

Sustainable Design Strategies for Fashion Post-Production

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ABSTRACT

Originated in a doctoral dissertation this study proposes a set of strategies for the post-production of fashion products, focusing on the stages of communication, sale, distribution, follow-up of the consumer experience, reverse logistics and end-of-life procedures. The proposed strategies seek to expand the performance of designers and companies on the final stages of the product life cycle, considering them as part of the sustainable fashion project.

Keywords: sustainable design strategies, post-production, fashion product.



Estratégias de Design Sustentável Para Pós-Produção de Produtos de Moda

RESUMO

Originado em uma tese de doutorado, este estudo propõe um conjunto de estratégias sustentáveis para a pós-produção de produtos de moda, com foco nas etapas de comunicação, venda, distribuição, acompanhamento da experiência do consumidor, logística reversa e encaminhamento do fim de vida. As estratégias propostas buscam ampliar a atuação de designers e empresas sobre as etapas finais do ciclo de vida do produto, considerando-as também como parte do projeto de moda sustentável.

Palavras-chave: *estratégias de design sustentável, pós-produção, produto de moda.*



Estrategias de diseño sostenible para la postproducción de productos de moda

RESUMEN

Originado en una disertación doctoral, este estudio propone un conjunto de estrategias sostenibles para la postproducción de productos de moda, centrándose en la comunicación, ventas, distribución, monitoreo de la experiencia del consumidor, logística inversa y enrutamiento al final de la vida útil. Las estrategias propuestas buscan ampliar el desempeño de los diseñadores y las empresas en las etapas finales del ciclo de vida del producto, considerándolos también como parte del proyecto de moda sostenible.

Palabras clave: *estrategias de diseño sostenible; post producción; producto de moda.*

1. INTRODUCTION

Sustainability has been addressed in diverse areas of knowledge with much more concern in recent decades. With regard to the constitution of business models, it has been diffused by the social, economic and environmental tripod (ELKINGTON, 1997). In design, it began to be considered as something inseparable from the practice of products and services projects (MANZINI; VEZZOLI, 2008) by concepts like *Design for sustainability* (CRUL; CAREL DIEHL, 2009). Concerning the specificity of the fashion design area, issues related to social and environmental impacts along the project has motivated alternative methodological propositions to the linear project (GWILT, 2014, RUTHSCHILLING; ANICET, 2014).

Slow fashion, a term created to designate sustainable fashion, and, thereby, to denominate product development and production processes that have sustainability issues involved, was defined by Kate Fletcher (2008). It emerged in opposition to fast fashion and was popularized by Zara, an apparel retailer that utilizes a logistic system that integrates a set of professionals who work in the design, production and sale of products in different parts of the world, having as main objective the distribution of fashion-trend products in a short period of time (CATALDI, 2010). Thus, the product is displayed in stores at the same time that a consumption trend reaches its peak (LESLIE et al., 2014).

On the other hand, the development and production process of fashion products known until now as linear process, starting with the project design and ending in the product disposal after the end of a trend, began to be discussed from the perspective of the product lifecycle (MANZINI; VEZZOLI, 2008) and as a

consequence of circularity¹ (BRISMAR, 2017). Conversely, scholar works (CLARK, 2008; MARTINS; SANTOS 2008; FLETCHER; GROOSE, 2011; GWILT, 2014; SALCEDO, 2014, SANTOS et. al., 2016) have proposed sustainable design strategies² to be applied in the conception, development and production stages of a fashion project. However, post-production stages have been addressed in a poorly systematized manner, which makes difficult its implementation in the fashion project.

In this context, considering the importance of ensuring sustainability throughout the chain of the fashion product lifecycle, this paper, originated in a doctoral dissertation, proposes a set of sustainable design strategies for the circularity of fashion products, with a focus on the post-production stages, seeking to fill an academic gap.

