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BUSINESS MODEL INNOVATION FOR CIRCULAR ECONOMY: A FASHION INDUSTRY PERSPECTIVE

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1. INTRODUCTION

Through the notoriety of sustainability worldwide, Circular Economy (EC) emerges as a potential strategy for the development of business practices based on environmental concern (Korhonen, Honkasalo, & Seppälä, 2018). From a restorative perspective, the CE seeks to change the systemic logic of economic activity (Ellen MacArthur Foundation, 2013). Thus, it proposes that companies no longer operate in a linear production and consumption system, but in an economy based on circularity(Prieto-Sandoval, Jaca, & Ormazabal, 2018), in which aspects of sustainability are essential for shaping the performance of companies and the relationships among these and other social and economic agents.

As the CE is a strategy for achieving sustainability(Pieroni, McAloone, & Pigosso, 2019), companies began to innovate in their business models (BMs), aligning them with the circularity precepts. As BM correspond to the ways companies adopt to improve market performance based on new ideas and technologies (Chesbrough, 2010; Teece, 2010), CE adoption takes shape through the business model innovation (BMI), which makes it possible to integrate a new logic focused on environmental and social issues. Thus, business model innovation for Circular Economy (BMI4CE) has the potential to spearhead the necessary changes in companies' action towards systemic environmental preservation, generating positive impacts in the economic sphere and sharing of superior environmental, social and economic value among the agents (Prieto-Sandoval et al., 2018).

Innovative BMs have been used and analyzed from different approaches across different industries (Pieroni et al., 2019), especially in industries with intensive use of natural resources (Todeschini, Cortimiglia, Callegaro-de-Menezes, & Ghezzi, 2017). As a recent theme, research on BMI4CE has increased in recent years (Diaz Lopez, Bastein, & Tukker, 2019), but it still needs to be deepened in industries that are specific and central to the negative environmental impact, such as the fashion industry. This is one of the world's largest industries in terms of turnover, being characterized as a global chain with multiple and numerous agents and its high degree of environmental and social impact resulting from the dominant fast fashion business logic, the characteristics of the production process and from the specificities of the value chain(Lueg, Pedersen, & Clemmensen, 2013).

Thus, the understanding of BMI4CEs in this industry is relevant because it enables the prediction of the industry's technological directions by identifying innovative market trends and solutions. Such an understanding is relevant because as Nosratabadi, Mosavi e Shamshirband (2019) propose, there are 14 categories of BMI, one of which is the fashion. Studies on BMI4CE are mostly theoretical and, as Pieroni et al. (2019) suggest, empirical investigations are necessary for the maturation of the theory in this study area.

In addition, there are several types of BMI4CE and differ in the way they generate value(Lewandowski, 2016), this raises the question of what elements are necessary for the effectiveness of any BMI4CE in the fashion industry. From the above issues that point to an empirical gap, this research aimed to identify what are the key elements of companies' BMI4CEs in the fashion industry. As BMI research are concentrated in mainly three areas: information technologies, strategic issues and innovation and technology management (Bowman, Nikou, & Reuver, 2019), in this research, the proposed investigation on BMI4CE in the Fashion Industry is related to the third area.

To achieve the proposed aim, exploratory and descriptive research was conducted from a multiple case study, composed of 10 companies based in Europe, North America and Asia, whose BMIs in the area of sustainability are promising for the fashion industry (Copenhagen Fashion Summit, 2019b). From the results, the key elements of the BMI4CEs of these

companies are presented, which contributes to the theoretical increase both in the field of innovation management studies and in the field of CE studies, through an interrelational analysis of them (i.e., BMI4CE). This research also contributes to managerial practice, as it presents innovations in the supply chain and technological and business logic trends, pointing out possibilities for the transition of fashion companies towards more sustainable practices.

2. THEORETICAL BASIS

Considering CE can contribute to the development of sustainability(Pieroni et al., 2019), this section presents the conceptual characteristics of CE on its interrelation with sustainability, bringing this discussion to the fashion industry as an investigative locus. Then, the characteristics inherent to the construction of the term BMI (Teece, 2010) are presented, allowing a better understanding and analytical deepening of BMI4CE concept for application in the fashion industry.

2.1 Conceptual Relations on Circular Economy and Sustainability in the Fashion Industry

As an emerging topic of studies, the Circular Economy (CE) concept is still under consolidation and is widely discussed by scholars from different fields (de Jesus, Antunes, Santos, & Mendonça, 2019; Merli, Preziosi, & Acampora, 2018). Regardless of the different views, there is a certain consensus in the literature that frames the CE as a drive for sustainability (Bocken, Schuit, & Kraaijenhagen, 2018; Geissdoerfer, Savaget, Bocken, & Jan, 2017; Ghisellini, Cialani, & Ulgiati, 2016; Hofmann, 2019; Kirchherr, Reike, & Hekkert, 2017), representing the most advanced and recent manifestation for a paradigm shift towards sustainability (Prieto-Sandoval et al., 2018). It differs from other sustainability approaches by proposing restorative and regenerative systems (Ghisellini et al., 2016; Ellen MacArthur Foundation, 2013), with strategies based on design, closed-loop systems (Murray, Skene, & Haynes, 2017), and resource and material efficiency (Nußholz, 2017).

