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TRANSITIONING TO A CIRCULAR BUSINESS MODEL IN SUSTAINABLE FASHION COMPANIES

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Dissertação de Mestrado apresentada ao Programa de Pós-graduação em Administração da Escola de Administração da Universidade Federal do Rio Grande do Sul, como requisito parcial à obtenção do grau de Mestre em Administração.

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LIST OF ABBREVIATIONS

BM	business model
BMI	business model innovation
CBM	circular business model
CE	circular economy
EC	European Commission
ECAP	European Clothing Action Plan
EMF	Ellen MacArthur Foundation
IE	Industrial Ecology
PSS	product-service system

ABSTRACT

The circular economy is a topic of growing interest as it presents an alternative to the current linear model of “take-make-disposal” and is needed to connect the environment and the economic systems. Not only new technologies and collaboration among the supply chain are crucial to achieve the circular economy, but new business models are required to expand the potential and application of circular principles. The fashion industry has an important role in our lives and is responsible for a huge environmental and social impact, what makes it especially interesting for the transition to a circular business model. The objective of this research is to analyze how the adoption of circularity by “born sustainable” fashion companies affect their business model. By identifying and adapting a circular business model framework from the literature to the fashion industry, the aim is to understand how companies from Brazil and Italy implement circular principles in their business models. This study is separated into two papers. The first had the objective of adapting a circular business model framework for fashion apparel manufactures, and experts were interviewed to validate the proposal. The second paper sought to analyze the application of the circular business model framework by four sustainable fashion companies of the aforementioned countries by conducting case studies. Results show that the small sustainable fashion businesses share the concern about the social welfare of the involved in the supply chain and offer garments aiming quality and durability. However, they present different design strategies and differ with respect to the materials used. Besides the design, is part of the implementation of circularity the offer of services such as repair, in which while the ownership is still transferred, increases the interaction with customers. Take-back systems, referring to the collection and management of used garments, are important buy still not widely implemented or utilized, indicating some barriers. Design challenges and high costs due to resources and manual and fairly paid production processes are other common challenges.

Key words: Circular economy, circular business model, business model framework, transition, fashion.

RESUMO

A economia circular é um tópico de crescente interesse, visto que apresenta uma alternativa ao atual modelo linear de “extrair-produzir-descartar” e é necessária para conectar o meio ambiente e os sistemas econômicos. Não apenas novas tecnologias e colaboração entre a cadeia de suprimentos são cruciais para alcançar uma economia circular, mas novos modelos de negócios são necessários para expandir o potencial e a implementação dos princípios circulares. A indústria da moda tem um papel importante em nossas vidas e é responsável por um enorme impacto ambiental e social, o que a torna especialmente interessante na transição para um modelo de negócios circular. O objetivo desta pesquisa é analisar como a adoção da circularidade por empresas de moda “nascidas sustentáveis” afeta o modelo de negócios. Ao identificar e adaptar um framework de modelo de negócios circular da literatura para a indústria da moda, o objetivo é entender como empresas do Brasil e da Itália implementam princípios circulares em seus modelos de negócios. Este estudo está dividido em dois artigos. O primeiro teve o objetivo de adaptar um framework de modelo de negócios circular para fabricantes de moda, e a proposta foi validada através de entrevistas com especialistas. O segundo artigo procurou analisar a implementação do framework de modelo de negócios circular por quatro empresas de moda sustentável dos países mencionados, através da realização de estudos de caso. Os resultados mostram que pequenas empresas de moda sustentável compartilham a preocupação com o bem-estar social dos participantes da cadeia de suprimentos e oferecem peças e acessórios visando qualidade e durabilidade. No entanto, elas apresentam diferentes estratégias de design e diferem em relação aos materiais utilizados. Além do design, faz parte da implementação da circularidade a oferta de serviços como reparos, onde mesmo com a transferência da propriedade, aumenta a interação da empresa com os clientes. Os sistemas de devolução, referentes à coleta e gerenciamento de roupas e acessórios usados, são importantes embora ainda não amplamente implementados ou utilizados, o que indica algumas barreiras. Desafios de design e altos custos devido a matérias primas, processos de produção manuais e pagamento justo da mão de obra são outros desafios comuns.

Palavras-chave: Economia circular, modelo de negócios circular, framework de modelo de negócios, transição, moda.

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1. INTRODUCTION

The circular economy (CE) can be seen as a solution to our business-as-usual economic system that has a high environmental impact (GHISELLINI; CIALANI; ULGIATI, 2016). The current linear model known as "take-make-disposal" is leading to scarcity of resources and becoming unsustainable, and a new economic system should be restorative and improve resources' productivity (EMF, 2013). The growing interest in this topic is visible from the increasing number of academic publications (GEISSDOERFER et al., 2017; MERLI; PREZIOSI; ACAMPORA, 2018) and actions from private organizations and governments, such as the European Commission (EC, 2015). Despite the increasing research, the definition, boundaries, and associated practices still need to be consolidated by the literature (MERLI; PREZIOSI; ACAMPORA, 2018).

The circular economy can be defined as a system "that is 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" (EMF, 2015, p. 5). This means that not only it avoids to impact the environment, but it also works towards to restore it, and that after resources are used as long as possible as products and components, they go back to the system by either being recycled or rejoining the biological cycle. In addition, there is a shift towards the use of renewable energy, the elimination of toxic chemicals, and the elimination of waste through the superior design of materials, products and systems (EMF, 2013). Another definition from the literature describes the circular economy as a "regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling" (GEISSDOERFER et al., 2017, p. 759). This delimitation brings the concepts of narrowing, slowing, and closing the loops, that are known due to the research of Bocken, de Pauw, Bakker, and van der Grinten (2016) on product design and business model strategies for the circular economy and refer to the efficient use of resources, prolonging the use of products, and retrieving back to the system, respectively.

The origins of the CE are rooted in the field of Industrial Ecology and other schools of thought that emerged in the 1970s (EMF, 2015), what can be the reason that until today there is some disorientation surrounding the concept. For instance, the term closed loop is often in parallel with the circular economy (BOCKEN et al., 2016). According to Geisendorf and

Pietrulla (2018a), CE can be confused with the concepts of Cradle-to-Cradle, Blue Economy, regenerative design, closed-loop supply chains, natural capitalism, industrial ecology, performance economy, biomimicry, and reverse logistics. Despite being highly interconnected, they present different focus and characteristics, and can sometimes overlap. Another common misinterpretation regards to the concept of sustainability, as it also seems to overlap with CE and their differences are not explicit in the literature. In fact, the relation between circular economy and sustainability appears to have different possibilities, such as conditional, beneficial, or trade-off relation (GEISSDOERFER et al., 2017). In general, it is possible to say that usually the circular economy plays a part, but is not the only one, in a sustainable system. One of the differences is that the social dimension, which concerns the well-being of the involved, has been limitedly covered by most authors in the CE literature (GEISSDOERFER et al., 2017; MERLI; PREZIOSI; ACAMPORA, 2018).

Among the different sectors that could implement circular economy principles for increasing the levels of sustainability, the fashion industry gains attention as it is constantly regarded for its massive environmental footprint in multiple aspects. The consumption of natural resources and the extensive use of water, energy and chemicals during the production process is one part of the problem, but not all. In the post-consumption, most materials end up in the landfill or incinerated (EMF, 2017). Clothes are designed to last a short period of time, consumers are buying more and using things for less time, as clothing use has declined by almost 40% in the last fifteen years (EMF, 2017). In addition, textile recycling rates are extremely low with only 1% of materials being recycled into new clothing (EMF, 2017). The low prices pushed by the fast fashion model, in which garments are quickly updated and replaced in the stores, not only encourage greater consumption, but also put pressure on the supply chain that is usually poorly paid (C&A, 2019). Despite the threat to the environment of continuing in its current rhythm and model, the global fashion industry should grow around 4% in 2019 (MCKINSEY GLOBAL, 2019).

As awareness about these issues grows, more companies are willing to propose a different scenario and offer garments that harm less the environment neither the labor force. This is particularly the case of “born sustainable” companies, which are business that have been created with sustainability in its core (TODESCHINI et al., 2017). As big international brands and small local firms function differently and their relation with sustainability is diverse in what regards the implementation of practices (CANIATO et al., 2012), this research focus on the latter profile as the they would be more likely to move towards a circular model due to their

sustainable values. In fashion, the circular economy appears as an extension of sustainable fashion, as not only companies aim to reduce their environmental footprint, but they can restore natural systems (C&A, 2019). The key principles to circular fashion according to the Ellen MacArthur Foundation are to use safe and renewable inputs, to develop new business models focus on increasing clothing utilization, and to find solutions to turn used clothes into new.

Even for sustainable brands, the adoption of circular principles will require changes and adjustments in the company's business model. Moreover, different challenges and barriers can hinder the adoption and slow down the transition to a circular model. That said, this research seeks to understand *what is the impact of the circular economy in the business model of born sustainable fashion companies?* This study aims to analyze the implementation of the circular economy in two different countries in order to identify similarities and differences. Brazil and Italy were chosen for having the complete fashion supply chain in the own country, what is not common especially for European countries that have the production outsourced in foreign countries.

1.1. OBJECTIVES

Therefore, in light of the aforementioned research problem, the main objective of this study is to analyze how the adoption of circularity by "born sustainable" fashion companies affect their business model.

The following specific objectives have been achieved to support the general objective of this research:

a. To identify in the literature propositions of frameworks for the transition to a circular business model
b. To adapt a circular business model framework for the reality of fashion apparel manufactures
c. To identify how selected companies from Brazil and Italy implement circular principles in their business models
d. To analyze what are the main challenges and barriers for the implementation of a circular business model

1.2. JUSTIFICATION

This research is relevant as it aims to address a topic that has gained attention, but is still little explored by the literature, as there is a limited number of studies related to circular business models in the fashion industry. More specifically, not many guides to a transition from a linear to a circular model are available by scholars (URBINATI; CHIARONI; CHIESA, 2017). Among different industries that have been implementing circular economy principles, fashion exhibits particular challenges but also big opportunities related to circularity, such as the increase in fiber recycling and the development of new sustainable materials. It is an important sector of the global economy and a fundamental part of our everyday life, that currently operates in a linear model resulting in a huge environmental and social negative impact (EMF, 2017). Despite the potential and the need for new disruptive business models based on access instead of ownership, such as renting, leasing and subscription, business models based on sale are traditionally the most common in the fashion industry and can still have the circular economy implemented. In addition, the research focus on the perspective of born sustainable companies, which is an area still little explored (DEMIREL et al., 2019) but that have a great likelihood to implement circular principles as they were already created with sustainability as a purpose.

The theoretical contribution of this study is to provide some light regarding circular business model innovation in the fashion industry. As the boundaries of the circular business model concept are still broad (NUSSHOLZ, 2018), to suggest the main characteristics of a circular model within the fashion industry can serve as a base to further development of this topic. In addition, the challenges faced by sustainable companies to implement a circular model were also presented. The research has also practical contributions. The adapted framework and the findings of the case studies can help businesses and practitioners to move in the direction of a circular model. The transition to the circular economy is not made in one step nor is a “one size fits all” solution. Thus, the business model perspective can support a gradual change by showing the elements that can be improved or implemented in each of the business model components.

1.3. THEORETICAL FOUNDATION

The theoretical foundation of this research is based on the context of circular business models and business model innovation. Sustainable business model within the fashion industry were also studied, as well as the challenges and barriers for circular business model (CBM) implementation. Types, patterns and strategies of circular business models are frequently described in the literature. The product design and business model strategies of narrow, slow and close the loop developed by Bocken, de Pauw, Bakker, & van der Grinten (2016) are often referred by other authors. To close the loop focus on the reuse of materials through recycling, which can be achieved by industrial symbiosis. Strategies to slow the loop refer to prolong the use and reuse of goods by designing long life products and extending products' lifetime through different activities, such as remanufacturing. Companies can narrow the loop by reducing resource usage, however it is not a strategy for the circular economy if it is done to reduce costs and not to cycle products and materials. Other classifications are similar in following the circular flows proposed by the Ellen MacArthur Foundation (2013) that include the reuse, remanufacture and recycling (LÜDEKE-FREUND; GOLD; BOCKEN, 2018; PLANING, 2015). Planing (2015) also highlights the shift from ownership to other models of temporary usage, such as access, performance, and result-base models.

Circular business models frameworks have been proposed in the literature in order to support businesses to transition to a circular model. The framework further chosen in this research to be adapted to the fashion industry was developed by Lewandowski (2016) and identified how circular principles could be applied to the Business Model Canvas framework (OSTERWALDER, A.; PIGNEUR, 2010). Two additional components were incorporated to the framework, the take-back system and adoption factors. Other frameworks focus on the multiple cycles of lifecycle management (NUSSHOLZ, 2018) and the 3-R principles reduce, reuse and recycle (RANTA; AARIKKA-STENROOS; MÄKINEN, 2018). The role of systemic innovations is also considered in the framework of Antikainen & Valkokari (2018), where elements from macro, meso and micro levels were incorporated.

As this study aimed to understand how circular business models can be applied to the fashion industry, the focus on business model innovation is crucial to the successful implementation of circular principles. Sustainable business model innovation have been the focus of research and it is required to take place in the four elements of business models: value proposition, supply chain, customer interface and financial models (BOONS; LÜDEKE-

FREUND, 2013). This means an environmental and/or social value proposition, a supply chain engaged in sustainable supply chain management, the encouragement of responsible consumption and the proper distribution of economic costs and benefits. In the circular economy, business model innovation refers to the value flows that are co-created by the multiple actors of the value chain (AMINOFF et al., 2014).

Specifically within the fashion industry, Pedersen, Gwozdz and Hvass (2016) state that high levels of business model innovation and proactivity towards corporate sustainability are correlated, and that these are, in turn, related to the organizational values and present a positive association to the company's financial performance. There are different ways fashion companies incorporate sustainability elements in their value proposition, from the use of sustainable materials, to the offer of repair and take-back systems (STÅL; JANSSON, 2017). However, sometimes take-back systems are implemented but companies do not attempt to create and capture value from the collected garments, especially in the case of fast fashion brands that outsource this activity (STÅL; CORVELLEC, 2018). According to Todeschini, Cortimiglia, Callegaro-de-Menezes and Ghezi (2017), born sustainable fashion companies usually combine different approaches, resources and competencies to create an unique value proposition and a new business model.

By analyzing the implementation of the circular business model framework by fashion companies, this study also aimed to understand what were the main challenges and barriers faced in the transition. Financial and economic challenges are widely discussed (LINDER; WILLIANDER, 2017; OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016; TURA et al., 2019), since higher costs, lack of capital and high up-front investment costs can hinder the adoption of circular models. There are fashion vulnerability and cannibalization risks (LINDER; WILLIANDER, 2017; MONT; DALHAMMAR; JACOBSSON, 2006), and challenges associated to slow fashion (PAL; GANDER, 2018) and customer awareness and expectations (TODESCHINI et al., 2017; TURA et al., 2019). In addition, there are challenges related to partners and the supply chain (LINDER; WILLIANDER, 2017; OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016; TODESCHINI et al., 2017), and also internal and external factors, such as cultural barriers (OGHAZI; MOSTAGHEL, 2018) and lack of government support and regulations (LINDER; WILLIANDER, 2017; OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016; TURA et al., 2019).

1.4. METHOD

Even though the topic of circular economy and circular business models has gained increasing interest in recent years (GEISSDOERFER et al., 2017), there are still a limited number of studies within the fashion industry that do not focus on a specific business model type. Therefore, a qualitative approach was chosen for this research as the variables needed further clarification (CRESWELL, 2013). The research strategy defined to achieve the goal was an exploratory research (MALHOTRA; D.; BIRKS, 2002), which consisted of different research methods that were divided into two phases.

The two phases started with a literature review on the topic, which connects the study with the broad picture of what is being said and studied about the subject (CRESWELL, 2013). Firstly, a search was made on the topics of circular economy, circular business models and sustainable business models in the fashion industry. The second step focused on sustainable and circular business model innovation and the challenges and barriers of CBM implementation. Three databases were searched in order to collect the greater number of publications (Scopus, Ebsco and Capes), and only studies that focused on the design or implementation or circular business models were included. Because this research aimed to develop a general business model, studies that focused on a specific business model type (such as access-based) were not included, as well as specific industries or sub topics (i.e. policies or consumer behavior). Other studies were identified through cross reference, and grey literature was also considered due to the novelty of the topic.

The literature review of the first phase also consisted of identifying a circular business model framework that could be adapted to the fashion industry. The chosen framework is based on the Business Model Canvas (OSTERWALDER, A.; PIGNEUR, 2010) and has incorporated the circular economy principles, complementing with two additional components (LEWANDOWSKI, 2016). First, the framework was reviewed considering the characteristics and principles of the circular economy within the fashion industry, introduced by institutions and research organizations such as Ellen MacArthur Foundation and the European Clothing Action Plan (EMF, 2017; ECAP, 2019). Next, four interviews with experts were carried out to validate the framework and raise more inputs about the circular fashion business model.

Table 1. Interviewed specialists.