2. SUSTAINABLE STRATEGIES FOR FASHION DESIGN

For the design of fashion products from the slow-fashion perspective, sustainable strategies were suggested by Clark (2008); Barreto & Santos (2008); Fletcher & Groose (2011); Jung & Jin (2014); Salcedo (2014); Gwilt (2014) and Santos et al. (2016). According to these authors, such strategies (Table 1) may be adopted by firms and professionals working in the areas of product design, production, service design and lifecycle.

¹ Concept derived from the circular economy, it focuses on the valuation of natural capital and minimization of wastes and seeks to close the loop of a product lifecycle. In this scenario, there is a need for a review of processes, products and the business structure so as to optimize the utilization of the necessary resources, making them circulate more efficiently. It aims to the development of economically-viable and ecologically-efficient products and services (BRISMAR, 2017).

² Plan that integrates the main goals, policies and sequences of actions of an organization (MINTZBERG; QUINN, 2001).

Table 1 – Sustainable strategies for fashion design

PRODUCT DESIGN	SERVICES DESIGN	LIFECYCLE
Authenticity Jung & Jin (2014)	Clothes-service system Santos et. al (2016)	Lifecycle
Fair trade and production Jung & Jin (2014) Clark (2008)		Barreto & Santos (2008) Fletcher & Goose (2012) Salcedo (2014) Gwilt (2014)
Design of new clothes intrinsically more environmentally sustainable Santos et. al (2016)		Shift of lifestyles toward sufficient consumption Santos et. al (2016)
Environmental improvement of flows throughout the supply chain Santos et. al (2016)		
Local production Jung & Jin (2014) Clark (2008)		
Atemporal product Barreto & Santos (2008) Clark (2008) Jung & Jin (2014)		
Environmental redesign of existing clothes Santos et. al (2016)		

Source: adapted from BARRETO; SANTOS, 2008; CLARK, 2008; FLETCHER; GROOSE, 2011; GWILT, 2014; JUNG; JIN, 2014; SALCEDO, 2014; SANTOS et al., 2016

For product design, Jung & Jin (2014) discuss the importance of **authenticity** as a qualifier of products design and production. According to these authors, this strategy is incorporated into the product by means of technical skills, allowing producers to spend more time at each stage of production of a garment to make it different, heterogeneous and produced in smaller batches.

About the **atemporal product** strategy, Jung & Jin (2014) and Clark (2008) discuss the production of sustainable and sensory products with the purpose of

creating garments that generate positive experiences for consumers, which have long shelf life and are more valued. For consumers, the product is seen as an investment and remains fashionable even after the season. Thus, sensory and emotional aspects guide the choices at the time of purchase.

Santos et al. (2016) proposed a strategy related to the **design of clothes intrinsically more environmentally sustainable**³. It considers the demand for development of new items with higher environmental performance (VEZZOLI; MANZINI, 2008). According to these authors, it is a design approach that considers the entire product lifecycle and aims to reduce all materials and energy utilized as well as the environmental effects within the processes, from pre-production to production and distribution, seeking to reduce phases.

Santos et al. (2016) propose, in the sequence, the **environmental redesign of existing clothes**, which seeks to improve environmental efficiency by selecting low-impact materials and energy sources and environmental redesign, replacing existing materials with others with less impact. The main interventions at this level are related to the materials used, which are characterized by toxicity, naturalness, recycling, biodegradability and renewability.

With respect to the **fair commerce and production** strategy, Jung & Jin (2014) point to the need for slow-fashion projects that adopt equity as a differential. About this principle, Clark (2008) discusses transparent production systems, with less intermediation between producers and consumers, combining transparency in the line between consumption and production. Such transparent and less

³ It is grounded on the sustainable design strategies proposed by Manzini and Vezzoli (2008).

intermediated production systems also improve the collaboration between designer, producer and user by redefining their roles, according to the author.

For **local production**, Jung & Jin (2014) and Clark (2008) refer to the utilization and valuation of local materials, resources and skills. This is an alternative to diversify aesthetical and symbolic aspects of products rather than using homogeneous materials and resources. It aims to maintain ecological, social and cultural diversity and fosters new business models and artisanal techniques to build fashion products.