Essentially, CE can be defined as "an economic model wherein planning, resourcing, procurement, production and reprocessing are designed and managed, as both process and output, to maximize ecosystem functioning and human well-being" (Murray et al., 2017, p. 377). It proposes the reduce of consumption (re-use or slowconsumerism), extend the life cycle of resources, materials and goods (re-use, programmed non-obsolescence) and replace ownership by access, adopting BMs aimed at the Product-Service System (PPS) (de Jesus et al., 2019; Hofmann, 2019; Manninen et al., 2018).

On the constitutive aspects, CE is a socio-economic model that opposes the linearly prevailing global economic logic, whose pattern was the basis for economic development hitherto characterized by the extraction of natural resources, their transformation into products, consumption, and disposal, generating environmental impacts (Agyemang, Kusi-sarpong, & Mani, 2018; Ghisellini et al., 2016). It presents the complexity and challenges inherent in proposals that change the *status quo* of business and economic logic, in part because of the need to reprogram the system as a whole, with the involvement and accountability of all stakeholders, and thus changes in social interrelationships, not only in business models (de Jesus et al., 2019; Merli et al., 2018).

The changes needed to implement circular solutions for sustainability can be even more challenging in industries that rely heavily on linear logic, such as the fashion industry. This is one of the largest industries worldwide and over the last two decades, its growth has been driven by the fast fashion business model, based on the massification of trends, Large-scale production and consumption of short-lived fashion items, low service life, low selling price, fast psychological obsolescence, and fast disposal (Armstrong, Niinimäki, Kujala, Karell, & Lang, 2015; Todeschini et al., 2017).

The garment production process itself is characterized by the high intensity of natural resource use, considering both the raw materials and the impacts of the production process

(energy use, chemicals) and the stages of distribution, consumption (use) and disposal are generators of high pollution. There is intensive use of water, energy, chemicals, and pesticides in the production of raw materials and textiles (Pedersen, Gwozdz, & Hvass, 2018). Thus, added to the potential for pollution and impact of the production process, the fast fashion model increased sales volume, resulting in increased production of goods, resource consumption and the volume of discarded items, with a consequent increase in social and environmental impacts.

Another challenging issue is the organization of the fashion industry production chain. Global brands dominate the market, giving high concentration and dominance to multiple and large competitors (Barnes & Lea-Greenwood, 2006). The operation takes place through a wide, global, dispersed and fragmented supply chain and distribution, often with a strategy of production outside of the origin country, seeking a low cost, shorter production times and larger scale (de Brito, Carbone, & Blanquart, 2008; Kozlowski, Searcy, & Bardeckir, 2015; Turker & Altuntas, 2014). The chain is characterized by asymmetrical relationships between large global buyers and small local suppliers (Talay, Oxborrow, & Brindley, 2018). Due to its fragmentation, there is a significant increase in the risks arising from social problems, such as child or slave labor, labor exploitation and precarious labor relations due to the outsourcing of production to emerging countries, occurring by the pressure to maintain low production costs (Lueg et al., 2013; Pedersen et al., 2018).

The sector has been concerned about the impacts generated. In 2018, a group of 94 companies (including large companies) representing 12.5% of the global fashion market signed a commitment called "2020 Circular Fashion System Commitment". The commitment aims to accelerate the transition of the fashion industry to a circular fashion system by stimulating circularity practices. The commitment is based on 4 action lines: 1) design strategy implementation for circularity; 2) the increased volume of used clothes and shoes collected; 3) the increased volume of resale used clothes and shoes; 4) increased use of recycled textile fibers from post-consumption clothing (Global Fashion Agenda, 2018). Participating companies have committed to at least one of these actions. The initiative is in line with what the literature proposes as opportunities for the clothing industry to be more sustainable (Armstrong et al., 2015; Todeschini et al., 2017). For companies to achieve these CE actions, they need to develop or reshape their BMs, based on innovation.

2.2 Unraveling the Concept of Business Model Innovation for Circular Economy

For a better understanding of BMI4CE, it is necessary first to understand the concepts of Business Model (BM) and Business Model Innovation (BMI), since studies in these areas usually lack clear conceptualizations (Foss & Saebi, 2017). The concept of BM has gained popularity in management and business (Björkdahl, 2009; Klang, Wallnöfer, & Hacklin, 2014). Broadly speaking, a BM can be understood as a system of holistic and interconnected activities that can occur within the value chain (Porter, 1989), based on products and services developed and offered to certain consumers (Teece, 2010; Zott & Amit, 2010). Thus, BM can be defined as "the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities" (Amit & Zott, 2001, p. 511).