Interviewees	Country	Area of expertise	Occupation
Specialist A	Brazil	Fashion	PhD in Design, professor of Design and Visual Arts, coordinator of the Sustainable Fashion Center from the Federal University of Rio Grande do Sul (NMS - UFRGS), founder of a sustainable fashion brand
Specialist B	Brazil	Fashion	PhD in Design, professor of Strategic Design, Fashion and Communication, member of a research group in Strategic Design for Cultural and Social Innovation
Specialist C	Brazil / Europe	Fashion	Master in Sustainability in Fashion, founder of a consultancy in circular fashion based in Germany
Specialist D	Brazil	Business model and innovation	PhD in Management Engineering, professor of Production Engineering, coordinator of a research group in Technology and Innovation

Source: created by the author

In the second phase, four case studies were carried out with born sustainable fashion companies in order to analyze the implementation of the framework previously developed. The execution of case studies would confirm if and how fashion businesses were implementing the elements of the circular business model. This methodology is appropriate when little is known about a topic (EISENHARDT, 1989) and multiple case studies, even if they can reduce the depth of study, can provide augmented external validity (VOSS; TSIKRIKTSIS; FROHLICH, 2002). Two companies were selected from each country, Brazil and Italy. They were small size fashion apparel manufacturers that had a sustainable purpose from its creation and should have implemented at least one circular economy principle. The case study protocol (YIN, 1994) was developed based on the circular business model framework and the data was collected from multiple sources. Both the interviews with the experts and the case study interviews were analyzed through the same methodology of content analysis and with the support of the software NVivo 12 Pro.

Table 2. Case study companies and interviewees.

Company	Country	Product description	Interviewees
Company A	Brazil	Accessories made from waste materials	Founder and designer
Company B	Brazil	Garments made with natural and organic fibers	Founder and designer
Company C	Italy	Garments made with sustainable materials and zero waste	Founder and designer
Company D	Italy	Garments made with recycled fibers of cashmere and denim	Founder and business manager

Source: created by the author

1.5. STRUCTURE OF THE RESEARCH

This study is structured in four parts. The first part corresponds to the introduction of the research, presenting the context and topic, research objectives, justification and method. The second part is the first paper, focused in the development of circular business model framework for the fashion industry, followed by the second paper, which aimed to implement the framework with four case studies. Finally, the fourth part presents the conclusions of the research.

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2. PAPER 01: A CIRCULAR BUSINESS MODEL FRAMEWORK FOR SUSTAINABLE FASHION COMPANIES

Abstract: In the circular economy, the value of products and resources is maintained in the economy for as long as possible, system effectiveness is fostered and waste is avoided. The fashion industry puts a huge pressure in the environment due to its intensive resource consumption, water, energy and chemicals used in the production, and generates large amounts of waste in the pre and post-production phases. Therefore, a transition to new circular business models is needed, and born sustainable companies, which were already created with a sustainable purpose, have potential for this change. In order to understand how born sustainable fashion companies can adapt their business model to transition to a circular economy, this paper aims to adapt a circular business model framework for fashion apparel manufacturers. After a review of the literature surrounding circular business models and sustainable business models within the fashion industry, an existing framework was selected and adapted with the circular principles for fashion businesses. The original framework is based on the Business Model Canvas and has two additional components related to the circular economy, the adoption factors and the take-back system. Interviews with three specialists in the fashion industry and one specialist in business model innovation were carried out to validate the proposed framework. The findings suggest that the new offerings and multiple cycles associated to circular business models, the focus of fashion companies remain the first sale product. Using renewable or recovered resources is key, however the collection of garments is still a challenge, as take-back systems can imply in high costs and new resources for small and medium companies. Fashion brands can offer a wide variety of services in order to extend the garment's lifetime, from repair to customization and alterations. In fact, the network of partners is crucial as they can provide some of these services, as well as other activities to cycle products and materials, such as reselling, that companies can not perform on their own. The validation of this framework should be conducted in future research.

Key words: circular economy, circular business model, business model framework, fashion.

2.1. INTRODUCTION

In the last years, the circular economy has become a growing topic and it is increasingly becoming of interest by both scholars and businesses. In the academic area, although still small when compared to sustainability, the number of publications has reached a tenfold growth in the last 10 years (GEISSDOERFER et al., 2017), and many authors have investigated the literature and concepts around the circular economy (GEISSDOERFER et al., 2017; MERLI; PREZIOSI; ACAMPORA, 2018). Even though there is a broad spectrum of principles and proposals surrounding the definition of circular economy in the last decade (MERLI; PREZIOSI; ACAMPORA, 2018), it is clear that it aims to replace our traditional linear consumption model of "take-make-disposal" (EMF, 2013), sharing the idea of closed loops (GEISSDOERFER et al., 2017). More specifically, the circular economy promotes a shift towards the use of renewable energy and the elimination of toxic chemicals, and targets the elimination of waste through the superior design of materials, products and systems (EMF, 2013).

The fashion business is an industry that has many opportunities for implementing the circular economy. Known for having a huge social and environmental impact, the fashion industry also reveals an increasing number of innovations that aim to minimize this damage, for instance with the development of new sustainable materials. Currently, most part of the textiles system still operates in a linear way, using large amounts of non-renewable resources to produce garments that will be used for a short time, and that will probably end in landfills or incinerated (EMF, 2017). However, sustainable initiatives such as the Pulse of the Fashion Industry report (Global Fashion Agenda, 2018), that measures and tracks the sustainability of the global fashion industry, are gaining strength in promoting the usage of sustainable materials and closing the loop practices.

Nevertheless, the transition to a more sustainable system in this industry still faces a long and challenging path. According to the New Textiles Economy report (EMF, 2017), recycling is a big challenge, as today less than 1% of material used to produce clothing is recycled into new clothing. Not only there is a lack of technologies to sort fibers and improve recycling, but the end-of-use stage is the weakest step of the value chain (Global Fashion Agenda, 2018). Evidently, the goal of achieving a circular model requires a higher degree of cooperation among the supply chain and with customers. Furthermore, new technologies and business models are needed as the existing solutions and models will not be enough to support

the changes needed (Global Fashion Agenda, 2018). There are different sales and services models that can satisfy customer's needs at the same time that increases clothing utilization rates (EMF, 2017), making business model innovation crucial for the transformation of the current system.

The focus of this study is on "born sustainable" companies, which are business already created with sustainable purpose (TODESCHINI et al., 2017). Also called "born green" or "green start-ups", it is an emerging field of research, but that still lacks solid definitions (DEMIREL et al., 2019). A study by Caniato, Caridi, Crippa, and Moretto (2012) showed that established international brands and small and local firms present different drivers and practices regarding the adoption and implementation of environmental sustainability, what support that these two groups are studied separately. In addition, small sustainable brands can likely have greater willingness to make a transition to the circular economy.

Considering all the changes required to move towards a new model, we seek to clarify *how can "born sustainable" fashion companies adapt their business model to transition to a circular economy?* In order to answer this research question, this paper aims to adapt a circular business model framework for the fashion apparel manufacturers to support their transition to a circular economy. This objective is relevant as there is still a limited number of research in what regards the circular economy and business models (NUSSHOLZ, 2018; URBINATI; CHIARONI; CHIESA, 2017). There is a lack of studies of circular business models within fashion, an industry that has a fundamental role in our everyday life, and that at the same time puts an enormous pressure on the environment. In addition, this research has also a practical contribution, as it can provide valuable information for business that are willing to become circular.

2.2. THE CIRCULAR ECONOMY AND CIRCULAR BUSINESS MODELS

Despite the growing interest being recent, the idea of a circular economy has first emerged in 1966 in a work by Boulding, which presented the concept of circular material flows (GEISENDORF; PIETRULLA, 2018b; GEISSDOERFER et al., 2017). Yet, several authors acknowledge to Pearce and Turner (1989) its introduction (GEISSDOERFER et al., 2017; MERLI; PREZIOSI; ACAMPORA, 2018), once they stated that the traditional linear economy was not sustainable and should be replaced by a circular system (GEISENDORF; PIETRULLA,

2018b). The concept of the circular economy has a theoretical foundation in the field of Industrial Ecology (IE) in the early 1990s (BOCKEN, 2016 AYRES, 1994) and different schools of thought that emerged in the 1970s can be related to the topic (EMF, 2015). Along with the IE field, the circular economy shares characteristics with these different areas of study, such as performance economy, Cradle-to-Cradle™, biomimicry, and the blue economy (EMF, 2015).

The Ellen MacArthur Foundation (2015, p. 5), widely known for its work in supporting and disseminating the concept of circular economy, defines it as "one that is 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". Another widespread definition is the one from the European Commission (2015, p. 2), that states that in a circular economy "the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimized". Although these definitions do not oppose each other, according to Geisendorf and Pietrulla (2018b) they are not clear about the condition of waste, that is, whether it should be minimized or completely avoided. The literature also defines circular economy as a "regenerative system in which resource input and waste, emission, and energy leakage are minimized by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling" (GEISSDOERFER et al., 2017). However, there is still not an agreement regarding the boundaries of the circular economy. The terminology has not been converging and often is used in parallel with the term closed loop (BOCKEN et al., 2016). The concept of CE can be confused with other similar concepts, such as reverse logistics, and the schools of thought previously mentioned. Even though they are highly connected and overlap many times, however, each one has unique focuses and characteristics (GEISENDORF; PIETRULLA, 2018b).

As stated by the Ellen MacArthur Foundation (2015), the circular economy rests on three principles. The first refers to control finite stocks and balance renewable resource flows in order to regenerate natural systems. It includes dematerialization when possible, a wise selection of resources, technologies and processes, and encouraging flows of nutrients within the system. The second principle is to keep products and materials in use. Here, there are five loops of the technical cycle allow the circularity of materials and resources. They start with the inner loops, where users can *share* products with each other, and they can count on the manufacturer or a service provider to *maintain* or *prolong* the products. Then, product can also

be *reused* or *redistributed* by manufacturers, as well as *refurbished* or *remanufactured*, to be sold as new products. As a last alternative, products can be *recycled*. In the biological cycle, the materials can be cascaded through other applications, until they become valuable feedstock for a new cycle. Finally, the third principle is to design out waste and pollution, fostering system effectiveness. The aim is to minimize systematic leakage and negative externalities. The foundation has also identified and developed a set of six actions that can be taken by companies to achieve a circular economy, known as the ReSOLVE framework: regenerate, share, optimize, loop, virtualize, and exchange. They all, in different ways, translate the objectives of the aforementioned principles.

New business models is arguably one of the four building blocks for the transition to the circular economy, together with materials and product design, global reverse networks and enabling conditions (PLANING, 2015). A business model can be defined as the core logic of how a company creates, delivers, and captures value (Osterwalder and Pigneur, 2010). It is a conceptual model that reflects what customers want, how they want it, and how the company can satisfy this need as well as the architecture of revenues, costs, and profits. (TEECE, 2010). A circular business model, therefore, can be described as "how a company creates, captures, and delivers value with the value creation logic designed to improve resource efficiency through contributing to extending useful life or products and parts and closing material loops" (NUSSHOLZ, 2017). In circular business models, the creation of commercial value is reconciled with the adoption of resource efficiency strategies, such as repair and remanufacturing (NUSSHOLZ, 2017), that is, it is based on utilizing economic value retained in products after use in the production of new offerings (LINDER; WILLIANDER, 2017).

The same divergence about the boundaries of the CE exists when it comes to circular business models. According to Nußholz (2017), "there is not yet a coherent view about which resource efficiency strategies and changes in material flows classify a business model as "circular"". In addition, most studies focus on actions to close resource loops (MERLI; PREZIOSI; ACAMPORA, 2018), with the majority of practices being of recycling (MERLI; PREZIOSI; ACAMPORA, 2018; RANTA; AARIKKA-STENROOS; MÄKINEN, 2018). Other slowing practices such as remanufacturing are much less widespread (LINDER; WILLIANDER, 2017; LÜDEKE-FREUND; GOLD; BOCKEN, 2018). This means that there is more attention to how to manage waste and to extend resource values, while innovative approaches to offer products and services are not being much explored (MERLI; PREZIOSI; ACAMPORA, 2018).

Furthermore, due to rebound effects, circular strategies do not necessarily lead to increased resource efficiency (NUSSHOLZ, 2017), which implies that circular business models may not be the most environmentally sustainable alternative. On the other hand, some authors emphasize the focus on the environmental performance improvements given by circular systems, rather than considering all three dimensions of sustainability (GEISSDOERFER et al., 2017). The circular economy is often integrated with an economic evaluation (MERLI; PREZIOSI; ACAMPORA, 2018), as it has to provide economic growth along with sustainability in order to truly emerge as the new growth model (RANTA; AARIKKA-STENROOS; MÄKINEN, 2018), otherwise it won't be able to compete with the traditional linear model. Apart from the potential generation of jobs (EC, 2015; EMF, 2013), the social impact is little considered in scholarly research (MERLI; PREZIOSI; ACAMPORA, 2018), resulting in a narrow coverage of social well-being (GEISSDOERFER et al., 2017). As elucidated by Geissdoerfer et al. (2017), the similarities and differences between circular economy and sustainability have not been clear in the literature, but they can actually have different relationship types. The CE is considered either a condition for sustainability, a beneficial relation, or trade-off. In this paper, we consider that the achievement of sustainability should be the first priority instead of just closing the loop. In fact, the importance of seeing environmental value as an absolute value has also been a topic of research (MANNINEN et al., 2018).

There is a considerable amount of studies aiming to analyze business model types and strategies to propose a categorization by 'circular purpose' and characteristics (BOCKEN et al., 2016; LÜDEKE-FREUND; GOLD; BOCKEN, 2018; PLANING, 2015). Bocken et al. (2016), based on the work of Stahel (1994, 2010), McDonough and Braungart (2002), and Braungart et al. (2008), has proposed one of the most used models by identifying strategies to *close*, *slow*, and *narrow* the loop. However, the latter is not a particular strategy for the circular economy as companies aim at reducing resource usage to reduce costs and not to cycle products and materials. Strategies to slow the loop aim at prolonging the use and reuse of goods, through the design of long life goods and product life extension, such as remanufacturing. To close the loop indicates the reuse of materials through recycling, which can be done for instance by industrial symbiosis. Planing (2015) has developed two CBM categorizations, one of which is aligned with the aforementioned circular flows (EMF, 2013), and the second is from the customer perspective, while Lüdeke-Freund et al. (2018) have identified six CBM patterns based on 26 CBMs from the literature. Some of the business model types are recurrent or with small

variations between the two classifications, such as reuse, remanufacture and recycle. A table in appendix displays the propositions of each author.

2.2.1. Circular business model frameworks

As pointed out previously, new business models are necessary in order to successfully move towards a circular economy (EMF, 2013; AGENDA, 2018; PLANING, 2015). New business models means that business model innovation is required, which comprises a reconfiguration in the business model elements, including innovating: the content, the structure, or the governance of the activity system between the company and its network (NUSSHOLZ, 2017; ZOTT; AMIT, 2010). As to sustainable business model innovation, Boons and Lüdeke-Freund (2013) refer to as business models that contain an environmental or social value along with the economic value in its value proposition. To help businesses make this move faster, business model tools and frameworks can provide a structured path and guidelines for the managers that are willing to but don't know where to start. For instance, the Business Model Canvas is a framework for conceptualizing business models (OSTERWALDER, A.; PIGNEUR, 2010) very popular in the literature and with practitioners for its ease of application and complexity of components (LEWANDOWSKI, 2016). This section aims to present and discuss circular business model frameworks that have the purpose of supporting business in the transition from a linear to a circular economy. Despite being an area still not much explored (URBINATI; CHIARONI; CHIESA, 2017), some authors present different views of how the circularity aspects can be integrated in the business model (i.e. Antikainen & Valkokari, 2018; Lewandowski, 2016; Nußholz, 2018; Ranta et al., 2018).

Nußholz (2018) proposes a tool that offers a standardized representation of the elements and possible cycles of circular business models that has the objective to prolong the useful life of products, parts and close material loops. The author uses four lifecycle management interventions, developed to integrate with traditional business model elements (value proposition, value creation and delivery, and value capture). They are collect and reintegrate, first sale (enabling prolonged useful life), additional sale(s) of the product or parts to other users, and material recovery. This generic visualization can reduce complexity and potentially guide practitioners in embedding circularity and adjusting their business models, as it enables preservation of the resources' value. However, most companies usually focus on only one

intervention to slow or close loops, as it may be unrealistic to implement multiple cycles in their business models as suggested by the scholars (NUSSHOLZ, 2018).

Ranta et al. (2018) have developed a different approach, by adding a separated CE-specific layer to a component-based business model framework. The CE layer is based on the 3-R principles reduce, reuse and recycle, and as a result it allows investigating the business model components in each of the three actions. By analyzing four case studies with this conceptual framework, Ranta et al. (2018) make important propositions for circular business model implementation from the perspective of economic value creation. The research showed that a circular business model requires that the focal firm take new positions in the value chain, specially through the introduction of the take-back system. In addition, the take-back system can achieve cost-efficiency in different ways, there is no single answer to how it should be implemented (i.e. through partnerships or managed internally). Recycling, however, is the dominant alternative, as it is easier to implement and has a smaller impact in the business model than reducing or reusing.

Furthermore, Antikainen and Valkokari (2018) have defined a generic model for circular business model innovation that integrates elements from macro (global trends and drivers), meso (ecosystem and value co-creation) and micro (company, customers, and consumers) levels. This framework aims to complement current business model tools by adding the business ecosystem level and analysis of sustainability costs and benefits, and it also presents the idea of continuous iteration with sustainability and circularity evaluation of the business model. Due to the incremental changes of business model innovation in areas such as key activities, key resources and distribution channels, especially in a sustainable circular business model, the role of systemic innovations was emphasized, considering the entire system and its several levels, instead of a single business model innovation.