The strategy for **environmental improvement of flows throughout the supply chain** presented in the study by Santos et al. (2016) acts in the redesign of processes and operations throughout the production chain to make them more resources-efficient, avoiding pollution and wastes generation. It aims to improve environmental performance of operational flows (materials and information) and processes flows (people and machines) to make materials and energy utilization more efficient without changing the product.

Santos et al. (2016) proposed the **design of cloth-service systems** which suggests as a strategy the integration of services associated with the commercialization of clothes, seeking to raise value perception and, at the same time, reduce the consumption of materials by consumers. To achieve this, a technical-productive reorganization of the business would be necessary in order to supply new needs and generate more significant socioenvironmental gains. It requires social acceptance because it interferes with the notion of "ownership" of the garment.

Santos et al. (2016) indicated an evolution of the previous strategy, called **shift in lifestyles towards**

sufficient consumption. This strategy attempts to develop activities in a cultural sphere which seeks to promote new criteria for perception of satisfaction and, from this, change the demand and supply structure for sufficient consumption.

For the product lifecycle, the strategy proposed by Martins & Santos (2008), **design of new clothes intrinsically more sustainable**, seeks to establish, still at the design phase, solutions that improve clothing performance in all stages of the product lifecycle. It consists of the development of clothing solutions that, since its origin, prevent or eliminate problems that the environmental design seeks to minimize.

In this scenario, it is also possible to cite the approaches of Gwilt (2014), Salcedo (2014) and Fletcher & Goose (2011), who proposed interventions to be made during the production, development and post-development processes of fashion products to make them more environmentally and socially sustainable. It is worth noting that the economic dimension of the same theory is little measured in these authors' works, representing a gap in the approaches presented.

Based on the study of Lima et. al (2017), it was possible to tabulate and identify strategies to be applied throughout the product lifecycle. In the present work, we decided to present the propositions grouped in stages, as follows:

Product conception: this stage adopts more sustainable strategies for the selection of materials and processes to produce clothes, using minimum processing processes such as softening and dyeing. The designer must conceive empathy-designed products, procure low-impact raw materials, minimize energy and water consumption and wastes generation, and produce fashion articles without wasting materials;

b) **Products production:** for the second stage, the authors present strategies for the construction of fashion products so that they are made ethically, employing workers from communities around the company and providing proper work conditions such as fair wages, adequate working hours and safety. Concerning the environmental dimension of this aspect, the importance of choosing low-impact kinds of textile processing is pointed out again, aiming to a cleaner production;

c) **Products distribution:** about the third stage, the authors discuss strategies that point out to the companies' importance of meeting demand needs, using local labor and packaging optimization. It is emphasized that the products distribution is made by low-impact transport modes. Points of sale must be efficient, with low stock levels and provided with a reverse logistics system⁴ to be used by consumers after use;

d) **Products use:** for the fourth stage, the authors emphasize strategies for designers to design clothes that require low-impact care such as few washes, no softening and ironing, and which can be repaired easily, and parts that are multipurpose, attachable or modular. In addition, they propose that designers think about the possibility of customization, thus promoting an extended lifespan of the garment;

e) **End of lifecycle:** as the last stage, the authors present alternatives for recycling fashion items, based on the principle of renovation and reuse of the materials used. This

⁴ The circular process is achieved by reverse logistics, which enables the return of materials to their productive cycle. It includes all logistic activities of collecting, dismantling and processing products, using part of the products and/or materials, so as to ensure their environmentally- sustainable recovery (REVLOG, 2009). PNRS (Law 12305/10) describes it as "an economic and social development instrument designed for a set of actions, procedures and ways to ensure collection and return of solid wastes to manufacturers for reuse in theirs or other production cycles, or other environmentally-appropriate final destination" (our translation). However, as Manzini & Vezzoli (2008) point out, it is important to consider this premise during the product development project.

is achieved by using techniques such as deconstruction and reconstruction of clothes, aiming to product lifecycle renewal and upcycling⁵, thus preventing early disposal and optimizing the products lifespan.