However, a BM's focus is not just on creating value for consumers. It is necessary to have, together, value appropriation, by the willingness of consumers to disburse resources, constituting the company's profit (Teece, 2010) and guaranteeing the long-term sustainability of the business. Thus, BM is a tool to represent the way a company creates and captures economic value (Björkdahl, 2009; Bowman et al., 2019; Shafer, Smith, & Linder, 2005). This understanding emerges from a classic economic discussion – "make or buy" (Lyons, 1995), in which value is created by developing and offering a solution (make) to a specific problem of a particular consumer group willing to purchase it (buy) at a certain price, i.e., the company's appropriation of value (Linder & Williander, 2017). For this cost-effective solution to

perpetuate, the company must have a lower cost than the amount to be charged for the solution (Hsieh, Nickerson, & Zenger, 2007), ensuring business profitability.

As the business environment is unstable and often unpredictable, the BM that supports the solution of economic problems and the commercialization of this solution for consumers needs to adapt to new market circumstances or dynamics (Chesbrough, 2007), leading to the development of innovations in BM. It is from this perspective that recent discussions about BMI emerge, in which learning about market conditions (Linder & Williander, 2017) induces the development of innovations (Schumpeter, 1961) in the way how companies create and appropriate economic value (McGrath, 2010).

Thus, BMI "occurs when firms improve their existing business models or introduce new ones" (Fjeldstad & Snow, 2018, p. 36), by restructuring the model components or by creating new business structures to offer new value propositions for a given market segment (Foss & Saebi, 2017; Zott & Amit, 2007). It is necessary to understand that innovations in products or services are not, by themselves, synonymous with innovation in BM (Geissdoerfer, Vladimirova, Fossen, & Evans, 2018) and even though they are distinct issues, they are also complementary.

BMIs do not come exclusively from an approach to support product or service innovations, but it is possible to develop a BMI without innovations in goods. However, BMIs make it possible for companies to effectively market innovations in products or services (Teece, 2010). In addition, companies immersed in digitization processes need to innovate in their BMs to stay competitive in the market (Bowman et al., 2019).

BMI is designed to address the market changes faced by companies, and current issues such as the increase of environmental and social concerns induce some companies to develop innovations in their BMs to better address these issues, primarily through the CE. Thus, companies whose focus is CE often develop BMI for CE (BMI4CE), which is an attractive concept for the rearrangement of both value creation structures and value chains that lead to the development of a more plentiful production and consumption system (Hofmann, 2019), rethinking and redefining the way to create, capture and deliver value (Lüdeke-Freund, Gold, & Bocken, 2019; Nußholz, 2017).

The terms circular business model (CBM) and circular business model innovation (CBMI) are used in the academic literature, but these concepts generate confusion and, mainly, do not consider practical issues in the construction of concepts (Pieroni et al., 2019). These authors state that absolute models such as CBM or CBMI do not exist and instead what exist are CE practices or principles that can be introduced into BMs. Seeking to overcome such conceptual limitations, Pieroni et al. (2019) postulate the use of the terms circular economy-oriented business model innovation or business model innovation for circular economy (whose acronym is here denominated as BMI4CE).

The inclusion of CE principles in a BMI requires a systemic, holistic and multidisciplinary view, in line with a change in the organization and thinking logic of the value chain and stakeholders, resulting in uncertainties and complexities (Pieroni et al., 2019). Challenges are related to environmental and social issues, such as consumer perceptions and preferences (Bocken, Schuit, & Kraaijenhagen, 2018), associated with safety and risks (Catulli & Reed, 2017) and, as for time, to the quality and quantity return of resources in the circularity process (Shaharudin, Zailani, & Tan, 2015).

Even with the challenges, there are benefits that enable the development of BMI4EC (Linder & Williander, 2017). They are geared to reverse cycles and resource life extension by repair and maintenance, reuse and redistribution, refurbishment and remanufacturing, recycling, organic raw material, and cascade and reuse (Hofmann, 2019; Linder & Williander, 2017; Lüdeke-Freund et al., 2019; Nußholz, 2017). Using thus closed-loop supply chains (Lüdeke-Freund et al., 2019; Nußholz, 2017), in order to minimize exploitation of virgin natural

resources (Hofmann, 2019) through the formation of a more efficient and effective economic system (Pieroni *et al*., 2019). Strategies are generally based on resource and material efficiency (Nußholz, 2017).

Thus, a BMI4CE can be defined as an economic system that seeks to replace the concept of "end-of-life" product through reduction, reuse and recycling (Prieto-Sandoval et al., 2018; Wang, Che, Fan, & Gu, 2014) of materials in consumption, distribution or production processes, enabling the achievement of development through three levels of action: micro (products, business, and consumers), meso (eco-industrial parks) and macro (cities, regions or nations) (Kirchherr et al., 2017). Regarding the above levels, companies are essential for the transaction from a linear to a circular economic system through the BMI4CE (Vermunt, Negro, Verweij, Kuppens, & Hekkert, 2019), which is why a micro-level analysis is adopted in this research.