Lastly, Lewandowski (2016) has carried out an extensive research on circular business models, from a broad identification of the literature to its categorization according to the components of business model structure. As a result, he developed a framework for a circular business model that can accelerate the transition from a linear to a circular system. This framework was designed for every company regardless of the industry or size, differently from other circular models that are case-based, as it identifies how circular principles can be applied to the business model canvas framework. He also identifies the necessity of two additional components, which were incorporated in the framework. The first, material loops, refers to the take-back system, as the reverse supply-chain is one of the most important components of

circular business models; along with adoption factors, which are the internal and external factors affecting adaptation of a business model to the circular economy principles. Although the circular business model canvas (CBMC) is more complex and therefore more difficult to apply than the original one, it supposedly succeeds to support the design of a circular model by combining the ReSOLVE framework with the business model components.

2.3. SUSTAINABLE BUSINESS MODELS AND CIRCULARITY WITHIN FASHION

Although there is an urgent need to reduce its environmental impact, the amount of studies of sustainable business models within the fashion industry is still limited. Researches have focused on specific types of novel business model, such as clothing libraries or second hand stores (i.e. Gopalakrishnan & Matthews, 2018; Pedersen & Netter, 2015), leaving apparel manufactures with a lack of support in order to make the transition from a managerial point of view. Next, we analyze some of the researches that focused on sustainable business models for fashion.

Todeschini, Cortimiglia, Callegaro-de-Menezes, & Ghezzi (2017) have identified several sustainable macro-trends and drivers that can lead to business model innovation in the fashion industry and analyzed how these drivers can affect the business model components. For instance, the 'circular economy' macro-trend has three drivers: recycling, vegan, and upcycling, and each one drives innovation in at least three components of the business model. With the realization of eight case studies, the authors also identified key opportunities and challenges for innovation fashion startups. The research indicates that usually born sustainable startups do not explore only one driver, but more than one concomitantly. By recombining different approaches, resources, and competencies, they can create a unique value proposition and a new business model that can generate and capture value.

Pal and Gander (2018), on the other hand, have analyzed the sustainable resource flows in the fashion industry, based on the work of Bocken (2014, 2016). Using the three logics of narrowing, slowing, and closing the loops, they have categorized and identified the methods used by fashion companies to attain sustainable business models. To narrow the loop, besides the energy and material efficiencies that can be achieved through lean manufacturing, clean technology for low-carbons, and integrated pollution prevention and control, the authors highlight the demand-driven approach to production. In this approach, apparel manufacturers

use flexible and modular production techniques to achieve a more accurate sales forecast, instead of the mass production strategy that leads to unsold stock and therefore waste. Companies can also use digital technologies such as digital 3D visualization and prototyping to reduce the environmental footprint of their processes (PAPAHRISTOU; BILALIS, 2017). As for slowing practices, slow fashion plays a main role, in which companies design apparel to increase its durability and ease of repair (BOCKEN; SHORT, 2016). Design for longevity, sufficiency, and responsible promotion also appear as slowing strategies. Lastly, the closing logic introduces the collaborative consumption, such as clothes renting model, and the multiple product lifecycles (recycle, remanufacture, reuse/sell) as alternatives implemented by the fashion industry, even though the latter presents several limitations.

Other non-academic contributors raise additional findings. The Ellen MacArthur Foundation (2017) explores four different business model types from which people can have access to clothes. These models are related to different types of consumers, each with specific needs regarding to clothing. Thus, for each consumer type there is a combination of two or more sales and service model options that would satisfy their needs. In common, all models share an overall strategy aimed at high utilization rates. Such models are resale, sale of highly durable clothes, short-term rental, and rental subscription, in which a monthly fee provides a fixed number of garments on loan and frequent outfit change.

Another example is the Mistra Future Fashion (ELANDER, M., WATSON, D., GYLLING, 2017), a research program that, among other studies, has performed an evaluation of business models that could increase reuse, collective use, and prolonged lifetime of textiles. The five models, adapted from Watson et al. (2014), are own product take-back and resale, general collection and resale, sharing with other users, longer technical life, and redesign. They were used to categorize a pool of 59 companies that supported the extended life of textiles, in order to understand key motivations, strengths and weakness, and factors of success.

2.3.1. Circular economy principles applied to the fashion industry

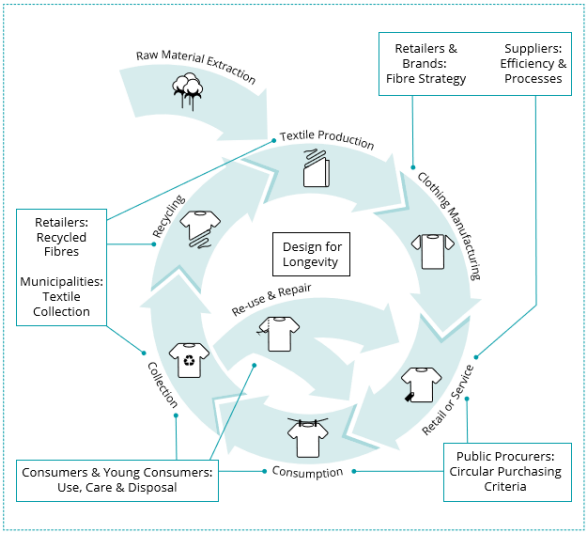
Despite the lack of a general circular business model focused on fashion businesses, there are several propositions regarding the circular economy in this industry. Such principles or practices can be used to guide the transition to a circular system, and therefore can be considered in the development of a circular business model framework for fashion companies.

A number of organizations focused on the circular economy devote resources to examine the clothing and textile industry separately (i.e. EMF, EC), as it is considered a resource intensive industry of high environmental impact (EMF, 2013).

In the report dedicated to the textiles and clothing industry, the EMF (2017) introduces the ambitions for what would be a new textiles economy based on circular economy principles. There are four ambitions that if implemented result in clothes, textile, and fibers being kept at their highest value during use, re-entering the economy after use, and never ending up as waste. The first ambition is to phase out substances of concern and microfiber release, which implies to ensure that "the material input is safe and healthy to allow cycling and to avoid negative impacts during the production, use, and after-use phases". Secondly, to 'increase clothing utilization' refers to transforming the way clothes are designed, sold, and used, to change the idea that they are disposable. There are many actions that can support this ambition, from designing durable garments to offering enhanced resale models, and access models such as renting or subscription, all of which can increase the average number of times clothes are worn. Next, there is the ambition of radically improve recycling that is related to different areas, from designing clothes to enable recycling, to scale clothing collection. In addition, technological innovation is still much required to improve the quality and possibilities of recycling. The fourth ambition is to make effective use of resources and move to renewable inputs. This means to not only eliminate waste and reduce the inputs of resources during the production process, but also to increasingly use renewable feedstock for plastic-based fibers and regenerative agriculture to produce any renewable resources.

In another approach, the European Clothing Action Plan (ECAP, 2019) has acted and collaborated in different parts of the clothing value cycle. ECAP's projects include design for longevity, sustainable fiber strategy for clothing manufacturing, suppliers' efficiency and processes, public procurement, consumer engagement, textile collection, and fiber recovery (recycling), as shown in figure 1. Moreover, they add that high quality, good maintenance, fashionable vintage, extracting fibers for high quality recycling are a few examples of a thriving circular economy. In what regards to fiber recovery, which means less use of virgin materials, less landfill and incineration, and water and energy savings, a pilot project with nine companies was executed to recycle fibers and turn them into new garments.

Figure 1. ECAP holistic approach



Source: ECAP (2019)

A third example of actions for circularity in the fashion business is the Global Fashion Agenda 2020, a commitment to engage brands and retailers in the circular economy that outlines four immediate action points to be implemented. The first is to implement design strategies for 'cyclability', followed by increasing the volume of used garments and footwear collected and resold. Finally, is to increase the share of garments and footwear made from recycled post-consumer textile fibers. These actions represent concrete changes embraced by the participating companies, and aim at accelerating the transition to a circular fashion system. In addition to the involvement of brands and retailers, the 2020 Commitment also aims to reach the wider ecosystem by acting in policy engagement, knowledge sharing and industry alignment.

2.4. THE DEVELOPMENT OF A FRAMEWORK FOR FASHION COMPANIES

It is possible to notice that EMF, ECAP and the Global Fashion Agenda share many aspects in what regards circularity for textiles and clothing, although they differ in the way they are presented. Moreover, it does not seem to have a lack of actions to be taken in order to move to a circular system, as they can be found in the different stages of the clothing lifecycle. Before incorporating the circular principles for fashion into a business model framework, however, it is necessary to organize such contributions to provide some clarity. Table 3 presents the consolidated circular approaches for each of the stages of the garment lifecycle.

Table 3. Circular approaches to each garment lifecycle step and business model components affected

Garment lifecycle	CIRCULAR APPROACHES	BM component affected
PRODUCT DESIGN	Design for longevity / durability Design for recyclibility	Value proposition Customer segment Key partners Key resources
RAW MATERIALS	Use of more recycled input Sustainable and renewable sources Environ. safe materials	
MANUFACTURING	Energy and water efficiency Waste reduction Environ. safe processes	Key activities Key resources
RETAIL OR SERVICE	Mantainance / Repair services Reselling	Revenue streams Key activities Channels Value proposition
	Access-based business models: as a service, renting, subscription	
	Demand-driven production	
CONSUMPTION	Customer engagement and education Slow fashion / Lowsuerism Responsible promotion	Customer relationship Customer segments Value proposition
COLLECTION	Clothing/textiles/used garments collection	Key partners / Channels Take-back system Cost structure Customer relationship
RECYCLING	Fiber recovery High quality recycling Upcycling	Key partners Take-back system

Source: created by the author

The first lifecycle stage is the product design, and it corresponds to the approaches of design for longevity/durability, and design for recyclability. The choice of the raw materials is also part of the design of the product, however here it is presented on its own because it relates to the circular approaches of using more recycled inputs, sustainable and renewable sources, and materials that are environmentally safe. As for the manufacturing stage, practices such as energy and water efficiency, waste reduction and environmentally safe processes can be implemented. In the retail or service stage, the actions can take part in three distinct ways. The first is the offering of maintenance or repair services, and reselling. Secondly, there is the possibility of access-based service models, such as renting and subscribing. The third option is to have a demand-driven production, to be more assertive with the sales forecast and to avoid surplus stock (PAL; GANDER, 2018). During consumption, companies can foster the engagement and education of consumers, employ responsible promotion strategies (PAL; GANDER, 2018), and endorse a brand positioning of slow fashion (TODESCHINI et al., 2017). The collection phase refers to the collection of clothing, textiles, and used garments, and the recycling phase concerns not only the recovery of fibers, but high quality recycling and other practices such as upcycling (PAL; GANDER, 2018; TODESCHINI et al., 2017). Not all of the

approaches proposed in the previous section have been considered in this analysis, as they are out of scope to be applied to a regular product lifecycle.

Regarding the business model components, circular approaches for each lifecycle stage affect two or more components. The product design and raw material stages have a broad impact on the components, as they are directly related the company's value proposition and therefore can influence the chosen customer segments. In addition, the selection of inputs affects the company's key resources and key partners. Manufacturing circular approaches are associated with the key activities of the company and also influences its key resources. Depending on the approaches of the retail or service stage, it can influence the value proposition and key activities, as well as the revenue streams and channels. The approaches in the consumption phase are related to the customer relationship and customer segment components, and can also be associated to the value proposition. The collection stage has a broad impact, as it depends first on the customer relationship and channels, key partners, cost structure, and the take-back system (LEWANDOWSKI, 2016). Finally, recycling also influences the take-back system and key partners. Key resources and key partners are the components more frequently impacted. The latter shows that, as emphasized by the literature, the transition to a circular economy strongly depends on cooperation among all the network and suppliers. On the other hand, customer segments, revenue streams, and cost structure appear to be affected by fewer actions. However, this does not make the impact in the components be less important.

Based on the circular business model framework from Lewandowski (2016), the identified circular approaches related to extending the value of textile and garments were integrated to each business model component in order to provide an adapted framework focused on fashion apparel manufacturers (Fig. 2). The propositions from the original framework were maintained if they were applicable to the reality of the fashion business. The description of each of the 11 components follows below:

(1) Value proposition – the value proposition has to translate the environmental purpose of providing a product that aims at increased utilization. This is done through the offer of circular products, that focus on durability, enabling repair and maintenance, and improving recycling. Slow fashion is part of the value proposition, as it represents the intention of the business to slow and reduce consumption. Services are offered to extend the product lifecycle (product-service systems), as well as the company can decide to run an access-based, "as a service" model, however this is an optional alternative that the company can choose to implement or not.

(2) Customer segments – the value proposition has to be aligned with the needs of the customer segments. The more sustainable the fashion business was before the transition to circularity, the less it will affect its customer segments, due to shared principles and values.

(3) Channels – virtualization is the main shift when it comes to channels in circular economy. However, for fashion apparel manufacturers it is most likely applicable the virtualization of the sales channels (through online shopping) and of the communication forms with customers (via website, social media, web advertising).

(4) Customer relations – consists mainly of the customers' engagement and education regarding the circular economy, including the return of garments for the take-back system. In addition, a responsible promotion means anti-consumerist messages, aiming at slowing the loop.

(5) Key resources – when it comes to garments, the resources are a key area to implement the circular principles. The change to sustainable and renewable materials that are environmentally safe and an increasing use of recycled inputs represent the raw material choices.

(6) Key activities – linked to the circular product of the value proposition, product design is a key way to apply circular principles. In addition to the selection of key resources, the design for longevity and durability can slow the loop, while design for recyclability allows the idea of closing the loop. Secondly, an efficient production means to have an increasing performance through better processes and technology improvement. Finally, key activities can include the repair and maintenance of products and also reselling.

(7) Key partners – the recycling network is essential as it allows closing the loop and obtaining recycled inputs for new production. One of the key challenges is to find suppliers that will share the same values and support the circular model. Other types of collaboration are possible, such as collaborative production.

(8) Revenue streams – are directly related to the value proposition, however most modifications are associated with the offering of services or other access and performance-based models. Refers also to the value of resources retrieved from the take-back system, and the reselling or repair of products.

(9) Cost structure – this component should reflect any financial impact in the business model, however the literature provides few examples related to the CE implementation (LEWANDOWSKI, 2016). Accounting principles can identify costs of product development

or costs savings from reverse material flow or virtualization. In addition, the take-back system can imply additional costs, as well as the incentives for customers to return garments.

(10) Take-back system – the take-back management for fashion businesses concerns the collection of used garments. It is an additional component in the circular business model in order to differ the reverse logistics, and as pointed out by Lewandowski (2016), it also includes the channels and customer relations related to this system

(11) Adoption factors – as identified by the author (LEWANDOWSKI, 2016), various internal and external factors support the transition to a circular business. Internal factors consist in organizational capabilities such that require intangible resources, as they are mainly based on developing human resources and team building, and the application of change management instruments. In turn, external factors are related to technological, political, sociocultural, and economic issues.

Figure 2. A circular business model framework for fashion apparel manufacturers based on the CBMC from Lewandowski (2016).

<table>
<tr><td rowspan="6">Partners
- Recycling network (fiber recovery)
- Suppliers that share the same values
- Other types of collaboration</td><td>Activities
- Design for longevity / durability
- Design for recyclibility
- Efficient production
- Repair / Maintanance
- Reselling</td><td rowspan="6">Value Proposition
- Circular product
- Slow fashion / Lowsuerism
- Product-service system
- Access-based model</td><td>Customer Relations
- Customer engagement and education
- Responsible promotion</td><td rowspan="6">Customer Segments
- Customer types</td></tr>
<tr><td>Key Resources</td><td>Channels</td></tr>
<tr><td rowspan="3">- Recycled inputs
- Sustainable and renewable resources
- Envirn. safe materials</td><td>- Virtualization of sales channels and communication</td></tr>
<tr><td>Take-back System</td></tr>
<tr><td>- Collection of used garments and take-back management
- Channels
- Customer relations</td></tr>
<tr><td colspan="3">Cost Structure
- Take-back system and value of incentives for customers
- Guidelines to account the costs of material flow</td><td colspan="2">Revenue Streams
- From reselling, or selling collected material to recycling
- Usage-based (PSS)</td></tr>
<tr><td colspan="5">Adoption Factors
- Organizational capabilities - PEST factors</td></tr>
</table>

Source: created by the author based on Lewandowski (2016)

2.5. RESEARCH METHODOLOGY

Considering that the topic of business models in the circular economy was not much discussed until recently, research on this topic is still somewhat limited. Therefore, this study has a qualitative approach in order to explore and understand the variables that have not yet been investigated (CRESWELL, 2013). To achieve the aforementioned objective of understanding how fashion companies can adapt their business model to circularity, the research strategy was to conduct an exploratory research (MALHOTRA; D.; BIRKS, 2002) through a bibliographic review and interviews with experts.