With regard to the end of life, Fletcher & Goose (2011), Salcedo (2014) and Gwilt (2014) consider that a sustainable fashion product does not have an end because it is designed and produced via a circular process⁶, where after long use it has its cycle reinitiated, and so manufacturers are responsible for closing it. However, according to the GLOBAL FASHION AGENDA (2018), closing the loop involves minimizing resources consumption, facilitating their re-entry into the chain value, repeatedly, until the residues become biodegradable.

On the other hand, for the economic dimension, Gwilt (2014) mentions the need for the products to be traded fairly, that is, the products should have fair prices, affordable to different publics. Salcedo (2014) proposes in this project dimension sustainable business attitudes as a strategy to achieve differentiation and competitive advantage.

Fletcher & Goose (2011), in turn, propose the transformation of production systems and business models by adapting traditional formats. According to these authors, changing the way in which the fashion product is made and the materials used is still little to effectively contribute to a sustainable fashion system. This is because by changing these aspects, the economic aspect will still remain the same, as garments will continue to be sold by the large

⁵ Upcycling means to use a material already utilized or a residue of a product as it was found, without spending extra energy to reuse it. It is a recovery process that transforms wasted residues into new products or materials with superior quality and value (SALCEDO, 2014; GWILT, 2014).

⁶ Circular fashion can be defined as garments, shoes or accessories that have been designed, produced and supplied with the intention of being used and circulated in society in an accountable and effective way as long as possible (BRISMAR, 2017).

retailers and washed in the same way by users. What follows are suggestions for possible actions:

- a) keep the materials stocks levels stable, seeking to meet the needs of each demand;
- b) commercialize artifacts incorporating social and ecological costs;
- c) produce in small and medium scale;
- d) produce employing local workers and artisans, thus promoting income distribution in the communities surrounding the business;
- e) work with sharing logics and clothes rental in addition to sale.

Therefore, based on the analysis of the studied contents, the authors of this work understood that the post-production stages of fashion products would require a more effective contribution, which would provide fashion designers with a means for implementation of sustainable design strategies in the communication, commercialization, follow-up of consumers' experience, distribution, reverse logistics and end-of-life processes. Then arose the idea of proposing a series of sustainable design strategies for the cited stages, which, according to the understanding of the authors, have not been addressed yet in the literature of this area.

In the next section, the methodological procedures will be described.

3. METHODOLOGICAL PROCEDURES

This work is characterized as an exploratory qualitative research (MARCONI; LAKATOS, 2010). A literature search was conducted on articles, books and dissertations that addressed design strategies for sustainable fashion. Having understood the phenomenon, an interview (Table 2) was

conducted with 13 sustainable fashion companies in the Metropolitan Region of Porto Alegre, Vale dos Sinos and Vale do Taquari in the state of Rio Grande do Sul. This data collection process aimed to gather information on the communication, commercialization and post-sale processes of the participant firms.

Table 2 – Interview roadmap

COMMUNICATION AND SALE	What is product communication like in your business? What is product commercialization like? What is the relationship with the customer like? What is the product post-sales like?
POST-SALE	How reverse logistics is made? How is the products disposal managed in your firm? How is the end-of-life product managed?

Source: Authors (2019).

The interviews were conducted from July to December 2017 with audio recording and subsequent transcription. For data analysis, the content analysis technique was used (BARDIN, 2011), and as an auxiliary tool the organization model proposed by Franco (2008) was used.

After preliminary data analysis, the findings were compared with the literature on sustainable fashion, and three gaps were identified, as shown in Table 3. For said gaps, the authors of this paper understood that the consulted literature made some indications that the product post-production stages should incorporate sustainability, also underlying its importance, but did not present strategies for implementing it.

