the corporate world of high fashion, a subject that has not been studied extensively.

Finally, it is still important to remember that recycled fibers could also be a potential marketing argument aimed at customers who are worried about sustainability, and one should stay critical of the companies' attitude towards a continuous consumption of products. Their efforts nonetheless remain a step in the right direction, and no evidence of green washing was found in the scope of this project. The main question remaining now is to see if those efforts are sufficient, or if time is running out more quickly. But only the future will tell us that.

### 8.2 Future research

As the empirical data for this project was only sourced from publicly available documents, more in-depth data could be collected through interviews and thus have the companies' direct opinion about the subject of recycled fibers and sustainability. It would also be interesting to analyze the social sustainability efforts of the fashion companies, which was not part of this project. Indeed, sustainability encompasses social, financial, and environmental aspects and it would allow to have a more comprehensive overview of the situation. How the products are marketed to the consumers is also an aspect that could be taken into account, as promoting overconsumption counterbalances the potential benefits. A follow-up study about the completion of the case companies' goals would also give interesting insights about what could be achievable in the future. Finally, it could also be beneficial to collect more empirical data about fast-fashion companies to give more weight to the analysis and discussion, as only one fast-fashion company was considered in this project.

On another side, more research about the consumers and their own buying habits regarding recycled fibers could allow a better understanding of the impact that garments made of recycled materials have on the environment. It may also be interesting to see if those habits depend on the consumer generation, as younger generations may be more sensitive to sustainability arguments. Policy aspects

and how they may influence corporate actions, and willingness to collaborate are also elements that should be further considered, as well as changes in legislation and their enforcements. Indeed, those aspects can strongly influence the motivation and use of recycled fibers by companies.

## **Acknowledgments**

I would like to thank all the people that have supported me during the course of this project and who believe in my study. I am especially grateful for the great support of my supervisor Cecilia Mark-Herbert, whose feedbacks, inputs, and encouragement made this adventure much easier. I would also like to thank my reviewer Thomas Zobel for his pertinent comments and inputs. A special thanks to my opponent Filip Fors as well, who gave me valuable comments about my manuscript. I am also grateful for the help and support from my fellow students, who were always supportive and encouraging. It was a pleasure to share this journey with you all.

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