As the investigation of circular business models within the fashion industry is scarce, the literature review was carried out in two parts, whose results were presented in the previous sections. The first step concerned the topics of circular economy and circular business models, while the second focused on sustainable business models in the fashion industry. The following key words were used for each search: “circular economy” and “business model”; and “sustainable or sustainability”, “business model” and “fashion” (and its variations, such as clothing and textile), in order to obtain specific studies on the target industry. Aiming to collect a greater number of publications, the databases Scopus, Ebsco, and Capes have been explored. This search has resulted in 164 articles for the first topic, of which 129 were non-duplicated, and 31 articles for the second, with 28 non-duplicated. Next, all titles and abstracts were reviewed to confirm that they match the criteria to be further analyzed in this study. To be included, papers should be focused on design or implementation of circular business models, but not on a specific business model type (such as access-based), other industry, or sub topic (i.e. policies or consumer behavior), in order to not escape from the research topic. As a result, only 32 and 8 articles remained for analysis, respectively. However, this examination also allowed the identification of other studies through cross reference. In addition, due to the novelty of the topic, a complementary search was performed on grey literature, with the purpose of collecting additional contributions of organizations that support the circular economy, and resulted in seven reports and documents.

After the identification of the framework to be adapted, findings on circular principles that are applied to fashion and the sustainable business models developed within the fashion industry have been incorporated into the business model components in order to build an adapted framework for “born sustainable” fashion apparel manufacturers. Next, interviews with three specialists in the fashion industry and one specialist in business models have been carried

out to raise inputs and validate the adequacy of the circular business model framework for fashion businesses. The three fashion specialists were selected for their interest and experience in sustainable and circular fashion, while the fourth interviewee was selected to validate the aspects related to the business model components. The interviews employed a semi-structured script and had approximately one hour of duration each. The results were analyzed through the methodology of content analyses, and finally integrated to the final version of the framework.

2.6. RESULTS

This section aims to describe the findings of the interviews carried out with specialists regarding the circular business model framework for the fashion industry previously proposed. Following the interview structure, the results are presented according to the eleven components of the business model.

2.6.1. Value proposition

According to one specialist, the value proposition of a circular fashion business model opposes the logic of the traditional fashion industry of offering products that will become obsolete in one season. As there should be no waste in a circular economy, customers must understand that garments should not be thrown away; instead, they should be used for the longest time possible. Therefore, durability is a key factor of the value proposition, and it is strongly related to the selection of materials and design. But not only durable, circular products in fashion should be designed considering a second cycle and the end of life, either through recycling or decomposition. In addition, for the garment to be used as much as possible before its end of life, there must associated services, which would be the product-service systems. Beyond repair, other service options are customization and alterations, allowing resignification and extension of the product's lifecycle. For one specialist, the offering of these services, from repairing and returning to models in which products are accessed through rent or subscription services is what differentiates a circular product from a sustainable product.

Specialists agree that the implementation of services gives an even more important role to the relationship of the brand with its customers, as it goes beyond the contact of the initial sale. This increased number of interactions allows customers to be consulted, enabling them to be co-creators and thus supporting the development of the value proposition. It also reinforces

the importance of their participation in a circular business model, as consumers become responsible for returning the products in order to close the loop. In this relation the customer also acquires other responsibilities to what regards the extension of the product lifecycle, for instance to follow specific washing instructions. However, customers should know that in case something happens, the company should provide the necessary support to bring the garment closest to its original state as possible.

Despite not being able to categorize all sustainable small and medium business as slow fashion, specialists agree that many characteristics of this positioning are found in circular fashion products. Besides durability, timelessness and versatility were the most cited, both contributing to a longer lifecycle. While the first prevents garments to turn "out of fashion" or obsolete, the latter expects they can be used in different ways and, consequently, more times. When it comes to circular economy, however, one specialist advises that not only the final product should be "slow", but all the production process should be made in a responsible and adequate way, with fair recognition of all the involved. Finally, the interviewees agreed that the production of such garments results in a fair and transparent price, which is often considered a higher price when compared to conventional, non-sustainable products.

Regarding access-based models, in which the ownership is not transferred to customer, most specialists believe that they are a trend and withhold potential business opportunities. However, they present different and complex challenges, from financial aspects to the logistics operation. The delivery, returning, and inventory management requires scale operation, and variety needed for instance in subscription services and fashion libraries will only become economically viable if it is a scalable business. There are also consumer behavior challenges involving culture and education that can compromise the service operation, as well as the need of technology, such as mobile applications.

Finally, despite all aspects regarding circularity within the value proposition, it is evident that the design attractiveness remains the main value of fashion garments. Before sustainability, customers will only buy what they like, if they find it pretty or if attends another purpose such as comfort. However, many sustainable brands do not keep in mind that they still must fulfil a visual or functional need of their customers.

2.6.2. Customer segments

Regarding customer segments, the specialists believe that it is natural for companies to focus on consumers that are sensible to the premise of sustainability. There must be a strong alignment between what customers value and the principles behind the value proposition, hence customers that value slow fashion and are aware about their environmental impact. The additional responsibilities existent in a circular model, as discussed in the value proposition, will require from the customer a high level of consciousness, one example being the return of the garment in the end of life. As mentioned, the processes and services associated with more sustainable products result in higher costs than traditional linear productions. This has a direct impact in the customer segmentation, as most brands will end up working with niche products due to the higher prices. This may result in a concern about the viability of the segments, however they can be enlarged by considering other pain points such as social aspects, that are addressed by fair trade and local production. For one specialist, companies must be aware that the traditional sale and the access-based models offer different products for different group of customers. In the former, the consumer invests in a garment with the intention of keeping it for a long time, while in the latter the customer desires variety and experimentation. In addition, some types of customers are not willing to buy online and prefer going to the physical stores instead, especially to try the clothes on and to feel the textures and the fitting in the body.

2.6.3. Customer relations

According to one specialist, to buy thinking in the sustainability perspective is still something that few customers do, as it is a recent approach and both the industry and the consumer market are starting to be aware. This makes the education role more important than in the linear logic. In general, more brands have started to talk about sustainability, transparency in the supply chain and conscious consumption. Fashion companies can go beyond the traditional relation by offering courses, workshops, or events to open a conversation with customers, all of which can also be done with the support of other partners. Education and engagement is crucial for customers to understand that products have to come back and that they also play a role in keeping the product in use for a longer time. Finally, companies can also teach consumers and share specific knowledge regarding how to maintain or repair garments by their own, for instance how to adapt and customize them for them to be used across different seasons.

2.6.4. Key activities

Besides the design for durability or longevity, other resource savings can occur due to the design project. The zero waste method not only avoids fabric loss but also makes the manufacturer responsible in case any waste is produced. Other technologies, such as the software Marvelous Designer, can save materials in the modeling and testing phases. The design for disassembly or recycling can be related to avoiding trims or thinking of the best way to remove sewing. Focusing the product's life extension and end of life, other strategies can be designing modular clothes, adaptable clothes, and of easy maintenance. Another crucial part is the selection of materials, further detailed in the key resources section, as it enables durability and recycling, in case of fabrics that are not mixed. Knowing how each material can be treated in its end of life is part of the design project. There are also some design limitations due to the lack of items made of more sustainable materials that cannot always be replaced. The combination of available materials with a disassembly objective results in a simplified design, with fewer trims and less combination of resources. One of the experts highlighted that the design should consider not only the environmental and economic aspects, but also the well-being of people involved in the process.

As in other industries, efficient processes in the production represent cost reductions. Modeling techniques and technologies that generate less waste, such as those mentioned in the design, are important as less material is used in the production, resulting in reduced costs. According to one specialist, many Brazilian companies are already implementing processes to reduce toxicity in the production, for instance by replacing items that have a toxic component with less harmful alternatives. The range of services offered to extend garment lifecycle is diverse. Repair can be from a simple stitching to adjustments in the measurement if the product is too big, and garments can be dyed and customized. Another additional activity is the sorting of returned products to identify their next destination, which can be a second life through reselling or donation, recycling, or the correct disposal if the previous options are not possible. In addition, remanufacturing can include transforming textile products into other products, such as blankets, that can then be donated. The activities performed once the product has returned are strongly connected to the network of partners, as companies may not be able to execute all those different actions. For instance, reselling can take place in outlets or second hand stores. However, it is important that brands are still responsible for knowing the garments' future after it is handled to a partner.

2.6.5. Key resources

For one of the experts, the first premise of resources should be to use safe materials, that is, materials that are considered ‘clean’ and free of toxics, to avoid contamination through the supply chain. Although there is a craving to solve the waste problem through recycled materials, they may not always be good options as sometimes their composition is not known and they may not be free of toxics. For instance, textiles produced from plastic bottles (PET) eliminate micro plastic during washing, continuing to generate pollution. In addition, fabrics that are composed by a combination of different fibers, known as mixed materials, are difficult to recycle. Therefore, ideally garments should stay in either the technical or the biological sphere, allowing them to be recycled or to return to the environment in the case of biodegradable materials. However, even natural fibers, which are considered more sustainable, can have environmental implications, such as the large amount of water used to grow cotton. Another natural alternative is wool, although it is not well accepted by the vegan community. The design limitations caused by the lack of more sustainable options of some items are mainly related to trims. For instance, there are options of biodegradable buttons and tags, but zippers are still made of plastic. Interlining and elastics are also difficult items to replace. As for the end of life, natural fibers that can no longer be recycled for losing their strength can be used in handcraft work, such as knit and crochet. Other materials that cannot be transformed into new textile can be used in downcycling or upcycling. For instance, as it is difficult to reintroduce polyester in the fashion cycle, it can be used as material in other industries. Finally, the use of recycled or reused materials can result in a challenge when it comes to the garments’ tags, in order to meet the legal requirements to state the item’s composition.

There should be more investment in the development of technologies for textile recycling. Machinery that transforms textile waste in fibers that can be rewoven, a “defibrillator” equipment, is not always easy to access. New technologies can also be used for a more efficient and clean production process. Moreover, the design for circularity requires specific competences and knowledge from the designer of the garments, resulting in a valuable resource in a circular business model. Therefore, staff members that are engaged with the circular economy cause and properly trained are part of the company’s intangible resources.

2.6.6. Channels

Considering the channels of communication and sales, they can be either offline or online, but most likely both or only online. It is a natural path today that fashion brands establish online channels to interact with customers, for instance through social media platforms. In any case, the intensification of customer relation due to the implementation of post-sale services requires channels to be more agile. Communication has to be effective and companies should be ready to receive and send back products that need repair or are being returned. The increase in online shopping also affects logistics. Post offices or other transportation companies are key partners and sometimes the only physical point of contact between the brand and the consumer. Some companies allow consumers to select two sizes to be able to try them on at home, therefore the cost of return of one item has to be considered from the beginning. To optimize this process, there are investments in virtualization technologies in which measures are checked virtually to "try on" the product before ordering it. Other virtualization technologies include virtual or augmented reality, with which, for instance, brands will no longer need to take their garments to expose on fair.

2.6.7. Partners

For textiles, the recycling network needed to close the loop may consist of a company that transforms used clothes into fibers through a defibration process, and another company that transforms this fiber into a new textile that will be used to produce new garments. If the resources are other types of waste or recycled material, the suppliers can be from other industries or recycling cooperatives. In addition, for the loop to be closed the regenerated textiles do not need to stay in the fashion industry. The new textiles can be used in several sectors, from blankets to pillow stuffing, and biodegradable material can end up as agricultural compost. Fabric waste can also be used to make paper and boxes, resulting in new products that go beyond fashion. Nevertheless, other partnerships in the form of services can take place during the lifecycle of the garments, not being restricted only to the pre and post consumption phases. To build a local supply chain can be an important element for companies that focus on slow fashion and on social impact. However, small businesses that sell online across the country can make partnerships with other companies from different regions, especially to avoid the reverse logistics costs and environmental impact of the take-back system. In any case, transportation companies also play an important role and are considered key partners.

Partnerships with NGOs and other organizations can take place and not necessarily involve the exchange of financial resources. On the contrary, there is a trade between materials and information or knowledge and in many cases workers involved in the manufacturing or recycling processes are people in social vulnerability conditions. Nonetheless, some specialists affirm that in this industry there is a community focused on education about sustainability and circularity, including customer education. Another example are companies that teach others how to recycle or to work with certain materials, or other partnerships that focus on knowledge and information transfer. These strategic partners can evolve to collaborations, such as the joint development of a new product. It was highlighted by one of the specialists that building a network of partners that shares the same values can be a continuous task for companies. There is a search and the process of visiting and getting to know the partner, and not all companies may understand these values at first, reacting with suspicion and mistrust.

2.6.8. Cost structure

In addition to the extra costs of services, logistics and structure required by a circular model, in fashion the selected materials can also contribute to higher costs. For instance, some recycled fibers are more expensive than the virgin material, especially when compared to polyester fibers. The use of organic fibers, such as cotton, is also more expensive than the traditional option. Although the reuse of pre-consumption material can generate savings, there may be challenges regarding the taxation of these resources, which can vary from country to country. The aforementioned design and modelling techniques, such as zero waste, can optimize fabric utilization reducing costs. Similarly, design for disassembly can reduce costs of remanufacturing of returned items. Besides a possible discount that can be offered for customers that return their garment, there are other costs related to the take-back management of products. The sorting of the returned items, as an additional activity, requires human resource time, physical space, and the reverse logistics fee. The returned pieces that need repair, such as washing, sewing and dyeing, before its second cycle also represent a cost. The main challenge is to add these additional costs to the product in its first cycle, which will increase the price to the customer without having a guarantee that the garment will be returned.

2.6.9. Revenue streams

Either the traditional sale or access-based models can be the main source of income for fashion companies, but it is possible to generate additional revenue through the offer of repair and customization services, even when the customer maintains the ownership. Two specialists referred to the financial challenges of product-service system models, in special access-based models, in which is more difficult to reach economic sustainability. This may happen because the initial investment is usually higher and the return of investment is very hard to estimate, when compared to the traditional sales model.

2.6.10. Take-back system

The management of the collected items is complex and involves human resources and processes, besides the definition of the channels involved and the strategy to engage customers. As mentioned in the key activities, once a garment is returned there are different possibilities to its second or end of life. Products that are in a good condition can be resold, maybe needing to be repaired, otherwise they can be donated to charity or sent to recycling.

The characteristics of the country also need to be considered. In Brazil, its large geographical size is a disadvantage for logistics, something that can be more easily managed in European countries. As reverse logistics may not be the most sustainable option due to carbon footprint, companies need to ask themselves if they have to receive their products or if they can collaborate with others when implementing take-back systems. Therefore, one alternative is to identify partners that can collect the products instead of sending them across the country. This is particularly important with the increase of online shopping, as sales that happen in the same city are easier to be taken back. Similarly, geographical distance is a challenge for access-based models, increasing transportation costs and the environmental footprint. Brands should evaluate their responsibility and the reverse logistics to guarantee the return is environmentally sustainable.

2.6.11. Adoption factors

The interviewees agreed that fashion business must have the sustainability value internalized in order to be willing to achieve a more sustainable or circular model. Otherwise, if the company is not losing customers or market share, it will make no change towards reducing

and being responsible for its waste. This not only should concern the environmental impact, but to act based on ethical principles. In general, companies should believe that this is their purpose, regardless of external factors or incentives.

Besides the internal ideology, there are several external factors that can influence the adoption of circular principles. To what concerns governmental aspects, it is noted that in Brazil there is a lack of support from regulations in general, from the encouragement to use recycled inputs to the accountability of fashion manufacturers for their waste. The Brazilian national plan for waste management (Plano Nacional de Resíduos Sólidos) is a prominent law in the field, but still has no comprehensive implementation and control, especially in the textile industry. Fiscal incentives such as tax breaks should be implemented for the use of circular materials, in order to reduce the cost of materials that are reused or considered waste. On the other hand, the European Union has been taking action towards waste and energy management since 2015 with the Circular Economy Package, which more recently has incorporated actions concerning users and services. Therefore, Brazilian companies that want to export face many more requirements. For instance, certifications related to the origin of raw materials are demanded for selling abroad or participating on fairs, which turns into a barrier since these certifications are not commonly adopted in Brazil.

2.6.12. Final framework

Finally, a circular model within fashion should refer to the responsibility of the manufacturer for what he produces until the end of life, in addition to the responsibility towards the production process, which has to be sustainable and fair. An important part of this responsibility can be addressed in the design phase, which in turn is strongly associated to the raw materials selected. Companies should consider the three principles of the circular economy (according to the EMF) when implementing a circular business model. Even if they are not able to incorporate all of them in their own offer, they should provide alternative solutions, for instance through their partners. Based on the findings, a reviewed and final version of the framework is presented below (Fig. 3), followed by the details of the main changes in each component:

Figure 3. A circular business model framework for fashion apparel manufacturers based on the CBMC from Lewandowski (2016), final version.