Table 3 – Summary of partial results

COMMUNICATION AND SALE	Communication	<ul style="list-style-type: none"> - Social networking websites - A gap that should be improved 	Indications by Fletcher & Groose (2011); Gwilt (2014); Salcedo (2014), but without strategies for implementation
	Commercialization	<ul style="list-style-type: none"> - E-commerce - Sale in collaborative platforms 	
	Distribution	<ul style="list-style-type: none"> - By post-offices 	
	Relationship with customers	<ul style="list-style-type: none"> - Close relationship, based on transparency and clarification of doubts 	
POST-SALE	Post-sale	<ul style="list-style-type: none"> - Information sent to customers and brand's contacts available on the websites 	
	Reverse Logistics	<ul style="list-style-type: none"> - Brands that think over the process - Brands that have doubts - Policy where consumer is the key actor 	
	Products disposal	<ul style="list-style-type: none"> - Number of disposals by the brand's consumers are not significant 	
	End of life	<ul style="list-style-type: none"> - The firms have doubts about the products end of life 	

Source: Authors (2019).

Based on the literature survey and comparisons, the authors conceived the design strategies for the post-production of sustainable fashion products, which are described in section 4.

4. DESIGN STRATEGIES FOR POST-PRODUCTION OF FASHION PRODUCTS

The production stages that were defined to allocate the strategies were based on fashion project and sustainable fashion methodologies. The design strategies emerged from analysis of interview data and comparison with literature. For presentation, the propositions were compiled in the product post-production stages: communication, commercialization, distribution, follow-up of consumers' experience, reverse logistics, and end-of-life management.

4.1 Communication

Given the scenario found in literature, as mentioned earlier, interviews were conducted with 13 sustainable fashion firms. Through applied research, we identified the strategies adopted empirically by the brands studied and which corroborate the indications of the authors cited to make processes transparent and closer to consumers.

The strategies that were identified and presented below are based on the indications described in sustainable fashion literature and empirical processes developed by the firms interviewed. They seek to provide owners and business partners with information on how to promote the products in a diversified manner, to ensure the brand's competitiveness and consumers' sustainable behavior.

Use of social media: they consist of a communication format comprised of image and a short text. It is used for products promotion where the characteristics are exhibited, including fabrics, trims, finishes. In addition, it is important to include in the social media posts of images and texts of products in full, photos produced in studios, photos that focus finishes, among others.

Use of blogs for information: the proposal is to use this channel to provide information on topics related to sustainability and the brand's guiding principles. The contents are prepared considering the scenario in which the firm is based. They should use easy language and contribute the consumers' sustainable behavior.

Use of websites to present the brand history: it is an enlarged communication form designed to share with consumers the brand history and details of the products production processes. It is an important tool for clarification and differentiation from other brands, especially the ones operating in the fast fashion segment.

Graphic traceability of the product: the brand should produce an illustration representing the product trajectory, from raw materials extraction to delivery to consumer. The central idea of this strategy is to let consumers know, by means of drawings (graphic icons) the processes involved in the design, development and production of the product, aiming to facilitate the understanding. Firms that have implemented reverse logistics processes and end-of-life product management should include them in the traceability graph. This tool can be used in social media, websites, and e-commerce.

Products timeline: it is indicated for fixed product models. The brand should produce a graphic timeline where modifications or evolution of a fixed model in the products mix can be shown in drawings, indicating the year or period when they were made, and the reasons. Like the previous strategy, it can be used in social media, website and e-commerce.

Provide information about the employees' working conditions: it can be developed using texts on their own websites, drawings or reports on social media. The idea is to describe in a practical way the working conditions offered to

employees or service providers, showing what differentiates the working practices provided by sustainable fashion brands from other brands, bringing the micro company closer to customers. It is believed that highlighting how products are produced attracts more consumers.

In the next section, the strategies developed for the commercialization phase are presented.

4.2 Commercialization

In the interviews, strategies empirically constructed by the studied brands were identified, which gave practical account of what the literature in the area indicated. Based on the issues discussed in this study, three strategies for the product commercialization stage were proposed.

Sale through own e-commerce: it consists of building an individual platform for sales to consumers, managed by the brands themselves. It is solely directed to the products produced by the proprietary brand, which can build a close relationship with consumers as it sells the product and manages the platform.

Sale through collective e-commerce: it is operated by a group of firms or business partners who have administrators that select the brands. The brands hosted on the site are responsible for dispatching the products and for the inventory accountancy. In turn, the platform administrator is responsible for the site maintenance and promotion of the products. The objective is to help firms to expand their market share.