3. METHODOLOGICAL COURSE

This study deals with the investigation of BMI4CEs in fashion industry companies, a field in which there is no deepening of the literature on such relationships. Thus, exploratory and descriptive research (Flick, 2013) was performed, which allowed the analysis of examples that stimulated the understanding of the phenomena inherent to this research aim (Gil, 2007). A multiple case study was conducted (Creswell, 2010), resulting in a comparative analysis between the cases adopted here as a way to better analyze the (similar or discrepant) elements they have.

It was adopted, as the first selection criterion of cases, companies that operate in the value chain of the fashion industry, not being delimited a specific type of company or position in the chain. As the focus is on BMI4CEs, it was necessary to select cases in the fashion industry that were relevant to understand the key elements of the respective BMIs. Thus, as a second selection criterion of cases, were considered the 10 companies that participated in the Future Lab of Copenhagen Fashion Summit 2019.

Copenhagen Fashion Summit is an annual event that is in its tenth edition and is focused on highlighting the changing needs of the fashion industry's production, consumption, and marketing. It is the leading leadership forum for fashion industry contributors about sustainability, assuming that sustainability must be rethought in this industry and can be driven by innovations, particularly in BMs. Thus, the event seeks to underscore the relevance of developing new forms of business to address challenges such as climate change, human rights and the increasingly challenging scarcity of natural resources in the fashion industry (Copenhagen Fashion Summit, 2019a).

The event seeks to discover and expose sustainable innovations in this industry worldwide. Holds the Future Lab annually, which is an exhibition of 10 companies with the potential to change practices toward achieving sustainability in the fashion industry through new technologies and BMs. From the presentation of developed innovations, Future Lab seeks to demonstrate how the value chain in the fashion industry that is built by a linear economy can migrate to a circular one, serving as inspiration for innovative change in other fashion industry companies (Copenhagen Fashion Summit, 2019b).

The cases were selected because they are emblematic for the industry under analysis and for being companies from different countries, which allowed a cross-cultural understanding of the elements of BMI4CEs in the fashion industry. The selected companies are presented in Figure 1.

Companies	Occupation area	Country	Foundation	Description (from companies websites)
Algalife	Development of clean-tech new materials	United Arab Emirates	2016	Explores a holistic and sustainable development of new materials which positively affect both the environment and the human skin. Bio-tech-textile: pigments and fibers, from the algae microorganisms, which is renewable and healthy microorganism.
Circular Fashion	Digital tecnology (plataform) to connect value chain	Germany	2017	Digital platform that allows a flow of information between suppliers of materials, brands, customers and recyclers to creation of a tech pack with a circularity check and provide a circularity.ID to the garment that allows allows the consumer to identify the origin of the materials and processes used in the garment manufacturing. Offers consultancy and trainning.
Circular Systems	Development of clean-tech new materials	USA	2017	Materials science company, focused on the development of innovative circular and regenerative technologies, transforming waste into valuable fiber, yarn, and textile fabrics for the fashion industry.
Dimpora	Development of clean-tech new materials	Switzerland	2019	Innovate and develop the next generation functional and sustainable high-performance membranes for outdoor enthusiasts, fluorine-free and fully porous membrane with high waterproofing.
Gibbon	Digital tecnology (platform) to rental market	Singapore and Amsterdam	2016	Artificial intelligence travel rental marketplace that connects excess inventory from brands and retailers to travellers, enabling a luggage-less travel experience.
Monochain	Digital technology (platform) to second-hand market	England	2018	Multi-tenant B2B2C platform on blockchain that offers end-to-end traceability to converge primary and resale markets, enabling a circular economy while simultaneously combat counterfeiting.
Nature Coatings	Development of clean-tech new materials	USA	2017	Transforms wood waste into high performing black pigments for inkjet and analogue printing, coatings, dope dye, paint and the apparel industry. Pigments are manufactured in a closed-loop system that does not emit measurable greenhouse gases and are safer to human health.
Reflaunt	Digital technology (platform) to second-hand market	England	2017	Technology and marketing solution that bridges first and second-hand fashion retail markets. Empower brands/retailers to implement a scalable and efficient circular consumption model within their existing activities, growing revenue, driving new customer acquisition and increasing retention.
Resortecs	Recicle (disassembly of apparel)	Belgium	2016	Machine for easy disassembly of apparel that dissolves at a high temperature and allows separate the components, so that those can be used again in a pure form. Offers products and services that tackle both the economic as well as technical challenges encountered.
Vegea	Development of clean-tech new materials	Italy	2016	Develop and engineer technologies and processes based on biomass and in particular on the valorization of agroindusry by-products by fostering the use of renewable sources in alternative to fossil sources. Plant-based alternatives to fully synthetic oil-derived materials for fashion, furniture, packaging, automotive & transportation.