<table>
<tr><th>Partners</th><th>Activities</th><th>Value Proposition</th><th>Customer Relations</th><th>Customer Segments</th></tr>
<tr><td rowspan="4">- Recycling network (fiber recovery)
- Suppliers that share the same values
- Other types of collaboration</td><td>- Design for durability
- Design for recyclibility
- Efficient production
- Services
- Sorting
- Reselling</td><td rowspan="4">- Circular product
- Slow fashion
- Relationship with customers
- Product-service system
- Access-based model</td><td>- Customer engagement and education
- Responsible promotion</td><td rowspan="4">- Customer types
- Niche segments</td></tr>
<tr><td>Key Resources</td><td>Channels</td></tr>
<tr><td>- Recycled inputs
- Sustainable and renewable resources
- Envirn. safe materials
- People and know-how
- Technology</td><td>- Virtualization of sales channels and comm.
- Agile channels for increased customer interaction</td></tr>
<tr><td>Take-back System</td><td>- Collection and management of used garments
- Channels
- Customer relations</td></tr>
<tr><th colspan="3">Cost Structure</th><th colspan="2">Revenue Streams</th></tr>
<tr><td colspan="3">- Take-back system and value of incentives for customers
- Guidelines to account the costs of material flow
- Service structure</td><td colspan="2">- Selling collected material to recycling
- Access-based model
- From other services (reselling, repair)</td></tr>
<tr><th colspan="5">Adoption Factors</th></tr>
<tr><td colspan="5">- Organizational capabilities - PEST factors</td></tr>
</table>

Source: created by the author based on Lewandowski (2016)

(1) Value proposition – the circular products are focused on durability and disassembly, but still feature an attractive design or functionality in its core. The slow fashion represents an opposition to the fast fashion logic, with garments that are timeless and versatile. Services such as repair, maintenance and customization are offered to extend the product lifecycle, increasing the importance of the communication and relationship with customers. Access-based models continue to be an optional alternative for businesses.

(2) Customer segments – besides the customers' values being aligned with the value proposition of sustainability, it is noticed that this and the usual higher price of circular products tend to result in niche segments.

(3) Channels – even with the virtualization of sales and communication channels, companies can choose to still operate offline. Nevertheless, as the interactions with customer are intensified, channels need to be more agile to meet this increased demand for communication and support.

(4) Customer relations – engagement and education towards sustainability and the returning of garments, especially as the customers acquire additional responsibilities in a

circular model. Although responsible promotion was not much commented, it is still a relevant action as well.

(5) Key resources – include environmentally safe materials that are sustainable and renewable, as well as recycled materials. People and know-how are also essential resources, as well as new technologies can be necessary to support the transition.

(6) Key activities – Design for durability and for recyclability are key, as well as efficient production practices. Other activities are the additional services, such as repair and customization, as well as the sorting of collected garments which can be resold (needing repair or not), sent for recycling or donated.

(7) Key partners – partners are a key factor for the implementation of a circular system, as they can provide both the raw materials and the technology and knowledge to deal with end of life garments. Many types of collaboration can happen, such as co-creation, exchange of materials, and education of customers.

(8) Revenue streams – most likely additional revenue sources can be from offered services or from the reselling of used garments. Access-based models provide a different revenue model overall.

(9) Cost structure – not only the take-back system and the incentive for customers can imply additional costs, but also the implementation of services, as it requires resources and not always will be paid by the customer. In addition, they make it complex to calculate the final price, combined with the higher costs of some sustainable or recycled resources.

(10) Take-back system – besides deciding how the take-back system will take place, for instance on store, through partners or post office, the management concerns the proper disposal or destination of the garments, which can be for instance reselling, donating, recycling or upcycling.

(11) Adoption factors – as small and medium business that were born sustainable already follow an ideology to achieve sustainability, transitioning to circularity should not result in internal barriers or considerable changes. The external factors, on the other hand, refer to the support, or lack of, from the government, such as tax incentives and regulations, influence from the competitors and customers' pressure.

2.7. DISCUSSION

The previous section presented an overview of the inputs raised by specialists regarding the components of a circular business model for fashion apparel manufacturers. This section, in turn, examines the findings in the light of the current literature about circular business models and circular principles within fashion.

In alignment to the definition of circular business models stated by Nußholz (2017), the value creation in a fashion CBM is associated to the adoption of resource efficiency strategies, specifically through repair, customization and reselling. However, the services for lifecycle extension of the first sale product are more easily implemented by fashion apparel manufacturers than the production of new offerings, which were highlighted by Linder & Williander (2017) as a way to retain the value in circular models. Even though the second lifecycle of garments is still an important element of the business model, the core of fashion businesses remains the first sale product. Ideally, such products should be produced with regenerated or recovered material, allowing the reintroduction of resources in the loop. Other characteristics of the developed CBM diverge from the literature in what concerns the focus on close resource loops and recycling (MERLI; PREZIOSI; ACAMPORA, 2018; RANTA; AARIKKA-STENROOS; MÄKINEN, 2018). Although recycling can be considered easier to implement in some industries (RANTA; AARIKKA-STENROOS; MÄKINEN, 2018), there is a challenge to retrieve products within fashion. Take-back systems can be costly and resource demanding for small and medium fashion brands, as well as it relies on customer's behavior to take the items back. In addition, there are still some limitations regarding recycling technologies in the textile industry ((EMF), 2017). Design strategies that use less resources and diverse second life alternatives make reducing and reusing more feasible in this sector, which can make slowing the loop more implemented when compared to other sectors (LINDER; WILLIANDER, 2017; LÜDEKE-FREUND; GOLD; BOCKEN, 2018). Finally, although the literature states that the impact of the circular economy on the social dimension is not widely explored in research (GEISSDOERFER et al., 2017; MERLI; PREZIOSI; ACAMPORA, 2018), the findings suggest that born sustainable fashion companies consider the social impact as well as the environmental impact. The fair payment and labor conditions of workers involved in the production of resources and manufacturing gains attention due to the known unfair practices in the fashion supply chain.

Regarding the different circular business model types and strategies available in literature, the framework developed in this study can relate to multiple types across the circular flows (PLANING, 2015), depending of the focus of each company. For instance, the classic long life strategy (BOCKEN et al., 2016) appears to be a basic condition for garment producers. However, while textiles in general can focus on repair, garments made with other materials, such as post-consumption, can focus on upcycling. In addition, the use of natural fibers could fulfil an organic feedstock pattern (LÜDEKE-FREUND; GOLD; BOCKEN, 2018), and the take-back system allows the extension of either the of product value as the resource value (BOCKEN et al., 2016). This suggests that fashion businesses could implement multiple cycle interventions, not focusing only on slowing or closing loops (NUSSHOLZ, 2018). Even though if in some of these cycles, for instance the reintegration and recovery of materials (NUSSHOLZ, 2018), the execution is performed by a partner and not by the company itself, which can happen also with the additional sale.

Differently from the cost efficiency expected from the circular economy (RANTA; AARIKKA-STENROOS; MÄKINEN, 2018) in fashion the adoption of circular principles may not necessarily result in savings for the company. That is mainly due to the higher costs of the recycled or remanufactured materials when compared to the virgin, non-sustainable alternatives, in addition to the extra costs and resources required by the offered services. On the other hand, the role of systemic innovation identified by Antikainen and Valkokari (2018) proves to have an important participation in the development of circular model within fashion. Without the range of diverse functions executed by suppliers and partners, the implementation of circular principles is not fully enabled, from the offering of recycled resources to the provision of services, collaborations and exchange of information. Moreover, the influence of external factors, such as government support and regulation, competition, customer pressure, even when they do not encourage the adoption of circularity, still play an important role in the company's decision making.

The circular business model framework was able to incorporate most of the circular principles proposed for the fashion industry previously analyzed (EMF, 2017; AGENDA, 2018; ECAP, 2019), although some were more easily integrated to the business model components than others. For instance, increasing the utilization of garments (EMF, 2017) is on the core of a circular fashion business model, supported by design strategies (AGENDA, 2018; PAL; GANDER, 2018) and services of reuse and repair (ECAP, 2019). The responsible selection of materials can prevent toxic substances (EMF, 2017), and the partnership with suppliers that

also aim sustainability can help to achieve a reduced environmental impact in the production through less emissions and energy and water savings. However, the increase of resale and recycled post-consumer fibers (AGENDA, 2018) still need to be further developed and explored, as the higher costs and logistics challenges of take-back systems can slow their implementation.

2.8. CONCLUSION

This study aimed to develop a circular business model framework that could help businesses and practitioners that are willing to move from a linear to a circular system. Through the review of available literature and the inputs from experts in the fashion industry and business models, the framework illustrates how companies can implement circular principles in the different business model components. The results show that the offering of circular products are the core of circular value propositions, supported by design strategies that focus on durability and recyclability, with the use of safe, sustainable, and when possible recycled materials. However, these are practices usually already adopted by born sustainable fashion companies. With circularity, beyond the sale of the first product, the company provides services that help to extend the garment utilization, such as repair and customization, changing the way customers relate to the brand, as they are also encouraged to return their products in their end of life. The responsibility of the brand for the garments' second life, through either reselling or recycling, is a main changing point from the linear to the circular system. In order to be able to slow and close the loop, brands can rely on a network of partners that can perform multiple roles, from the recycling of materials to the provision of services.

Some divergence was found regarding some characteristics of the fashion circular business model when compared to other CBM from the literature in general. This may indicate that the fashion industry has specific and diverse particularities towards circularity, making this study relevant to properly guide companies in a transition to a circular model. There are different business model types and strategies towards circularity, and this framework tried to provide as many opportunities as possible to integrate them in the fashion reality. As it is intended to be a generic model across this sector, it is expected that changes occur from company to company. Not all characteristics are supposed to be mandatory, and businesses can rely more on some principles than others, according to their product and value proposition. A

limitation of this study is that it is still a conceptualization and therefore its implementation should be tested. Therefore, a further step of this research is to test this framework with real fashion companies in order to confirm its validity for the industry.

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APPENDIX

Categories of circular business model types

Author	Circular business model types
Bocken, Pauw, Bakker, van der Grinten, 2016	1. Slowing • Access and performance model • Extending product value • Classic long life • Encourage sufficiency 2. Closing • Extending resource value • Industrial Symbiosis
Lüdeke-Freund, Gold, Bocken, 2018	• Repair and maintenance • Reuse and redistribution • Refurbishment and remanufacturing • Recycling • Cascading and repurposing • Organic feedstock
Planing, 2015	1. Along the circular flows • Product recycling / Recycling 2.0 • Product transformation • Upgrading • Remanufacturing / Next-Life sales • Hybrid model / Gap-exploiter model • Reuse / refurbish / maintain / redistribute • Performance model / Product as Services / Result-based models • Access model / Collaborative Consumption • Energy recovery 2. From the customer perspective • Ownership-based business models • Access- or Usage-based business models • Performance-based business models • Result-based business models

3. PAPER 02: THE APPLICATION OF A CIRCULAR BUSINESS MODEL FRAMEWORK IN BORN SUSTAINABLE FASHION COMPANIES

Abstract: Circular business models have been the topic of research as they are necessary for the implementation of a circular economy. However, the definition of circular business models is not clear about which resource strategies should be implemented, possibly hindering their implementation. In fashion, business models should aim at increasing clothing utilization and use safe and renewable inputs. However, businesses still have little support to make a transition. By using the circular business model framework that was adapted to fashion apparel manufacturers in paper 01, the objective of this study is to analyze its application on four born sustainable fashion companies from Brazil and Italy, thus understanding how CBM implementation occurs and raising potential challenges and barriers to its adoption. To achieve this goal, four case studies have been conducted, and data was collected from interviews with the founders, secondary data obtained from online sources, and direct observation. The studied companies offered different products and value propositions, which ranged from recycled and waste materials to natural and sustainable fibers. Results show that the garments design is the base of a fashion circular model, which aims at durability and the use of safe and sustainable materials, but still satisfies customers' preferences aesthetically or functionally. In addition, the offer of services that extend the product's lifetime is also crucial, and as a consequence increases the interaction with customers. The take-back system presented a lower rate of implementation, but continues to be an essential part of the circular model. Many challenges and barriers can hinder the adoption of circular principles, such as design challenges and high costs from resources and manual processes.

Key words: circular business model, business model innovation, circular implementation, fashion.

3.1. INTRODUCTION

The circular economy presents itself as an alternative model to reduce the environmental impacts of the current linear systems, as it is able to connect the environment and the economic system (GHISELLINI; CIALANI; ULGIATI, 2016). The implementation of CE can occur at three main levels: micro, which analyzes single processes at company or consumer level; meso, in which eco-industrial parks are examined; and macro, that focus on the level of local, regional and national economies (GHISELLINI; CIALANI; ULGIATI, 2016). The transition to circular business models, in which the value creation logic is designed to improve resource efficiency, extend products and parts lifetime and close material loops (NUSSHOLZ, 2017), is a topic of interest within the circular economy field of research (MERLI; PREZIOSI; ACAMPORA, 2018). However, the circular economy definition is not enough to differentiate how the CE can be adopted, which can be towards the customer value proposition and interface (downstream circular), the value network (upstream circular) or fully circular (URBINATI; CHIARONI; CHIESA, 2017).

More recently, the fashion industry has been the target of research in circular economy, due to its resource-consuming and high polluting processes, that speed up the consumption leading to fast and irresponsible disposal (EMF, 2017). The circular economy applied to fashion means that companies must rethink the design, value proposition and product life cycle to promote regenerative natural and social systems, redefining the meaning of success of this industry (C&A, 2019). However, although there have been many attempts to analyze the adoption of sustainability by fashion companies, the implementation of circular business models in this industry is still scarce and focused on specific models such as access-based (i.e. PEDERSEN; NETTER, 2015). According to the Ellen MacArthur Foundation (EMF, 2017), new fashion business models should increase clothing utilization by making durability more attractive, as well as stimulating resale and boosting clothing maintenance and repair.

According to Stål & Jansson (2017), fashion companies can incorporate different elements of sustainability in their value proposition, such as sustainable materials, repair, and take-back system, but these elements vary the most regarding how they are developed by each company. By comparing established international brands with small and local firms, Caniato, Caridi, Crippa & Moretto (2012) have found different drivers and practices of the two groups regarding the adoption and implementation of environmental sustainability, which are mainly influenced by the scale, processes and relation with supply chains. In addition, there are several

challenges that hinder the adoption of sustainable or circular business models, such as lack of network support, difficulty to estimate financial flows, and even design barriers (LINDER; WILLIANDER, 2017).

Nonetheless, practitioners still have little support to make this transition, which makes the circular business model framework adapted for fashion companies in the first article helpful for companies to achieve circularity. This study seeks to answer *how do "born sustainable" fashion companies adopt the elements of a circular business model framework?* The objective is to analyze the application of the circular business model framework by four sustainable fashion companies to understand how a CBM implementation occurs and to raise the potential challenges and barriers to its adoption.

3.2. BUSINESS MODEL INNOVATION

According to Teece (2010), the development of good business models is fundamental for companies to deliver or capture value from their innovations. This means that product innovations themselves do not necessarily create value, as assumed by many, but that business must also thrive in the business model design. However, business model innovation will not result in a competitive advantage if the model is not differentiated and hard to imitate. Strategy analysis is needed to provide this differentiation by determining the specific characteristics of the value capture and delivery (TEECE, 2010). Business model innovation may affect one specific business model component, such as the business revenue model (TEECE, 2010), and many times have a strong link with technological innovations, as it can influence the development of new business models (BADEN-FULLER; HAEFLIGER, 2013).

When comes to sustainability, Boons and Lüdeke-Freund (2013) have identified a set of normative requirements for sustainable innovation that business models should meet. First, the value proposition should provide environmental and/or social value in balance with economic value, while the supply chain should be engaged into sustainable supply chain management. In addition, the company should encourage responsible consumption throughout customers and stakeholders and properly distribute the economic costs and benefits among all the involved. According to Pieroni, McAloone and Pigosso (2019), most conceptual models, methods or tools for circular or sustainable business model innovation support companies in identifying opportunities (sensing) and designing new business model concepts (seizing), rather than focusing on experimenting, testing and implementing the business model concepts

(transforming). In fact, although CE-oriented and sustainability-oriented business model innovation overlap in many of these approaches, they differ as sustainable-oriented BMI has the social dimension as a key driver over resource efficiency and longevity (PIERONI; MCALOONE; PIGOSSO, 2019).

Business model innovation towards the circular economy consists in moving to CE ecosystems, in which resources are integrated and circular value flows are co-created by the involved actors (AMINOFF et al., 2014). A CE ecosystem is composed by various value circles, which in turn include "the full range of activities, performed by different actors, which are required to bring a product or a service to a user and back to the system" (AMINOFF et al., 2014). Through a proposed framework, the authors suggest that disruptive business model (co)-innovation has an important role in the transition to a CE. Similarly, Roos (2014) proposes that in a circular value chain intermediary outputs such as physical, energy, informational and relational can be used as inputs by external value chains when they no longer used in the company's value creation activities. In addition, there is a maximization of revenue sources that were not accessible before the circular business model, as companies can monetize multiple value added streams that were considered waste, at the same it offers services in multiple loops (ROOS, 2014).

The process and role of circular business model experimentation were analyzed by Bocken, Schuit, and Kraaijenhagen (2018), which suggest that the assumptions of each business model component can be tested through iterative learning cycles and sustainability checks. This process helps companies that are transitioning to a sustainable circular business model, and highlights the role of the collaboration with external partners in the innovation process. When it comes specifically to the fashion industry, it was noted that high levels of business model innovation are correlated to proactivity towards corporate sustainability (PEDERSEN; GWOZDZ; HVASS, 2016). In turn, business model innovation and corporate sustainability are strongly associated to the organizational values, and present a positive relationship with the financial performance of companies.