Sale in collaborative physical store: it consists of a physical point of sale managed collaboratively by the brands that operate in the same space. The brands share the costs

and responsibilities of the store and, in turn, have a physical point of sale to offer the product to their consumers

Rental: it can be implemented by firms that have their own brand, as a complement to existing marketing processes and a process to foster users' sustainable behavior. This strategy consists of renting products at prices set by the brand. This modality can be developed in two ways: in the first, the user rents an outfit for a specific event and, in the second one, the user rents for the season, for a given period of time.

Sale of second-hand clothing: the clothes that returned by reverse logistics to the respective brand could be reconfigured or repaired and then sold at a price lower than the original one. The brands started the process by a team of professionals who revised and repaired the pieces when necessary. After this initial process, they can implement a second-hand line of products to sell the returned pieces.

Sale of surplus raw materials. Two issues were considered: the first was related to the need for purchasing a minimum number of meters of fabrics from suppliers, and the second identified the importance of increasing the revenues of sustainable fashion brands, which was reported by six interviewees who identified "high costs as a business difficulty". In this regard, it is suggested to the brands that they sell their excess raw materials to other brands that have the same purposes or to fashion students. The idea is to share the sale of such excess materials to facilitate this process. The sale can be announced on the brands' social media, on their own websites or by a group of interested brands.

Courses: this strategy considered the need for increasing the revenues of the interviewed brands. Suggestion is that the micro companies use collaborative spaces to offer courses on any topic that brings participants closer to the

sustainable fashion concepts developed by each brand. The courses can be announced on the brands' social media, blogs or websites and can be a one-day course or a workshop.

The next section describes the strategies developed for the distribution stage.

4.3 Distribution

Bicycle transport: suitable for distribution of small quantities of product to short distances. This modality does not produce carbon gas and would be a way to compensate for other suggested distribution forms that account for larger quantities of products distributed in long distances.

Distribution by the mail: it is the option for e-commerce sales, but can be used by physical stores when there is a need for any product adjustment. As post-offices have the SEDEX and PAC (economic products delivery) services, they represent better benefits for the businesses since the client is responsible for the cost.

Delivery made by the owner: this strategy could be an option for distribution of small quantities. It is suitable when the brand seeks for the customer loyalty, value creation and relationship building. In addition to handing over the product, the owner would present the proposal and how the brand operates. However, it would require possible movings of owners and/or partners.

Use of carriers: it consists of a form of delivery of large product quantities. It is indicated for brands that produce projects for firms, with their own stores, or for larger orders from other cities or states that require this form of delivery.

The next section presents the strategies developed for the follow-up of consumer's experience.

4.4 Follow-up of Consumer's Experience

This proposition comprises five strategies that can be used to follow up the consumer's experience, before, during or after sale.

Clarification of doubts: this strategy is designed to reduce consumers' doubts about the most diverse aspects related to the manufacturing, purchase and maintenance of a product. It can be done by chat, e-mail address, answers to posted comments, among others. The purpose of this strategy is to solve customer's doubts on any aspect relating to sizes, values and materials employed in the products.

Follow-up by e-mail: the focus of this strategy is on the post-production process. Through this system, an e-mail is sent to the customer asking whether the product was delivered on time, whether he/she is satisfied with the purchase or has some doubt about it. The principle of this proposition is to make the brand available to customers to motivate them to make new purchases.

Contacts: the strategy consists of making the brand contacts clearly available to customers either in the communication channels or in physical format, at the time the product delivery. This strategy has the function of facilitating the use of other communication strategies and the consumer's access to the brand.

Product care instructions: it aims to provide information to customers on the product maintenance process. It can be available on-line, in the brand channels, or in physical format, which is sent with the product at the time of purchase. It consists of direct care instructions for proper maintenance of the item purchased. It is important that the brand makes a prior

research and is able to transmit the information properly to the customer about the raw material used in their products, washing instructions and other maintenance procedures. Such instructions should be available on the websites, dispatched with the products at the time of purchase, by e-mail or even by posting them on the brand's social media.

