

Valérius 360: Co - creating a circular fashion system

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Abstract

Purpose: High environmental costs are associated to pollution from chemical treatments used in textile dyeing, finishing and preparation, occupation of land for the production of natural fibers, high water and energy usage required during textile production, the scale of landfill produced during disposal and the disposal of large amounts of unsold stock. This project main goals are: to give an eco-friendly solution for our own textile waste and brand's over stocks; to reduce substantially the use of raw materials, energy, water and chemicals; to design and produce an ethical premium jersey collection at affordable prices and an inspirational garment capsule collection; to produce sustainable paper, with the waste from the textiles recycling process.

Design/methodology/approach: Valérius 360 project is innovative and wants to achieve a superior “quality” dimension in textile recycling, starting from the conventional six steps process – garment collecting, sorting, grinding, re-born yarn, knit and apparel. Throughout the recycling conventional technologies and proceedings for textiles, some wastage can't be return to this industry, so this project introduces the idea of reusing these pre-consumer short fibers textile materials for the paper industry.

Findings: Valérius 360 intends to co-create a circular fashion system with their stakeholders, encouraging to building a greener future and sustainable environment.

Originality/value: Valérius 360 process intends to recycling the partner brands and group clothing waste over production and stocks in order to produce yarns, textiles, garments and paper, co-creating a circular fashion system.

Keywords: circular economy, sustainability, fashion system, textile industry, case study.

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1. Introduction

Before mass production, people possessed far fewer clothes and accessories. Items were tailored for the wealthy, while the lower social classes made their own clothes. Garments were used and maintained for several years by repairing and remodelling. Indeed, they could be considered long life products (Black and Eckert, 2007).

Textile companies generate wastes at a fast rhythm, due to the continuous change of collections and the emergence of new ideas. At the same time, globalisation of production, increased competition and consumer demand have resulted in accelerated fashion cycles, which in turn have led to a culture of “fast” and disposable fashion. They must store notable quantities of textiles and components not longer used for production. Furthermore, the percentage of scraps of fabrics, leather and other materials, is often significant. Recycling can be applied to the Fashion sector in order to recuperate wastes and create original items, which can be particularly successful in a market where customers are increasing their sensitivity towards sustainability (Cimatti *et al.*, 2017). The excessive consumption of fashion, consequently generates an enormous amount of textiles discarded and not reused. The birth of ready-to-wear fashion implied the standardization of sizes and a reduction in production costs that allowed consumers to buy more clothes even if they did not fit as perfectly as the ones of the dressmakers (Black and Eckert, 2007; Cimatti *et al.*, 2017).

Fast Fashion brings up ethical and environmental issues as it clearly embodies unsustainability. In particular the lack of social dimension is evident. Fashion’s fast obsolescence is highly unsustainable and it is due to a social and cultural issue coming from a continuous desire for fashionable renewal, which individuals have in order to achieve a personal affirmation and to distinguish themselves from others. Fast Fashion products do not last long and generate a lot of wastes, also the environmental dimension of sustainability is relevant. Thinking more widely, Fashion in general, more than any other industry, embraces obsolescence as a primary goal, on which most profits are based, in opposition to the criteria of sustainability (Abrahamson, 2011; Cimatti, *et al.*, 2017). In the innovative dimension, words such as “slow” and “timeless” fashion were used to describe products or collections, indicative of an attitude towards long-lasting products and fashion, less consumption and less waste. Slow fashion refers to fashion production and commercialization practices that oppose the fast fashion paradigm (Fletcher, 2010). Slow fashion drives innovation in value proposition and customer relationship, as firms orient their offering toward increased perceived quality and authenticity and address customer concerns in terms of environmental (by reusing or recycling materials) and social (by prioritizing locally-made products and partners that adopt fair trade principles) impacts (DiVito and Bohnsack, 2017; Todeschini *et al.*, 2017).

The fashion industry underwent a remarkable expansion in the last 2 decades, especially

with the consolidation of the fast fashion approach, which emphasizes an entrepreneurial modus operandi of rapid acquisition and disposal of mass-produced, homogeneous, and standardized fashion items (Fletcher, 2010). However, by stimulating widespread consumption of easily replaceable garments, fast fashion has a significant downside in terms of environmental and social sustainability.

Consumers seem to be aware of these issues, as evidenced by growing interest in green products. As a response, large-scale retailers such as H&M and Zara have recently invested in sustainable actions and there are reasons to believe this trend will grow. At the same time, cultural and socioeconomic macro-trends such as circular economy and sharing economy are challenging traditional mass production paradigms, driving the need for new and innovative business models that consider sustainability not as an afterthought, but as a crucial design element (Todeschini *et al.*, 2017).