3.3. CHALLENGES AND BARRIERS FOR CIRCULAR BUSINESS MODEL IMPLEMENTATION

The slow rates of implementation of circular business model has taken researchers to investigate the challenges and barriers to CBM adoption (OGHAZI; MOSTAGHEL, 2018), as the differences in the nature of circular and linear models has led to reluctance in implementing circular systems (LINDER; WILLIANDER, 2017). Many authors refer to financial and economic challenges (LINDER; WILLIANDER, 2017; OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016; TURA et al., 2019). They range from lack of capital (RIZOS et al., 2016), high up-front investment costs and higher costs of different skills and resources (OGHAZI; MOSTAGHEL, 2018). For Ranta (2018), cost efficiency is crucial for the success of circular business, as the use of recycled materials can lower material costs when compared to the virgin alternatives. In addition, business models in which the company retains the product ownership present additional and specific challenges. For instance, as the stock of products increases with additional sales, it increases the risk and the impact from failure (LINDER; WILLIANDER, 2017).

Furthermore, other challenges affect different business model components. Regarding the value proposition, durable products face the risk of fashion vulnerability and risk of cannibalization (LINDER; WILLIANDER, 2017; MONT; DALHAMMAR; JACOBSSON, 2006), as they can not follow trends and slow down the sales of new products. Moreover, slow fashion is associated with restricted consumption due to niche segments and slowing the consumption (PAL; GANDER, 2018). This is connected with the customer segments, as dynamic customer preferences may go against slow fashion (PAL; GANDER, 2018). There are still lack of awareness regarding sustainable products (TURA et al., 2019), as customer expectations related to sustainable fashion garments (TODESCHINI et al., 2017) are still difficult to manage. In addition, there might be restrictions from customers regarding remanufactured products (PEARCE, 2009).

There are multiple challenges in the design phase, in which the design translates the sustainability principles to the value proposition (TODESCHINI et al., 2017). The selection of materials can present technical challenges and limitations (TODESCHINI et al., 2017) and may have limitations regarding remanufacturing capabilities (LINDER; WILLIANDER, 2017). Technological barriers are also considered, as limitations can slow down the potential of scalability of the business (PAL; GANDER, 2018). The adoption of new technologies can be

especially difficult for small and medium companies, and the skills required usually need to match with the current staff in order to be implemented (RIZOS et al., 2016). In general, the literature identifies organizational and cultural barriers such as resistance to change (OGHAZI; MOSTAGHEL, 2018). However, for smaller companies this barrier can be less relevant, especially if the business have already adopted sustainable practices (RIZOS et al., 2016).

Challenges and barriers related to the partners' network are widely discussed in literature (LINDER; WILLIANDER, 2017; OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016; TODESCHINI et al., 2017; TURA et al., 2019). They are mainly related to the lack of channel control and supply chain support (LINDER; WILLIANDER, 2017; RIZOS et al., 2016). The implementation of sustainable supply chains require collaborative arrangements with the commitment of stakeholders to share knowledge and resources (TODESCHINI et al., 2017). Finally, there are also external factors that can influence CBM adoption. They are based on the support, or lack of, of the government and regulations (LINDER; WILLIANDER, 2017; OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016; TURA et al., 2019). It includes the availability of funding opportunities, training and effective laws, regulations and tax policies (RIZOS et al., 2016).

3.4. METHOD

In order to attain the purpose of verifying how a circular business model framework can be applied by fashion businesses, the research strategy was to conduct an exploratory research through comparative case studies with born sustainable companies from Brazil and Italy. Case studies are a suitable approach in the early stages of research on a topic and when little is still known (EISENHARDT, 1989), which is the case of circular business models implementation within the fashion industry. The case study protocol, which contains not only the instrument, but procedures and general rules to that guide the investigator (YIN, 1994), was developed based on the circular business model framework proposed in the first article of this research. The framework (figure 1) provides the elements of each business model component that are connected to the circular economy. The data collection in case studies should have multiple sources of evidence (YIN, 1994), and in this research it was done through interviews, documentation and direct observation. An interview was conducted with each of the four selected companies, following a semi-structured scrip that can be found in the appendix of this

paper. All the interviewees were founders of the companies, and all with the exception of one were also the designers of the brand. The secondary data was obtained from the companies' website, social media profiles, and media articles that were based on interviews. Direct observation was possible only in the two Brazilian companies, during the visits to the store and headquarter to conduct the interviews.

Figure 4. A circular business model framework for fashion apparel manufacturers based on the CBMC from Lewandowski (2016).

<table>
<tr><th>Partners</th><th>Activities</th><th>Value Proposition</th><th>Customer Relations</th><th>Customer Segments</th></tr>
<tr><td rowspan="3">- Recycling network (fiber recovery)
- Suppliers that share the same values
- Other types of collaboration</td><td>- Design for durability
- Design for recyclibility
- Efficient production
- Services
- Sorting
- Reselling</td><td rowspan="3">- Circular product
- Slow fashion
- Relationship with customers
- Product-service system
- Access-based model</td><td>- Customer engagement and education
- Responsible promotion</td><td rowspan="3">- Customer types
- Niche segments</td></tr>
<tr><td>Key Resources</td><td>Channels</td></tr>
<tr><td>- Recycled inputs
- Sustainable and renewable resources
- Envirn. safe materials
- People and know-how
- Technology</td><td>- Virtualization of sales channels and comm.
- Agile channels for increased customer interaction</td></tr>
<tr><td></td><td></td><td></td><td>Take-back System</td><td></td></tr>
<tr><td></td><td></td><td></td><td>- Collection and management of used garments
- Channels
- Customer relations</td><td></td></tr>
<tr><td colspan="3">Cost Structure</td><td colspan="2">Revenue Streams</td></tr>
<tr><td colspan="3">- Take-back system and value of incentives for customers
- Guidelines to account the costs of material flow
- Service structure</td><td colspan="2">- Selling collected material to recycling
- Access-based model
- From other services (reselling, repair)</td></tr>
<tr><td colspan="5">Adoption Factors</td></tr>
<tr><td colspan="5">- Organizational capabilities - PEST factors</td></tr>
</table>

Source: created by the author based on Lewandowski (2016)

To perform a comparative study, four companies were chosen, two from each of the aforementioned countries. Multiple case studies can provide augmented external validity, even though it can reduce the depth of study (VOSS; TSIKRIKTSIS; FROHLICH, 2002). The criteria used to select the companies was to be a small or medium size fashion apparel manufacturer that has a sustainable purpose from its creation. Companies should also have the implementation of at least one circular economy principle and be willing to participate and share information. The company size ranged from two to five employees, and they differed in their product offer. Companies B and C focus on the production of clothes, while company D produces clothes and accessories such as gloves and scarfs. Company A makes different accessories and offers a jacket model. Finally, the data was analyzed through the methodology

of content analysis, in which data is categorized with the purpose of classification, summarization and tabulation. The software NVivo 12 Pro was used to support the analysis by providing the coding of the data, which followed the elements of the business model framework.

Table 4. Case study companies and interviewees.

Company	Country	Product description	Interviewees
Company A	Brazil	Accessories made from waste materials	Founder and designer
Company B	Brazil	Garments made with natural and organic fibers	Founder and designer
Company C	Italy	Garments made with sustainable materials and zero waste	Founder and designer
Company D	Italy	Garments made with recycled fibers of cashmere and denim	Founder and business manager

Source: created by the author

3.5. RESULTS

This section presents the results of each of the four companies studied. In the following section, a discussion of the results is presented in the light of the current literature.

3.5.1. Company A

Created over the idea that we live in a world in which there is already too much stuff, the founders of Company A decided to use waste as a source for new products. In 2013, the brand started the production using tires and umbrella fabric as raw materials, implementing a circular production process from the beginning. Today, the company works with "batch" production: the items are produced with the material collected and are made available in lots through the online store until the end of the inventory. Each collection is composed of products such as bags, backpacks, purses, wallets and jackets. In addition to the collections, Company A also offers consultancy to companies that wish to turn their supply chain more sustainable, by the co-creation of products and implementation of circular processes. With the purpose of increasing the social and environmental impact of the business, the brand works with sewing cooperatives and encourages their customers to return the articles in their end of life so that reverse logistics is done.

The company defines itself as a social business that through the use of waste materials can positively impact cultural, social, environmental and financial aspects. An outstanding design has always been a premise, in order to attract people for aesthetic and not only because of the sustainable cause. The company creates garments that have no gender, and by offering eco-products it aims that customers can stay connected with nature. There is no collection calendar, the brand started with five products and today offers ten. In addition, there has been collaborations with artists and other companies. Even though the company itself is not currently considering to implement an access-base model, after participating different industry events with bigger players, the founder believes that it is a potential trend that companies are already thinking about how to address.

Company A has built a strong community with its customers, which even has its own name. Even though some consumers may buy only because of the products' design or attractiveness, the founder believes that the majority knows the company's purpose. According to her, today's consumers are already aware and well informed, and want to buy from a brand that has a purpose or that they know how the products were made. However, this changes from consumers to corporative clients, with whom the brand plays a stronger educational role and acts as a sustainable actor. That is because companies are used to bargain price when buying large quantities, what is not possible with Company A due to its manual production process. Therefore, the brand needs to show the product's added value and why they have a higher price when compared to conventional options. Although corporate clients can be more sensitive to price, the company knows that the price range of consumer products can narrow the customer segment, but it is a result of the fair production process.

The core of the design is the use of old umbrellas and tires, materials that otherwise would be considered waste. Different resources have been analyzed before the creation of the company, and the tire demonstrated to be an alternative to leather as it is impermeable and black. However, working with waste results in many challenges related to the design. There are limitations since the product has to adapt to the format to the tire, for instance, and extra care is required when sewing so as not to compromise the product's durability, as in the case of the umbrella fabric used in the jackets. The processes were created unaware of the circular economy, as at that time the concept was still not widespread. Since then, the design has evolved to enable disassembly, something that was not considered in the beginning.

In addition, there is the positive impact throughout the process, from the collection of these materials to the production. The value network that Company A has been building since

its creation is a very important aspect for the company. Working with cooperatives, even if sometimes they will not become suppliers, is a way to for the brand to leave a legacy for that community, which will have the opportunity to work with waste and generate revenue from it. The recycling cooperatives separate the umbrellas and used tires are bought from tire stores, making the pre-production network a crucial step and the first to be developed. Meanwhile, different sewing cooperatives work on the production of the garments that use the umbrellas and the tires.

The brand has headquarters at the city center, but the batch sales of the products is made online. Customers that register in the website receive a notification when a new batch is launched. Even though Company A as well as other fashion brands have a widespread use of social media, the founder sees a movement from other brands to a less online and more personal approach. The reference was a friend's fashion brand that relies on mouth-to-mouth and has a limited number of social media followers, resulting in an even more niched segment of customers.

Since it was created, Company A has tried different ways to sell its consumer products. Initially they were sold through a regular e-commerce in which they produced and then sold, but then the company moved to on-demand production in order to better manage the costs and the inventory. Thus, the brand has adopted the approach of batch production, in which the products are available periodically and is easier to manage the production. In addition, the company has started to work with corporative customers by first offering corporative gifts and special products, and then through consulting services. This was also a way to scale up the business, as they can produce bigger orders.

Company A aims to be responsible for the collection of used garments from its customers, which receive an identification tag with the product. However, it is still something that has not happened, probably due the young age of the company. One customer has contacted to return one product once, but as it was still in good conditions, the customer ended up reselling it in a second hand platform. The brand is committed to pay for the reverse logistics, even though they are not able to have a contract with the post service due to the high volume for delivers required per month. This system of reverse logistics is definitely something that could be improved and made more accessible. After the products are returned and if they are not in conditions to be used, the plan has always been to make a new product, although it was not very well defined what and how. However, currently the company is working in the development of a new material, which will be composed from the products that can no longer be used.

The interviewed founder believes that the solid waste law that is taking place in Brazil is starting to be effective now. In special for companies that hold an ISO certification or that need to renovate other certifications or licenses, which will need to be compliant with the regulation. Therefore, today companies do not rely solely on internal factors to implement circularity. In addition, there is also a movement towards innovation, in which companies try to implement new practices just because everyone else is doing it. Nonetheless, it is also valid even when companies do not understand why they are innovating, because they will still be trying to achieve sustainability.

3.5.2. C**ompany B**

Company B is a slow fashion brand from Brazil that focus on organic, natural, and low environmental impact fabrics. The production is made using natural dyes and manual techniques, resulting in timelessness, high quality tailoring garments. The brand was born from a naïve will to change the world and to enable a conscious and responsible consumption. Through the experience of the founder in fast fashion chains, she was disturbed by the inequality of the supply chain and that products were made only to fulfill financial demands. After working with permaculture, she realized that most garments that we produce still exist even after the disposal, because they are not made from degradable materials. Thus the choice to work with natural fibers.

The company aims to offer not only products that have are conscious in its design and production, but also to be a source of information, conversation and questioning about fashion and consumption. The focus is to help customers to reflect about what they already own, how garments can have their lifecycle extended and how to properly dispose in the garments' end of life. All this united to the products' design, which has to meet the customer's taste. Company B positions itself as a slow fashion brand, offering high quality items from basic t-shirt to garments that are more versatile, such as overalls that can be used in different ways. In addition, the brand does not follow a calendar of collections. Some products are the same since the creation of the company, and others are launched and offered for a shorter period, depending on the customer's acceptance. The price formation and time to develop and launch new products are also related to slow fashion. For the founder, slow fashion attends the needs of people who do not like to follow runaways and seasonal fashion trends. Company B offers the natural re-dyeing of the items as a service. With this process, the company also recovers other products

that are not from the brand, such as old garments that became yellowish, giving them a new life through a new color. Usually the founder suggests customers to buy the products in white, so they can be dyed with another color after they have been used, resulting in virtually a new garment. The re-dyeing is also made in cases of stains or discolor, and other sewing repairs are done if necessary. The relation with customers makes it accessible for them to come back and ask for support in case something happens to the garments, and this is the main difference comparing to large fast fashion brands. Regarding access-based models, Company B currently does not plan to work directly with this model, but knows other companies that are willing to start. These companies would buy the Company B's garments and add them to their renting or subscription catalog, therefore acting as partners.

According to the founder, in general the brand's customers are conscious about their consumption habits, which is aligned with the brand's purpose of questioning the product's origin, where it came from, who made it and why. For instance, there are customers concerned with how the sheep from the wool garments were treated and raised. There are three different customers' profiles. The first buys for the design, regardless the type of material used; next there are the customers who really support the cause and save to acquire a product made from natural fibers; and finally there is the type that is able to connect both perspectives. This type of customer is already aware of sustainable practices within fashion and already shop from sustainable brands. When it was created, the challenge of the brand was to find a balance offering items that are basic, but in which customers perceive an added value. For instance, customers would not understand in the beginning why a white cotton t-shirt had a higher price than a conventional cotton one.

After the sale, especially when it is made online, the founder always reaches the customers in a few weeks to collect feedback about the product and the experience. This brings a more human experience to the brand, as customers usually are not expecting such contact. In addition, one of the purposes is to teach customers that they can reuse garments that they already own, for instance clothes that belonged to the family and can have a new life after being repaired and dyed. Social media is a strong channel used to interact with customers, to have conversations and share information. The brand posts polls and games, and there is an open space for questions and to discover more about the brand. Through this platform, the company connects not only with its customers, but also to content consumers. Besides the contact through email and social media, there is also a website and a blog, which are updated weekly. The brand is part of a fashion collective store of sustainable and conscious brands, where the products are

available for sale. As the fabrics used are “plain”, they are easier to buy in the physical store as customers can try them out and also talk and learn more about the products. However, online shopping is growing, and because of that the brand tries to show many pictures of the clothes in different body types and to think in advance of questions customers may have regarding the products.

The company has access to all the production process through its partners and being a slow process makes it easier to control. For instance, the producers collect all fabric scraps, as the founder always have a destination for them. Even though Company B does not have a take-back system or perform other second life activities such as reselling, all items that cannot be sold due to a flaw in the production process are donated to a home for children that runs a second hand store. If the brand started to receive used garments, they could be resold through this organization, or transformed in scraps to be used in college projects if they were not in good conditions.

Regarding the design, the flat fabrics offer some additional challenges compared to knit garments, which adapt better to different body types. Another design challenge is to replace or avoid the use of trims or other non-natural components. For instance, even though the fabric is degradable and can be composted, the sewing thread is still made from polyester, as the cotton thread does not have the same quality. In addition, buttons are difficult to scale if not made from polyester, but interlining is completely avoided. Despite these challenges, all the fabrics are selected for being biodegradable. The materials used are organic cotton, linen, modal fiber and wool. Mixed compositions are avoided, with the exception of a basic top that contains elastane. Recycled cotton and recycled pet fabric have also been used, but the latter was abolished, as it is polyester. Concerning people and know-how, the company consists of the two founding partners and the production partners. As the natural dyeing is a manual and ancestral process, there are technological limitation only for automating and scaling up the processes.

The company’s network of production is very small. The dyeing process is made by the founder, an artisan makes the artisanal products, such as the wool items, a couple is responsible for the other garments and a cooperative makes the eco-bags. Around five suppliers provide the raw materials. The founder believes that sharing either the knowledge of the process or promoting the suppliers that work with organic fibers can strengthen the market, as this resource will become more recognized and acceptable by consumers, and maybe will even reduce its cost if there is a higher demand. The collective in which the company is based is an important

partner, as brands share information, knowledge and can also share orders to the same supplier. Finally, the home for children that receive the garments that cannot be sold is the main partner for the product's second cycle. The institution welcomes children in socially vulnerable conditions, and teach and prepare them to have a profession.