Disposal instructions: it can be available on-line, in the brand channels, or in physical format, which is forwarded with the product at the time of purchase. Such instructions should provide to the customer, in a clear and/or illustrative language, the procedures for correct disposal of the product, indicating possible points of collection, and, especially, highlighting the importance of the process for sustainability.

In the next section of this paper, the design strategies developed for the reverse logistics process are presented.

4.5 Reverse Logistics

Discount policy: it aims to encourage consumers to send their products, after used, to the producing brands. Upon delivery, the brand gives to the respective customer a specific percentage discount on the next purchase. This proposition has a direct relation with the efficiency of the communication strategy *disposal instructions*, since it requires an effective communication to be achieved.

Collective points of collection: it aims to ensure the products collection process by slow-fashion brands, especially the small ones. This strategy aims to encourage the formation of partnerships between sustainable fashion brands to collect products. The idea is that the same point of collection may receive the products of the partnership brands, which may occur in different cities and states. Based on this principle, the

brands may use each other's products, share or send them to the origin brands, which will dismount and reuse the materials used. The choice will be motivated by what implies less cost to the collecting brand and uses less transportation.

Partnership with the environment departments of the city: it is suggested that firms come together and make formal arrangements with the city's environment departments to facilitate the logistic reverse processes. It is believed that the support of a public institution would facilitate the reverse logistics process, where materials receiving could be made collaboratively by establishing alliances between wastes separation and recycling units, municipal environmental programs, consumers and sustainable fashion brands. The solid wastes separation units could receive the reverse logistics products and forward them to the participant brands. In this context, considering the significant amount of materials, it would be interesting that the products received were forwarded to different brands, not only the initial ones.

Agreements with public and private universities that offer fashion courses: the proposition is to make fashion students the main actors of the process of transition from linear to circular fashion. In this way, the brands and universities may establish new relationships or strengthen existing ones, involving Fashion Design undergraduates who may think of fashion films to be implemented by the firms, act as digital influencers of a brand or a collective unit or even develop a project with pieces that come from reverse logistics to highlight the importance of this theme in the communication channels.

The next section presents the strategies developed for the end-of-life stage.

4.6 End-of-Life Management

For the last stage of the product lifecycle, three design strategies were developed, as follows:

Defibration: The focus is to recycle products coming from reverse logistics in the segments of footwear, accessories and clothing, especially materials made up of polyester, polyamide and heat-activated adhesives such as interlining fabrics. The defibration process is developed by specialized firms with their own machinery and techniques.

Disassembling and materials reuse: this strategy is for brands that manufacture clothing and accessories, which, by dismantling the product they select the materials that can be used in new garments. Such selection follows the principle of identifying what is in good conditions to be reused, e.g. textiles, buttons, zippers and decorative items. After arrival of the product from reverse logistics, the items are examined and the materials are separated according to categories of textiles and trims, by disassembling them. It is important, at this stage, to detach interlining materials from the textile if they are not in proper conditions for use. Later, the materials that were separated must be arranged according to the type of material and reused in production.

Composting: it is aimed to products made of natural materials, including textiles and trims. It consists of disposing the product into a composter by the customer himself. Such activity should be guided by the brand responsible for the product manufacturing in the strategy related to disposal instructions. According to the interview, it was found that two apparel-producing companies that employ natural textiles follow this process, but which can be hindered because the brands use sewing threads and trimmings that are made of plastic materials because they are less expensive. Thus, for appropriate composting, trims and decorative items, if not from natural origin, must be

removed from the garment before disposal and forwarded to the brand, which will reuse it in new products.

Product customization or reconstruction workshop: in this context, designers, modelists, cutters, dressmakers, craftsmen or embroiderers acting in sustainable fashion brands or services could develop free workshops for rebuilding products that have been used by a customer who wants a “new” garment, or customization workshops for clothing pieces already used. The workshops can take place in the own brand’ studios or in collaborative spaces, such as coworking spaces

The following illustration was built to show the strategies devised for the product post-production stage, so as to be added to the processes already employed in the product pre-production and production phases in sustainable fashion companies. This way, with design strategies, the lifecycle of a fashion product is closed.