Figure 1. Cases Identification and Presentation
Note. Source: Elaborated by the authors (2019)

With the delimited cases, then proceeded to the collection of secondary data as a form of development of the exploratory research (Gerhardt, 2009). The collection took place in July 2019 through access to publicly available documents and information, which came from the corporate websites and social networks (e.g., Facebook, Instagram, and Linkedin) of the 10 companies. From these data, it was possible to analyze the information and characteristics of the companies, as well as the characteristics and elements of their BMIs and how they contribute to the adoption of CE in their industry. Thematic/categorical content analysis was adopted to analyze the data, following to Bardin (2016) precepts.

The categories of analysis emerged from the instrument proposed by Lewandowski (2016), which is an adaptation of the Canvas instrument (Osterwalder & Pigneur, 2010), commonly used in BMI analysis. The instrument was adapted by the author to the CE context, being one of the most relevant for the analysis and development of BMI4CEs (Pieroni et al., 2019). However, during the data analysis, it was realized that not all categories could be analyzed since the secondary data did not support the analysis of certain categories of this instrument. Given the incompleteness of information from secondary data and seeking greater robustness for the analysis of BMI4CEs of the analyzed companies, it was adopted the inclusion of some analysis categories from the instrument proposed by Lüdeke-Freund, Gold and Bocken (2019) to BMI4CEs analysis. Thus, from the two instruments (Lewandowski, 2016; Lüdeke-Freund et al., 2019), the analysis categories were defined: 1. Business type; 2. Resources usage strategy; 3. Business value proposition; 4. Revenue sources; 5. Customer segmentation; 6. Value proposition type; 7. Operation form; 8. Value creation process; and 9. Cost structure. It is noteworthy that the seventh category is called “model” in the literature, however, here it is called "operation form" since it is understood that the latter term clarifies the essence of the category under discussion.

During the data analysis, it was found that certain characteristics of the BMI4CEs of the analyzed cases could not be verified by the lack of specific information, such as the monetization of the companies and if they realize social actions, that were not found from the data collected online. In search of such information, it was decided to perform a new data collection, this time primary, through open questions sent by e-mail on July 18, 2019, to the 10 companies. As only the Reflaunt company answered the questions, while the Circular Fashion company answered the e-mail stating that it was not available to participate, a new e-mail was sent on July 30, 2019, to the other companies, but there was no return of these.

Regarding the quality aspects, it is noteworthy that the reflective analysis of the researchers (Creswell, 2010) about the data demonstrated the relevance of the cases to the proposed investigation in this research, which is why these cases were considered. Moreover, the diversity of cases analyzed here characterizes a triangulation of evidence sources, as advocated by Bruning, Godri, and Takahashi (2019). It was also adopted the triangulation of researchers (Creswell, 2010), which consisted of data analysis by each researcher individually and then individual evaluations were discussed collectively for a common understanding.

4. RESULTS AND DISCUSSION

The analyzed companies are located in developed countries from different continents (North America, Europe, and Asia), and are characterized as startups that have been in operation for a maximum of 3 years. It can be understood that they are sustainable born companies, with businesses based on sustainability values and principles, collaboration, and innovation (Todeschini et al., 2017). They present innovative and practical solutions to social and environmental problems and are described as pioneering in the application of new technologies in their areas, with a greater propensity for disruptive and radical innovations (Demirel, Li, Rentocchini, & Tamvada, 2017). Thus, it was not possible to analyze the “Adoption Factors” category proposed in Lewandovisk's (2016) instrument, as these are general factors needed to

change from linear to a circular system. Still, regarding the instrument, none of the evaluated cases showed an emphasis on “Take-Back Systems”.

The companies' BMI4CEs were evaluated based on the nine analysis categories presented in the previous section, which made it possible to group the main characteristics and elements for a better comparison between the cases. Thus, Figure 2 summarizes the main characteristics of the 10 BMI4CEs in the nine analysis categories. Next, the characteristics and elements that make up the companies' BMI4CEs are discussed and presented from the analysis of the nine categories.

On business type, it was found that among the cases analyzed, six have product-based BMs, while four are service-based BMs. Product-based businesses focus on reusing waste to make new materials (reuse), using renewable sources of fiber and pigment manufacturing resources (reduce - minimizing the use of natural resources) and development of fibers with higher performance and durability and less environmental impact in the production process. Thus, it is understood that product development in these cases is aligned with two of the three CE guiding principles (i.e., reuse and reduce) (Prieto-Sandoval et al., 2018; Wang et al., 2014). In addition, the proposed solutions align with the close resource loop value creation strategy and focus on value retention at the material level (Hofmann, 2019; Lüdeke-Freund et al., 2019).