Regardless of the color, the products have the same price, as it is not possible to separate the costs of the dyeing. Therefore, when customers buy a white garment and want it dyed afterwards, it is already included in the price. For other cases, the customer pay for the re-dyeing, or for the transport in case of repair. The implementation of the take-back system would generate extra costs that possibly would have to be added to the product in order to cover for the logistics and partners. The manual nature of the company's process makes it difficult to accelerate and develop a scaling up plan. Due to the strong human and handmade aspect, the founder states that it is easier to be a small company in today's market.

Regarding the adoption factors, the company has no current incentives to work with sustainable or ethical fashion, not even for working with cooperatives. Certifications are not required in Brazil yet, but they are needed to export and sell abroad. The company has participated in an international fair and all components had to be specified in the product's tag, a more complex process than it is required today for Brazilian companies. Moreover, the founder states that a certification such as the "B Corporation", which recognizes companies that balance profit and purpose, should be adapted for small brands, as the available model does not fit for companies that have few employees. For the founder, small companies are showing big players that it is possible and necessary to make more sustainable products and process. For large companies, the cost of resources or the relationship with suppliers is still a priority, even if the materials are not sustainable. The result is complex as sustainability focus on quality and durability while fast fashion focus low cost and accessibility.

3.5.3. Company C

Company C is an Italian company based in Milan that offers high quality garments focusing on two pillars: zero waste and traceability and transparency of the production and supply chain. The brand design all its products using the zero waste technique, which eliminates textile waste and reduces pollution and the demand on natural resources, and has 90% of sourcing and production taking place in Italy, where it is fully controlled by the company. The items offered are timeless, durable, and oversize, aiming the creation of a connection with the

fashion garment. Company C is the result of an intense research project on sustainable innovation and luxury, and the founder and designer is continually searching for better and more sustainable resources to use in the collections.

The interviewed founder's goal has always been to optimize textile and fashion processes. The company's value proposition is based on the pillars of zero waste and responsible sourcing, and today being locally sourced and "made in Italy" is a strong strategy. However, the founder believes this value can change as new materials are created and the production evolves. Being local is currently a viable strategy for small companies that aim at responsible sourcing, because suppliers can be visited and controlled without major travel expenses. The search for new and better resources is the reason the company is not focused on one type of material, such as organic or recycled fibers. Despite not identifying itself as slow fashion, the brand presents some characteristics. There are two collections launched per year, and the items that are not sold are either used in the next collection or sold at an outlet focused on sustainable designers. The garments are timeless and oversize, which means they adapt better to different body shapes and so they can last a longer time. In addition, durability and high quality are essential to the brand's collections.

The brand was initially targeted for women between thirty and forty five or fifty years old that would understand the value of the garment. However, the customers' average age is higher, ranging from forty to fifty five years old, which is possibly because this group has the budget to access the clothes. According to the founder, the consumers perceive the high quality of the garments, as they are made with very high quality materials, and like the shapes of the products, but not necessarily are aware of the sustainable and responsible sourcing values. The collections are sold in third party stores through Italy, such as small conventional and multibrand stores, and also online to all Europe. Because sales channels are mostly indirect, the brand currently does not have a strong community with its customers. A few times a year private events are hold to customers and partners, where there is an opportunity to share more information about the brand. Besides that, the hand tag of each garment contains information about the involved suppliers, in an effort to connect the final consumer to the suppliers and me more transparent. A list of all suppliers is also available on the company's website.

Considering the aforementioned design characteristics of zero waste, timeless, durable and oversize, one challenge for small designers that aim at responsible sourcing is the minimum purchase amount of the fabrics, which are often very high. Fortunately, the brand has access to platform called C.L.A.S.S. eco hub, which offers sustainable and innovative fabrics and yarns

from 1 meter up to 50 meters, making easier the production of smaller quantities. For the founder, the materials used in the brand's collections are usually connected to the circular economy, as for example the Reverso Wool, a transformed wool made in Italy from pre-consumer scraps, and recycled polyester "New Life", from plastic bottles collected within a specific Italian region. The latter is done through a mechanical process, rather than the usual chemical process through which polyester is transformed. Occasionally organic silk is also used in the production. Not always natural fibers are selected if they can compromise the quality and durability of the garment, which is the case of natural fiber threads. In such cases, a synthetic yarn is used, even if it is not the ideal solution for the environment.

The company currently does not offer services such as repair of its clothes, but this is something they would like to implement in the future. The main reason is that the garments are mainly sold through small and multibrand stores, resulting in not much direct contact with the consumers. The founder believes it would be expensive and challenging to collect the garments from different places with the company's current structure. The same applies to the take-back system, which has not been implemented yet, but would require an improvement in logistics. Regarding access-based models, in the past Company C has already joined renting platforms such as VIC and Dress You Can, and believes it is a model that should be further explored and expanded.

Responsible sourcing being a key pillar, the partners and suppliers network is a central element for Company C. About 90% of the materials sourced are from Italy, and the manufacturing takes place between two Italian cities. It is a condensed supply chain where the company has the opportunity to check all the steps. However, it is not always easy to find and collaborate with new partners. Sometimes companies have sustainable practices but do not communicate it, and in other times companies state many things, but they do not share more information about it when asked. The search for a new supplier has to go beyond the information available on the website, but fortunately, companies are usually open to receive a visit. Another challenge regards the zero waste method, as usually companies are used to another way of production and may seem impossible to use all the fabric. In these cases, the brand has to talk to the partner to find a solution together. Other important partners are the stores in which the garments are sold, which are always under revision. Some collections can be suitable for some stores for only one season, while for others it can be suitable for several seasons. The responsible sourcing platform *(C.L.A.S.S.)* is also a key partner as it connects the designer to different materials from responsible and innovative suppliers around the world.

For the founder, the trend of sustainability is an opportunity for Italy, as the country cannot compete on price with other manufacturers. As quality is now integrating with responsibility, Italian companies have the opportunity to communicate what they are doing. However, there are not incentives from the government, apart from the high taxes applied to waste. Therefore, these high taxes motived the waste reduction, as companies do not want to expend a high amount of money, and they start to optimize, to recycle, and find second uses for their scraps. Some regulations already demand a list of requirements companies need to fulfil, but they are no very strict. Companies located in national parks zones have more restricted requests in terms of water and energy management, for instance. Finally, Fashion fairs are giving more attention to sustainable brands by highlighting them in their expositions, what encourages other companies to adopt new practices.

3.5.4. Company D

Company D is a garment and accessories brand that uses 100% recycled fibers in the production, offering high quality products made from old cashmere or denim cotton clothes. Located in a textile district in central Italy, the company utilizes a recycling technology that exists over a century and is the base of city's history with garment production. After years living abroad and working with manufacturing in countries such as Vietnam, Company D's founder found a solution for the waste problem he was facing at his own hometown. In this way, the brand "combines the protection of the planet with the old tradition of a city known throughout the world for its textile innovation". With around one year and a half, the brand produces sweaters, ponchos, socks, gloves, hats and towels.

The company is based in the three values of sustainability, quality and responsibility. The first is because they want to do something for the environment, as for the second it refers to being locally made in Italy. Finally, the brand aims to be responsible ass part of the online revenue is donated to local NGOs and other institutions from the city. The process used is defined as upcycling as it transforms scraps into something more valuable. By taking back this existing tradition of the textile district, the brand was able to integrate a circular model inside the fashion industry, with 100% upcycled fabrics in "Km 0". Company D promotes a slow fashion process against the traditional fast fashion model of production and consumption, which means garments are made to last more and that there is an attention to the production quality and the rights of people involved, considering the social and environmental impacts.

According to the brand's founder, the market has changed and if formerly other companies would not tell that the garment was made from recycled fibers because it was not considered an added value, today customers not only accept products made from recycled fibers, but they buy from the brand because of that. The company offers a more affordable product when compared to a traditional cashmere sweater, because the production process of recycling cashmere fibers turns to be cheaper than the use of the virgin material. While a cashmere knitwear is around 120 euros, Company D's product costs 90 euros. Therefore, the brand is not concerned with niche segments of customers, as the idea was to create a product more accessible and they are competing on price.

The company makes an effort to inform their customer about the products, to reassure the quality and show why they have their price. To keep the quality during the usage, washing advice is provided on the tag of each item, as well as the product composition. In order to encourage conscious consumption, Company D does not run any promotions or discounts, neither participates in sales events such as the Black Friday. Instead, before every launch there is a pre-sale campaign, in which customers can acquire the products with a reduced price as they wait more for the production. This pre-sale campaign also helps Company D to understand the demand of the market and the preferences about colors, providing a better control and therefore avoiding overproduction.

Company D's products are high quality and can be recycled again in their end of life. As mentioned, to produce the garments only recycled fibers from cashmere wool and denim cotton are used, being the latter a more recent implementation. The recycled fibers come from old clothes that have proven composition through the tag, and are transformed into yarn to be used again in the production. The production process reduces the amount of water, pesticides, energy and chemicals used. In addition, the products are not dyed, which also saves water and avoids chemicals. The "Km 0" production means that all the products are crafted in the textile cluster within a 30km radius. Besides saving fuel consumption on the transportation, this support the creation of local job opportunities and gives the company access to control the quality and ethics of the entire process.

Regarding services, the company offers within Italy the repair of garments that are still in good use. There is a take-back system available also only for Italy, in which customer can send for free their old sweaters, scarves, cardigans and socks that are 100% cashmere, and receive a voucher of 10 euros to use with the brands products. In the future the system should be expanded for other European countries as well, and even if the company is responsible for

the costs of collection, it is not considered a restraint as they believe for the expansion. Although the take-back system had always been part of the plan, it was not implemented from the beginning. Moreover, as the company is only one year and a half, it is still early to start receiving back their own products, but it is planned to increase this communication for customers in the future.

As all the production takes place in the textile cluster, Company D has a very close network of partners, around ten in total. The brand does not own any part of the production process, and therefore counts with different partners for each step. They are mostly local, small and medium size enterprises that make the yarn and the garments. The source of the used garments is another important part of the chain. There is a market for these "leftovers", which are normally collected by NGOs and cooperatives, and they work as intermediaries as they collect and trade used garments. Otherwise, the company also collects directly from consumers. The sales channels are other key partners, as besides their physical and online stores, Company D sells in around fifty different boutiques across Europe, Japan and Canada. The main challenge concerning the exports is that as the company is new, partners have to know well the brand in order to ask for bigger purchases.

According to the founder, there are currently no incentives from the government to perform the collection of old garments, however it is as essential area in which they should take action. There should be more accessibility for businesses to make the collection in order to implement a really circular system. In addition, there should be a law regarding the reuse of materials, but it is still not in place. In the founder's vision, Italy is still behind on such regulations when compared to other countries of the European Union. Despite the lack of incentives, Company D has not faced other challenges even when exporting, as certifications is something already common in Italy and they have already implemented.

3.6. DISCUSSION

This section aims to highlight the aspects regarding business model innovation of the four studies companies in each of the business model components, as well as to analyze the challenges faced.

3.6.1. Value proposition

The four companies selected for this research shared the concern of reducing the environmental impact of the garments produced, but they present different ways to do it (STÅL; JANSSON, 2017). In these case studies, this concern was translated mainly in the use of waste materials, the recycling of post-consumer fibers, the use of natural resources and the optimization of the processes to avoid waste. In addition, all brands shared the responsibility over the social impact by being aware of the production process and choosing to partner with local and small companies and cooperatives. Although not all companies identified themselves directly with slow fashion, they have many characteristics in common. The products are designed to last longer, and Company B and Company C stated that timelessness is a core characteristic. Company A and Company B do not have a calendar of collections, which means some products are the same for years and eventually new products are created, which then depend on customer acceptance. For Company D, slow fashion is not only to do things slowly, but for them to last longer than conventional fast fashion products. The risk of cannibalization and fashion vulnerability of offering more durable products and garments that do not follow fashion trends did not appear to be a threat the studied companies (LINDER; WILLIANDER, 2017). Furthermore, to have slow processes seems to be a bigger challenge to escalate the business than the restriction of the customer market of slow fashion itself (PAL; GANDER, 2018).

Apart from Company C, which aims to implement in the future, all other companies offer some kind of service, in special repair. Company B offers the repair and dyeing of garments, including the dyeing of white items that is added in the initial price. Additionally, it offers the dyeing of other products that are not from the brand. Company D offers the repair of cashmere sweaters and the collection of cashmere garments, while Company A repairs products when necessary, as the design in made to be strengthened. None of the studied companies currently runs or is part of an access-based model, however, apart from Company D, they all consider it a potential opportunity in the future. Even though they are not willing at the moment to have it directly implemented in their own business model, Company B and Company C mentioned they know companies that provide this service and could work as partners by adding the products in their catalog. Even though Company A has no plans towards an access-based model at this time, from the consultancy projects and other initiatives within the fashion

industry the founder recognizes it as a trend that many companies are already thinking to address.

3.6.2. Customer segments

As they offer diverse products, the companies target different customer segments. In spite of that, they share the fact that many customers are already aware of the environmental and social impacts of the fashion industry, while others are not aware and buy from the brand because of the design or other features. For instance, in the case of the upcycled fibers from Company D, many customer buy the products because of that, what also shows to be no restrictions related to used materials in fashion (LINDER; WILLIANDER, 2017). Company B, with its natural fibers, states to experience different levels of awareness, while for Company C many customers buy because of the high quality materials and the design shapes. In addition, most companies target niche segments due to the garments price range. As companies were already created based on the value of sustainability, there seems to be less challenges regarding the customers, such as customer expectations (TODESCHINI et al., 2017), which are easier to manage comparing to fast fashion firms.

3.6.3. Customer relations

The companies have shown different ways of building customer relations, although they all share an effort to inform customers about their products origin and characteristics. Company B has a very active communication after the purchase via email and uses social media platforms as a source of information and questioning about conscious consumption. For Company A, the corporative clients need much more education regarding sustainability, as consumers usually are already more aware. Even though Company C does not currently have a strong customer community due to the indirect sales model, the company runs private events sporadically and focus on sharing information about its suppliers through the garments hand tags and the website. Lastly, Company D performs a responsible promotion by not making sales or offering discounts, in exception of the pre-sales campaign, with the purpose of encouraging a more responsible consumption. Overall, the brands seem to make an effort towards customer education, possibly reducing the risks of consumers not recognizing the value of their products (TODESCHINI et al., 2017).

3.6.4. Key activities

The brands rely on different design strategies that aim the durability of the garments, which is strongly related to the quality of materials used and the production process that many times is manual. Besides the timelessness of Company B's and Company C's items, the former also includes versatility, meaning that garments can be used in different ways, while another design strategy adopted by the latter is to make clothes oversize, so they can fit different body shapes. Nonetheless, the companies face different challenges in the design phase, as stated by Todeschini et al. (2017). Company B makes constant revisions in the products design, because of the challenge of using flat fabrics such as cotton, and to try to use less trims in a way that does not affect the product's attractiveness. Replacing or removing non sustainable components is a challenge for the two aforementioned companies. On the other hand, Company A's challenges are mainly related to work with waste materials, which are more limited than conventional resources and thus require further testing and studying to reach the right design. From the creation of the brand, the design has evolved to have an easier disassembly. Likewise, due to the fiber recycling process, Company D's products are designed to be recycled. The recycling process also saves resources and avoid the use of chemicals, which is also the case of some materials used by Company C such as the polyester New Life, that uses a mechanical process instead of chemical. Finally, Company B states the having a slow production makes it controllable, for instance to collect scraps so they can be used in something else. Besides the offer of services previously mentioned in the value proposition section, some brands have additional activities. For instance, Company A provides consulting services with their own tool called Vital Design, and Company B offers natural dyeing workshops. Despite none of the brands current work with reselling, there are different destinations for the next cycle of the product's life. Company B donates garments that cannot be sold to a social institution that runs a thrift shop, while Company C sells the products that were not sold in one collection in a special outlet.

3.6.5. Key resources

The main materials used by the companies differ. Starting with the natural fibers from Company B, which are compostable even though this is not communicated due to the synthetic thread and other trims. Interlining is avoided, as it includes glue, and all scraps are donated to university projects. Company C works with different types of sustainable and innovative

resources, including circular materials such as the Reverso Wool. The biggest challenge regarding the sourcing of material is the minimum purchase amount of textile, which are usually large for small designers. In the case of Company D, wool and cashmere were already materials used in the textile cluster, but the company was able to expand the process to denim cotton as well. It was possible to notice that the choice of materials sometimes faces a paradigm of quality, as not always the more natural alternative will be the more durable. For instance, if it affects the design, the aesthetic will always come first. For Company A, not only is more difficult to design using waste materials, but they also require manual work, making more difficult to escalate the production. Possibly because they are small companies, people and know-how were not very emphasized. The founders are usually also the designers and the challenge is more about educating partners, both manufacturing and material suppliers, about the practices and methods. In addition, as many processes are manual, as the techniques of natural dyeing from Company B for example, there do not have a need of new technologies. At the same time, however, new technologies could be useful to automate and escalate the operations. Therefore, although technology may be needed for further expansion, it is not considered a major challenge in the current business models as pointed by the literature (OGHAZI; MOSTAGHEL, 2018; PAL; GANDER, 2018; RIZOS et al., 2016; TURA et al., 2019).