In the picture below (top to bottom, left to right):

GREY: post-production, pre-production, production.

GREEN: composting, disassembly and materials reutilization; defibration, end-of-life management; discount policy, collective points of collection, reverse logistics.

BLUE: disposal instructions, care instructions, contacts, follow-up e-mail, doubts solution, follow-up of customer’s experience.

PURPLE: carrier, delivery by owner, post-office, bicycle transportation, distribution, partnerships with fashion courses in private and public universities, partnerships with city’s environmental protection departments, second-hand items; rental, collaborative logistics, collective e-commerce, own e-commerce, marketing.

RED: disclose images and information on collaborative works; products timeline, product graphic tracking, websites, blogs, social media, communication

Figure 1 – Design strategies for products post-production



Source: developed by the author

The next section presents the final remarks.

5. FINAL REMARKS

The strategies proposed here have a focus on the product post-production stages. As mentioned earlier in this paper, these stages comprise the product final lifecycle phase, which

are fundamental to the transition from the linear to circular model.

Considered by the author of this study as a topic that has been addressed subjectively in literature, the proposed strategies contribute to micro companies in the sense that they can improve the final lifecycle processes by adding the proposed content to sustainable practices already performed in pre-production (project conception, ideas generation and materials selection) and in production (modeling, cutting, sewing) stages, thus seeking to ensure the circularity of the products made.

The strategies were built based on literature gaps, on studied practices and cases presented as new business configurations. The sum of the contents studied enabled a simplified proposition that allows to serve different segments of sustainable fashion companies and, given their possibilities and practices, they can decide on the implementation of strategies that best fit the lived scenario. Thus, companies will be able to decide on which strategies are suitable and which are not relevant due to costs and logistics-related issues or other processes.

With respect to content publicization, the strategies will be available on *Trello*⁷ platform. The intention is to facilitate incorporation of the proposed material into the daily operations of companies of the apparel industry and contribute to the performance of different actors in the process, allowing their visualization and commitment, identifying the professionals involved and defining a schedule for the activities. This obstacle was identified during data collection (interview) because in

⁷ Free on-line projects management platform. It allows to share activities, set schedules for images execution, insertion of status monitoring. In addition, it can be shared with the project team through an e-mail link. Available on <https://trello.com/pt-BR>.

some companies the actors responsible for the product development and production stages are based in different locations.

It was found during the conduction of the applied study that many companies do not know how to implement the strategies for these stages, or have difficulties in doing so, due to the lack of clear material and the businesses configuration. However, as pointed out in the interviews, the companies expressed interest in implementing practices that would contribute to the products final lifecycle and could be applied in their contexts.

For the communication, commercialization, distribution and follow-up stages, strategies are suggested with the purpose of instrumentalizing professionals in organizations, especially designers, to perform these processes and make more assertive choices in product development and production. However, considering the most participative processes of design, development and production, it is suggested that these choices be also made collectively, with participation of different actors of the brands.

For the reverse logistics and end-of-life management stages, given the existing complexities relative to the return of pieces, materials composition and technologies involved, indications are presented for the preparation of instructions to customers and creation of partnerships with companies so that these processes may be effective. It is understood that the biggest challenges for implementation of this study in the reality of micro companies are in these two stages. However, as already mentioned, it was noticed that the interviewed companies have in their essence concepts of collaboration and partnership which, in our understanding, will facilitate the entire process.

With regard to use, the strategies were proposed to product and fashion designers, but can be used and contribute to the

performance of the business managers. In the case of designers, the strategies can help understand that the product project is not limited to the completion of the production stage, but it is necessary to broaden the professional's vision and project the subsequent stages. For managers, the strategies can be used as important tools to enhance the brands' competitiveness and position in the market, because the material has the characteristic, especially in the communication and commercialization stages, of approaching the brands to customers.

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