In the case of service-based BMs, digital platforms are used to offer solutions for clothing retailing (also called second-hand market), clothing rental and supply chain management, with a focus in product reuse (Prieto-Sandoval et al., 2018) and reducing consumption and material use (Manninen et al., 2018). They involve services that use digital platforms based on technologies such as blockchain (Monochain) and artificial intelligence (Gibbon) and are targeted at multi-level relationships (i.e. B2B2C). Digital technologies such as blockchain have been described in the literature as enabling closed-loop supply chains (Casado-vara et al., 2018; Saberi, Kouhizadeh, Sarkis, & Shen, 2019).

The business value proposition spells out the model core: the provision of consumer benefits (Lüdeke-Freund et al., 2019) that differentiates companies from other market competitors (Stål & Jansson, 2017). In the case of BMI for sustainable practices, the value proposition must encompass the economic, environmental and social dimensions (Boons & Lüdeke-Freund, 2013). In the cases analyzed, there is a certain emphasis on environmental aspects regarding companies focused on the development of clean-tech new materials. Companies that offer services through digital technology seem to focus their proposal on marketing, economic, and environmental aspects.

In addition to environmental benefits such as reuse and extended product life, the analyzed second-hand parts resale business focuses on manufacturer brands and not directly on the end consumer. The literature describes the practice of selling second-hand items as selling by consumers of items that are no longer in use, which results in the item being reused, extending its useful life and reducing the consumption of new items (Todeschini et al., 2017). The focus on brand management and delivering value to retailers and fashion brands seem to bring an innovative value proposition. In the Reflaunt case, for example, monetization is based on a monthly fee paid by the retailer plus a percentage on each sale.

Thus, while Reflaunt also offers end-user benefit, the value proposition is geared toward the fashion retail business. In addition, benefits are offered such as traceability of parts, which allows not only the environmental monitoring of the item but also of its useful life, time of use, consumer profile, counterfeiting of parts and brands, and consequent better control of the brand image (Talay et al., 2018). Another value proposition is the brand's connection with consumers, especially the Millennials generation, and with new consumer

	Categories								
Cases	**1.** Business type	**2.** Resources usage strategy	**3.** Business Value Proposition	**4.** Revenue sources	**5.** Customer segmentation	**6.** Value proposition type	**7.** Operation form	**8.** Value creation process	**9.** Cost structure
Circular Systems	Product	Closed-loop	High-value textile fibers for the fashion industry produced from agricultural, industrial and post-consumption waste	?	B2B	Products, materials or waste used as production inputs	Closed-loop: Circular Supply	Recycling of products, materials, waste; upcycling	Product and process development; labor, waste handling, processing, manufacturing
Algalife	Product	Closed-loop	Biodegradable pigments and fibers developed from renewable microorganisms	?	B2B	Not listed: development of renewable organic raw material (microorganisms)	Closed-loop: Circular Supply	Material Design	Product and process development; labor, processing, manufacturing
Nature Coatings	Product	Closed-loop	High-performance black pigments made from wood waste	?	B2B	Wastes used as production inputs	Closed-loop: Circular Supply	Waste recycling; upcycling	Product and process development; labor, waste handling, processing and manufacturing
Resortecs	Product	Closed-loop	Equipment that facilitates disassembly of garments by dissolving metal components at high temperature	?	B2B	Waste Processing and Recycling	Closed-loop: facilitate resource recovery through recycling	Product and material recycling	Product and process development; labor
Vegea	Product	Closed-loop	Vegetable leather produced from agricultural waste from grape peel	?	B2B	Wastes used as production inputs	Closed-loop: Circular Supply	Waste recycling; upcycling	Product and process development; labor, waste handling, processing and manufacturing
Dimpora	Product	Closed-loop	High performance and sustainable functional membranes for outdoor enthusiasts	Parts sales	B2C	Unlisted: Technology Development - Raw Material	Closed-loop: Circular Supply	Product and material design	Product and process development; labor, processing, manufacturing
Circular Fashion	Service	Closed-loop	Digital platform (software) that enables information flow between material suppliers, brands, customers and recyclers	?	B2B2C	Facilitate Collaboration + Unlisted: Value Chain Management/Tracking	Not described: enable value chain collaboration and management	Connecting suppliers and customers, providing access to services and product-based results	Manpower, transactional (relationship, network management), solution development (software), supply risk
Gibbon	Service	Reduce materials use and consumption	Digital clothing rental platform that connects excess inventory of brands and retailers to travelers, enabling a luggage-free travel experience	?	B2B2C	Product-Service Based Functions	Sharing: availability based PPS	Providing access to product functionality; meeting excessive capacities with insufficient capacities	Labor, Repair, Maintenance and Control, Transportation and Logistics, Supply Risk
Monochain	Service	Reduce materials use and consumption	A multi-user blockchain platform that offers end-to-end traceability to converge primary and retail clothing markets	?	B2B2C	Take-back management + Unlisted: Post-use product tracking - cycle closure	Optimization: resale of used products	Providing product-based access to services and results; connecting suppliers and customers	Labor, solution development (software)
Reflaunt	Service	Reduce materials use and consumption	A technology platform that unites first and second-hand fashion retail markets	Monthly fee paid by retailer hiring service + percentage on each sale	B2B2C	Take-back management + Unlisted: Post-use product tracking - cycle closure	Optimization: resale of used products	Providing product-based access to services and results; Connecting suppliers and customers	Labor, solution development (software)

Figure 2. Cases Investigation from the Analysis Categories

Note. The symbol (**?**) was adopted where no information was obtained from the data. Source: Elaborated by the authors (2019)

macro-trends that have driven changes in consumer behavior (Todeschini et al., 2017; Vehmas, Raudaskoski, Heikkilä, Harlin, & Mensonen, 2018).