3.6.6. Channels

The studied brands have presented different combinations of sales channels, mixing online and offline, direct and indirect channels. The batch collections of Company A are only available online, while Company B counts with the online store and the physical store of the collective from which it is part. The Italian brands Company C and Company D are also present online, but count with other multibrand stores and boutiques in different locations to sell their products. All companies but Company C have a blog, and all have social media profiles to connect with its customers, although Company B uses them more actively as it is part of the purpose of the company to share information and have a conversation about conscious consumption.

3.6.7. Partners

Each with its own particularity, the companies' network of partners and suppliers is a component with a key importance. First, as brands share a concern for the social conditions and

to fair recognition of all the involved, they all demonstrate to care and to have a close contact with all steps of the supply chain. Starting with the resource suppliers, the companies that work with natural and sustainable materials, Company B and Company C, have a selection of partners that provide the high quality resources that meet their criteria. For the latter, the selection of new suppliers is more frequent as new materials are always sought. For Company D, the sourcing depends on the intermediate markets usually run by NGOs and cooperatives that sell old cashmere and denim garments, which can also be collected directly from customers, while Company A has built its own pre-production network by collaborating with recycling cooperatives and tire stores, resulting in a long way before the waste material goes to production. The garments' manufacturing of all brands is local, made by artisans, small and medium size companies or sewing cooperatives. Some brands sell their products in third party stores, however the only examples of partnership for the second life were the children's home from Company B that sells the items in a thrift shop and the designer's outlet from Company C. In the literature, partners and supply chain are one the main sources of challenges and barriers regarding the circular economy implementation (LINDER; WILLIANDER, 2017; PAL; GANDER, 2018; RIZOS et al., 2016; TODESCHINI et al., 2017; TURA et al., 2019). In fact, Company C highlights that the sourcing of materials takes time and it is required to explain the sustainable practices for the companies it would like to work with. That is because some, already with their processes in place, are hesitant to apply new methods, such as zero waste.

3.6.8. Cost structure

With the exception of Company D, which is able to reach a cheaper production process with recycling rather than virgin fibers of cashmere, the other companies show that sustainable fashion can represent higher costs compared to the traditional model. This is due to different aspects, such as the use of manual techniques and high quality and sustainable materials, and the recognition and fair pay of labor throughout the supply chain. While these brands acknowledge they offer a higher price range, Company D aims to be competitive in price. It is possible to notice that the companies that already have the take-back system implemented, Company D and Company A, have embedded the costs of reverse logistics in their model. On the other hand, for Company C and Company B these costs would still need to incorporated, and would result in a higher price in the products for customers. Overall, from the possible

economic and financial challenges and barriers related to the cost structure, the high costs appears to be the main one for the studied companies (TURA et al., 2019).

3.6.9. Revenue streams

Even though none of the companies has currently implemented an access-based model, which would have a strong influence over the revenue streams, some companies propose alternative sales models for their products. One example is Company A's batch production, in which the products are available for a limited time each batch launch. Company D's pre-sales campaign also allows the company to have an on-demand production, better controlling the quantities and inventory. Finally, an additional revenue source from Company B is the natural dyeing of products of any brands. In addition, the two Brazilian companies revealed alternative revenue sources to the sale of products, such as workshops and consulting services, supporting the idea of multiple profit pools in circular models (ROOS, 2014). In this way, the knowledge used to design and produce the garments is accessible as a service. The two brands also mentioned about scaling the business. Company A is growing in a very slow and gradual way, while for Company B the type of handcraft process is something that can make acceleration more difficult.

3.6.10. Take-back system

Only two companies have already implemented a take-back system to collect their used products. Company A communicates to its customers that once the garment is too old, it should be returned instead of disposed. However, so far they have had on tentative of return, which ended up being resold as it was still in good conditions. What happens to the end of life products is still being validated, but one alternative is to make another product, and recently the company has been developing a project to create a new material from used resources. Company D, on the other hand, has a take-back system for any cashmere and denim garment in order to recycle the fiber and produce new clothes, and offers a discount voucher on new garments. At the present, the system is only available in Italy, but should be expanded for other European countries in the future. Company C and Company B also showed interest to implement a take-back system in the future. The brands that offer this system are have already a circular model due to the use of recycled fibers and waste material, therefore not presenting a decoupling from

their core value as it happens with fast fashion and other premium brands (STÅL; CORVELLEC, 2018).

3.6.11. Adoption factors

The analyzed companies share the same characteristics regarding the creation of the brands, as due to personal experiences and principles, the founders wanted to do something different from the traditional linear fashion model. They have not referred to and did not seem to face internal and organizational barriers, as raised by some authors (OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016; TURA et al., 2019). Interestingly, most companies do not use the term "sustainable" in their definition or communication. Either for being too broad or not willing to fall into a "green washing" perception, the brands prefer to focus on the specific ways collaborate to a more sustainable fashion, using words such as natural, responsible, positive impact and upcycled. As for the external factors, companies also agreed that there is a lack of support from the government to implement sustainable and circular practices (LINDER; WILLIANDER, 2017; OGHAZI; MOSTAGHEL, 2018; RIZOS et al., 2016). It ranges from a resource perspective, such as working with reused and waste materials and collecting used garments, to a social perspective, of for instance working cooperatives. For Italy, it was mentioned that high taxes for textile waste are motivating companies to reduce waste in order to have financial savings. Although soon there may be regulations regarding the reuse of resources, Italy is still considered behind in this aspect when compared to other European countries. On the other hand, certifications are already something common, on the contrary to Brazil. In the South American country, the national plan for waste management (Plano Nacional de Resíduos Sólidos) is presumed to have an effect on fashion companies that need to renew licenses and certifications such as ISO.

3.6.12. General discussion

Circular business models in the fashion industry can present different designs. The four sustainable fashion businesses of this study demonstrated different material sourcing for their products, from the use of waste materials (Company A), recycled fibers (Company D), natural fibers (Company B), and multiple sustainable and innovative materials (Company C). This reflects different ways the circular economy is related to the companies' value proposition, which can be through upcycling and garments that can be recycled into new garments, to the

focus on extending the product's life through services, or zero waste techniques. The companies that work with recycled or reused resources, Company D and Company A, already embrace the responsibility for the end of life of their products, being the only brands to have a take-back system and therefore being more likely to close the loop. On the other hand, Company B and Company C, by focusing on zero waste and low impact materials respectively, are more likely to narrow and slow down the loops, especially in the case of services offered to extend the garment's lifecycle. However, the brands share many aspects in common. They rely on local supply chains with which they have a close contact, caring for good conditions and fair recognition of the involved. In addition, they offer or aim to offer, as in the case of one company, services of repair. Although the degree of intensity differs, all the brands aim to inform their customers of their products, processes, and partners, raising awareness about sustainability. As they were selected for being born sustainable, they share similar motivations from the founders that led to the creation of the brands. In general, they agree also about the external factors, especially that they could benefit from governmental support. Finally, some companies presented alternative sources of revenue by offering services decoupled from the garments production, as well as others consider to partner with access-based model companies in the future.

Considering the results of the case studies, it is possible to notice that the first important step towards a circular model relies on the design, which refers to durable garments made with quality sustainable or upcycled resources. Next, is the offer of services that aim to extend the product's life cycle, such as repair. In this step, customers must be able to count with the support of the company and the level of relationship is intensified. The implementation of take-back systems comes next, as it can be more natural for companies that use recycled or recovered materials in their production, but can be seen as a future move for brands that rely on sustainable virgin resources. This illustrate a different approach from large fast fashion players, which many times implement collection systems without applying other relevant changes in their product design or business model (STÅL; CORVELLEC, 2018). In addition, differently from other industries where the circular economy implementation is focused only on the environmental and economic aspects (PIERONI; MCALOONE; PIGOSSO, 2019), in fashion the social dimension is also considered from the beginning. Although the key partners and customer segments were not deeply explored by the companies during the case studies, they are key for a circular chain as identified in the literature (AMINOFF et al., 2014; BOCKEN; SCHUIT; KRAAIJENHAGEN, 2018).

Throughout the research, some challenges and barriers of implementing circular business models were identified. Firstly, there are challenges related to the design, which may vary from replacing non-sustainable materials to limitations of waste materials. In addition, different design techniques, such as zero waste, may require additional effort to find and educate partners. The selection of resources can lead to a quality dilemma, in which the natural or sustainable material will not provide the same quality as the non-sustainable alternative, compromising the garment's durability. To improve process automation and scale up the business is another challenge that can arise from the manual production process and the human aspect of the brand or resource restrictions such as waste materials. Furthermore, manual and fair production process, as well as some sustainable resources, may result in high costs, a challenge in the pursuit for financial viability of businesses. The take-back system implementation may imply not only in additional costs, but the additional structure needed can be challenging for small businesses to implement. Finally, there is the lack of governmental support, as companies today do not have any kind of incentive to transition towards circular models.

3.7. CONCLUSIONS

This paper sought to understand how sustainable fashion companies implement the elements of a circular business model framework designed for the fashion industry. For that purpose, four case studies with fashion brands from Brazil and Italy have been carried out, based on the framework developed in the first paper of this research. The companies were small fashion apparel manufactures that offered different products and value propositions, ranging from recycled and waste materials to natural and sustainable fibers. Results show that a fashion circular model should be based on the garments design, which embraces the circular economy principles of durability and use of safe and sustainable materials. The offer of services aimed at product life extension is a key characteristic of a circular model, as customer can count on the support of companies increasing their interaction. Finally, the take-back system is a crucial part, even if its implementation may occur in the long term.

Even though this study was not an experiment that can help the transition to a more sustainable business model (BOCKEN; SCHUIT; KRAAIJENHAGEN, 2018), the developed framework can still guide companies by demonstrating the possible changes and adaptations

they can run in their business models to achieve a transition to a circular system. The fact that there were some differences from findings of the literature suggest that this profile of born sustainable fashion companies must be further explored in focused studies. Limitations of this research include the impossibility to generalize the results for all the industry due to the specific company profile and restrictions of the selected method. Therefore, further validation and testing of the framework and the raised topics on the implementation is recommended in future research.

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4. CONCLUSION

This research has investigated how the adoption of circular economy principles affects the business model of born sustainable fashion companies. To accomplish this goal, the study was conducted in two subsequent papers. First, an existing circular business model framework from the literature was adapted to suit the reality of small sustainable fashion businesses, showing that the circular economy principles can be adopted in many ways in the business model. In the second paper, the implementation of the framework was analyzed by conducting four case studies with companies from Brazil and Italy.

While the first paper raised theoretical inputs of how each business model component could be influenced by circular principles, the second paper was able to demonstrate practical evidence of how companies are dealing with the implementation of circular models. The first paper highlighted the overall responsibility of fashion brands, from the design of the product to its end of life, and the provision of services, such as repair and customization, that changes and intensifies the relationship with customers. Different second life options were also indicated after the collection of the garment, such as reselling, donating, and recycling, what can be done through partners. Although not all theoretical elements were present in the case studies of the second paper, the results show that brands share some of the aspects when trying to reach circularity. They offer durable and quality garments and have a special attention to the social pillar, as they are concerned with the conditions and remuneration of the workers.

Although the literature highlights the creation of new offerings as core to circular models (LINDER; WILLIANDER, 2017), fashion companies still retain the main value in the first product offer, as it was shown in the development of the framework and in the case studies. One possible reason is the costs and processual challenges of implementing additional activities such as reselling in a traditional sales model. Some companies rely on the reuse of materials to produce the garments, such as waste materials or recycled fibers, however that is not always the case. Therefore, although reuse may still be not very applicable for many small fashion companies, slowing the loop is still the strongest strategy within fashion especially due to the services to extend the garments lifecycle. The take-back system was shown to be a future step for companies that source sustainable and natural materials, while it was already implemented by the brands that used waste or recycled material. Although of high relevance for achieving a circular model, additional costs and required process or structure appear to be a challenge for

small companies to implement it. Besides recycling, the few second life practices (i.e. reselling or donating) implemented were both pre-consumption.

The two studied countries showed to be in different levels concerning regulations for circularity in fashion. In Italy certifications are commonly required and some practices such as textile districts regulations and taxes for textile waste appear to be already in place. In addition, the country has to comply with the plans stablished by the European Union, which are more ambitious towards the circular economy. In Brazil, on the other hand, small companies feel that the textile industry is still not being contemplated by the national solid waste regulation. Either way, brands from either locations affirmed that there is a lack of incentives to implement sustainable or circular principles, from garment collection to working with cooperatives.

The circular economy is a multi-loop system in which many activities can take place with the final goal of extending the lifetime and retrieving them back to the system. However, many times it is still confused with the final step of the consumption cycle of returning and recycling. Overall, this study was able to demonstrate the different ways the circular principles are incorporated by the fashion industry, from the design strategies to the offering of services. The framework can help businesses and practitioners that are willing to move from a linear to a circular system to understand the basic premises and the other multiple opportunities within circular business model innovation.

The research present some limitations. First, the developed framework is generic, meaning that it was not built to attend one type specifically of the different business models that exist. In addition, it is not possible to generalize the results for the entire industry due to the specific company profile that was chosen and due to method limitations, which raised assumptions but still need further validation and testing. The business model approach can be too broad, not allowing much detail on each of the components. For instance, relevant factors such as partners and customer segments were not deeply explored by the studied companies. Further investigation of this subject is suggested. Future research should have a bigger sample and use quantitative methods. Focus on one country can better examine the influence of external factors and support the creation of public policies. In addition, other design methods and tools that support the circular business model implementation can be analyzed, such as guides, steps and processes. Finally, research into innovative business models that retain product ownership is needed to explore the potential of circular economy within the fashion industry.

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APPENDIX – INTERVIEW SCRIPT WITH COMPANIES

I am a Master student and this interview is for my thesis research, which is about the impact of transitioning to a circular economy in the business model of fashion companies.

This interview has the purpose of analyzing the implementation of circular principles under the perspective of the business model, aiming at understanding the changes occurred during the transition to a circular model.

The circular business model used in this study is based in the Business Model Canvas from Osterwalder and Pigneur, which is composed of nine components. The framework was already adapted to included two additional components specific for the circular economy.

In this research, we consider that the circular economy is a system "restorative and regenerative by design and aims to keep products, components and materials at their highest utility and value at all times", which can be reached by narrowing, slowing and closing material and energy loops.

1) Can you talk a little about the company? Why it was created, with which purpose, how does it position itself, what are the products and differentiators?
2) What do you understand by circular economy in the fashion industry / business? What do you consider essential attributes or actions for achieving circularity within fashion apparel manufacturers?
3) What is the relation of the company with the circular economy? (has it already transitioned, its implementing…)
4) How do you think the adoption of circular economy principles affects the way the company delivers its value to the customers? (value proposition)

- Circular products
- Slow fashion
- Relationship
- Services (product-service systems), such as repair, maintenance and customization
- Access-based models (such as renting, leasing and subscription)
    a. Do you think the slow fashion/timeless products are vulnerable for not responding to fashion trends? Could slow fashion slow down sales?

5) What impact can the circular economy have in the customer segments of the company?

- Customer types
    a. Do you think the target audience is someway restricted because of slow fashion (niche segment)?
    b. Are there customer restrictions regarding the type of product? (eg.: second hand, recycled material, etc)
    c. Is there a lack of awareness from customers regarding sustainability and circularity?

6) How the company's channels (sales, communication, and distribution) are impacted by the implementation of a circular system?

- Virtualization
- Online or premises
- Partners (eg.: post)
    a. What is the consequence of an increase interaction with customers? (services, take-back system)

7) How a circular business model affects customer relations?

- Customer engagement and education
- Responsible promotion
    a. How difficult it is to implement this education?

8) What changes can happen in the key activities of the company?

- Design for longevity and/or recyclability
- Production efficiency
- Services of repair and customization
- Sorting of returned items (reselling, donation, recycling)
    a. What are the challenges of the design phase? Do the products have restriction for recycling or remanufacturing?
    b. How much do these additional activities require new resources?

9) And in the key resources, that is the physical, financial, intellectual and human resources necessary for the business operations?

- Recycled inputs
- Sustainable and renewable resources, materials that are environmentally safe (e.g. no toxic substances or micro plastic)
- People and specific know-how

- Technology (e.g. equipment)
    a. Are there limitations or lack of knowledge?

10) What changes regarding the key partners and suppliers?

- Recycling network
- Other types of collaboration
- Suppliers that share the same values
    a. What are the challenges related to the network? Are there restriction or lack of support?

11) How the change to a circular system influences the revenue stream? That is, the value customer are going to pay, for what and how they are going to pay.

- Resell or selling the collected materials to recycling
- Services (repair, customization)
- Access and usage-based models (renting, subscription)

12) How the cost structure, considering all main costs of the business, can be affected?

- Take-back system and value of incentives for customers for returning the garments
- Identify the costs of product development or the cost savings from circularity (Guidelines to account the costs of material flow)
    a. How does the company deals with reused/recycled inputs, regarding taxes?
    b. Are there other economic or financial barriers?

13) How the take-back system can be organized?

- Take-back management
- Channels
- Customer relations

14) What are the main adoption factors related to transition to a circular economy?

- Organizational capabilities
- External factors (PEST factors)
    a. How could the company benefit from the support of regulations? For instance, fiscal incentives / tax breaks?
    b. Are there internal organizational barriers?