The analyzed cases present as target consumers other business (B2B) and elaborate B2B2C relations, and only one of the cases (Dimpora) present a solution aimed at the final consumer (B2C). BMI4CEs have the ability to create monetary and non-monetary value involving proactive and long-term perspective management of multiple stakeholders (Geissdoerfer, Morioka, & de Carvalho, Marly Monteiro Evan, 2018). Thus, B2B or B2B2C relationships can be strategically valuable toward moving from linear to circular systems, as they involve multiple agents (companies) along the value chain and, consequently, by means of the influence of the relationships in the chain, there may be greater involvement of agents in circularity actions.

From this understanding, it is assumed (as an assumption) that through the influence of business relationships in the chains, companies under the circular logic start prospecting partners and consumers (companies in B2B or B2B2C) who also act or are willing to act under the circularity principles, in a process of forming strategic networks, i.e., CE networks. Thus, the CE paradigm drives companies that participate in the same value network to incorporate sustainable practices and collaboration in the chain allows access to resources that companies do not own or have limited, which allows reducing transaction costs strategically (Talay et al., 2018).

Along these lines, supply or value chain management is at the core of the Circular Fashion company's BM, which offers a platform that connects suppliers, fashion brands and recyclers. The platform offers circular raw materials and design and business tools that enable the creation of a well-known and transparent supply chain product as proposed by Lueg, Pedersen e Clemmensen (2013). As a result, it enables tracking and certification of production and value chain management, including consumer involvement, as proposed by Camacho-Otero, Boks, & Pettersen (2018). Aligning with the one proposed by Bocken, de Pauw, Bakker e van der Grinten (2016), the business offers a tool that considers the specifics of the circular supply chain and may be an important and necessary tool for CE development.

The value proposition types of the business models were evaluated as proposed by Lüdeke-Freund, Gold e Bocken (2019). Among the studied cases, three present value proposition not listed by the authors: Algalife, Dimpora, and Circular Fashion. Algalife and Dimpora develop innovative raw materials to replace existing ones in use in the market. Algalife produces pigments and fibers from renewable organic matter and Dimpora proposes new raw materials with low environmental impact in production and use. It is suggested to classify the value proposition of these two companies as the development of new raw materials (renewable/alternative) instead of traditional raw materials (non-renewable). In the case of Circular Fashion, its value proposition can be considered complex and encompasses more than one type of value proposition: in addition to facilitating collaboration in the chain, it enables the management/tracking of the value chain by setting a new category.

Regarding the operation form of the BMs, it was found that the cases of companies that offer products are mostly based on circular supply, and one of the cases seeks to facilitate resource recovery through recycling. In the case of service companies, Circular Fashion could not be classified in the models proposed by Lewandowisk (2016, pgs.8-9), suggesting a new model: “enable collaboration and value chain management”. Gibbon's BM is based on resource optimization through resale of used products and sharing based on Product Service System (PPS). The solutions based in Service-Product System (PSS) are “an integrated bundle of products and services which aims at creating customer utility and generating value” (Tukker, 2015, pg. 87) and have been linked in the literature with sustainable and circular BMs (Hofmann, 2019; Nußholz, 2017; Tukker, 2015).

The value creation processes of the cases studied involve recycling of products, materials, and waste; upcycling; material design; supplier and customer connection; product-based access to services and results; access to product functionality; and meeting excessive capacities with insufficient capacities. Thus, there is an alignment with that described in the literature (e.g., Hofmann, 2019; Linder & Williander, 2017; Lüdeke-Freund et al., 2019; Nußholz, 2017).

5. FINAL REMARKS

The investigation of BMI4CEs in fashion industry presented some remarkable notes. First, it was possible to identify different types of BMI guiding the pathway to implementing circularity in the industry, by means of services and products. Innovation and technology were identified in all cases, highlighting digital technologies. According to (Pagoropoulos, Pigosso, & Mcaloone, 2017), digital technologies can help the transition towards CE. Material development technology has also proved important for the development of new raw materials for use in the industry, as well as machines and equipment aimed at enabling conditions of implementation of circular models.

It was identified that the environmental and economic dimensions receive priority attention in the analyzed BMI4CEs. Information was sought on the social dimension, place, and production conditions, type of employment and working conditions, management of social relations in the chain, especially considering businesses that deal with recycling and waste processing or machine production. However, there is no mention in any of the websites and materials consulted on the subject, reinforcing the criticism found in the literature about the CE's lack of attention to the social dimension (e.g., Hofmann, 2019; Pieroni et al., 2019).

Moreover, the results support the understanding that the key-elements common to fashion industry companies' BMI4CEs are: closed-loop and reduction of consumerism and materials use. Special focus can also be found in the search for elements such as reuse and new uses of materials and circular supply. Thus, this research contributes to highlighting new theoretical perspectives under an investigation area still little explored in the literature, that allows broadening the horizons of future theoretical discussions. It also enables managers in the fashion industry to better understand the functioning of BMI4CEs and the key elements needed for their effectiveness towards CE adoption in the industry.

It is noteworthy that the use of secondary data generated certain limitations on the analytical deepening of the research, as some questions that proved relevant could not be investigated due to the lack of information to conduct such investigations. Thus, it was not possible to identify, for example, which revenue sources the analyzed companies adopt (according to Figure 2), only that of Dimpora and Reflaunt, and the identification of the latter was obtained by primary source (questionnaire via email). Moreover, even though research has focused on relevant and innovative cases, exploratory research does not guarantee generalization of findings to all fashion industry companies, as specificities must be considered in identifying and applying key elements in BMI4CEs of this industry. It is emphasized that the cases selected, by itself, characterizes a limitation, since they are companies based in developed countries, which points to the understanding that the migration from a linear economy to a circular economy can be better developed in these countries, since access to resources (e.g., knowledge and technology) can be facilitated within these nations. Another limitation is the disregard of institutional issues such as regulations and public policies that may influence the formation of BMI4CEs in the fashion industry.

Thus, future investigations may deepen the analysis proposed here with the same cases, through primary data collection, which would enrich the analysis and, in a complementary manner, would give more robustness to the results presented here. As well, future research may broaden the investigation through the quantity and/or diversity of cases, corroborating the

findings presented here or complementing them, by identifying other key elements besides those listed. Future research can also be developed to broaden the investigation to the scope of developing countries, focusing on the specificities of these nations and the characteristics that the fashion industry has in these countries. In addition, future research may broaden the analysis for agents at the end of the value chain by analyzing the results of BMI4CEs for consumers and how they can assist in shaping them, i.e., co-creating value for CE reach. It is noteworthy that institutional issues such as regulations and public policies may have some influence on the formatting of BMI4CEs in the fashion industry, which requires the deepening of such relationships and can be analyzed in future research. Another intriguing issue is the formation of CE networks that can be developed through BMI4CEs based in B2B or B2B2C, as assumed from the cases analyzed. It is emphasized that the study of CE networks is still little explored in the literature, possibly because it is a phenomenon still little developed in practice (Geng, Sarkis, & Bleischwitz, 2019), but it needs development for CE flourishment (Braun, Kleine-Moellhoff, Reichenberger, & Seiter, 2018). Thus, from the assumption raised in this research, future efforts can be made to identify and analyze the formation of CE networks, specifically through BMI4CEs based in B2B and B2B2C as potential drivers of the development of these strategic networks.

From the results, the following question emerges: is it possible that innovation in the BMs, by itself, has the power to influence and modify the value chain structure in the fashion industry toward CE? Consumers are known to be an important part of the chain because they decide the "value" of innovation. However, it appears that the business (here analyzed) is chain-oriented, and it is unknown how the consumer will be added to the system or how they will be responsible (or be held responsible) for their decisions and actions on fashion items purchase, maintenance, and disposal. Thus, the above question remains without a clear or precise answer, requiring the development of reflections and discussions from future investigations.

There is an important point to note regarding the instruments developed for BMI4CE analysis. As stated earlier, the consensus in the literature understands CE as a means to drive the adoption of sustainable practices (e.g., Bocken et al., 2018; Geissdoerfer et al., 2017; Ghisellini et al., 2016). However, it seems that CE is not yet being seen as a starting point, but as part of a transition process - which starts from linear logic. The EC stresses the need for a "functional service" model, in which the producer has the awareness and responsibility for the impacts it generates and its business must be thought to reduce, even, the number of products in the market, through strategies such as reuse, recycling and PPS, for example (Ellen Macarthur Foundation, 2013), as well as reducing the level of overall consumption in society. This logic is not contained in the “traditional” BM conception, which is the starting point for creating tools or instruments for BMI4CE analysis.

Thus, BM analysis tools are “rearrangements” that adapt circular logic within linear logic. However, if the CE wants to rethink and redefine the way it creates, captures and delivers value (Lüdeke-Freund et al., 2019; Nußholz, 2017), it would not be necessary to formulate new tools and instruments designed and created from the CE logic and theory? Such questioning is intriguing, requiring further deepening and discussion from the conduction of future investigations.

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