There is a sustainable trend encompassing various technological innovations, enabling improved sustainability in fashion. Among the technological innovations that currently impact business models in fashion, sustainable or alternative fibers seem to be the most prominent innovations according to our literature review. Impacts include improvements in clothing durability, reduced waste from cleaning processes, and the use of alternative (synthetic) raw materials instead of scarce natural resources. Moreover, technological innovation in garment materials and manufacturing processes enable a new way to think about business models that goes beyond scale economies and scope advantages generated by fast fashion. It is a time of opportunity for fashion entrepreneurs to build innovative business models that explore these trends while pursuing not only economic but also social and environmental value creation (Todeschini *et al.*, 2017).

Decisions affecting the whole product are made during the design phase concerning quality, appearance, materials, manufacturing processes, and associated costs. As such, design decisions impact the whole business model but have particularly critical influence on the translation of sustainability principles to the value proposition. In this sense, adoption of environmentally-friendly materials and production processes can yield relevant business benefits. However, the decision to adopt such materials still represents a challenge for fashion firms that still do not perceive it as a strategic priority for the industry (Dissanayake and Sinha, 2015).

2. Business models and sustainability: sustainable business models

Business models have consequences on the physical environment in which they are practiced, both positive and negative. Developing an understanding of sustainable business

models demands that one includes value relationships beyond those exchanged between customer and company, and move towards including the impact of the business model on the natural environment (Abdelkafi and Tauscher, 2016; Evans *et al.*, 2017). The business models of enterprises in the global fashion industry produce highly negative outcomes for the environment.

Business models can be seen as the agents of sustainable change in the fashion industry. In order to begin the task of building business models that are sustainable and can survive in the challenging field of fashion apparel production and consumption, it is necessary to explicitly build propositions that can test the dynamics and properties of the emerging business models in fashion that are attempting to operationalize environmental value. In this way observers of the fashion industry can distinguish between interesting, but ultimately marginal contributions to building sustainable fashion business models, and the qualities needed to construct sustainable business models that have the potential to replace the existing unsustainable ones (Pal and Gander, 2018).

Fashion is undoubtedly one area of the economy that urgently requires the adoption of more sustainable business models. For example, is classified has ranked clothing, textiles and footwear fourth in the list of industries by impact on the environment, after Housing, Transport, Travel and Food. This undesirable ranking is largely a result of the “rise of fast fashion”, which has led to strikingly high environmental costs (Fletcher, 2016; Kant, 2012). In a world with growing water scarcity, the current usage level of fashion is very concerning, particularly when textile production largely takes place in areas of fresh water stress. In a fashion system where only around 20% of clothing is recycled or reused huge amounts of fashion product ends as waste in landfills or is incinerated. Overall apparel consumption is predicted to increase by 63% from 62 million tons today to 102 million by 2030 (Pal and Gander, 2018; Pulse of the Fashion Industry, 2017).

Given the structure and character of the fashion system, it is clear that any new sustainable business models innovations cannot reduce environmental costs merely by transferring the cost to the company or requiring customers to sacrifice some of the value they seek in their fashionable products. Competitive dynamics and the nature of the customer value proposition mean that such a redistributive approach would not be sustainable economically. Companies practicing such sustainable business models risk their survival and limit their ability to grow and thus reduce their ability to challenge the dominant unsustainable business models of their competitors. What is required are innovative ways that resources can be used, production and distribution organized and value exchanged and perceived (Arend, 2013).

This is in contrast to conventional fashion supply chains which can end up with nearly one-third of the produced goods as unsold. Such an excess in production produces wasteful

resource consumption upstream along the supply chain. Many high-street fashion businesses including those often tagged with the fast fashion business model, e.g. Primark, illustrate and epitomize this systemic challenge. So, viewed in this light, the increased accuracy of Zara's version of the fast fashion business model represents the promise of a more sustainable approach (Mustonen *et al.*, 2013; Pal, 2014).

3. High environmental costs and sustainability

Studies suggest that nearly seven out of every ten fashion companies do not focus on managing environment and resources such as water and cotton along the supply chain (Deloitte, 2013). Given the huge impact of the material stage in the supply chain in terms of energy and resource consumption and emissions (Allwood *et al.*, 2006; Deloitte, 2013), such an 'un-narrowed' linear flow of resource poses huge problems for a sustainable future. High water usage, pollution from chemical treatments used in dyeing and preparation and the disposal of large amounts of unsold stock through incineration or landfill deposits combine to make clothing one of the highest impact industries on the planet. That way, high environmental costs are associated from occupation of land for the production of natural fibers, high water and energy usage required during textile production, pollution from chemical treatments used in dyeing, finishing and preparation, and the scale of landfill produced during disposal (Fletcher, 2016; Kant, 2012). Growing awareness of the damaging environmental consequences of the fashion industry have encouraged the emergence of new more sustainable models of organizing production and consumption. The environmental factor also plays an important role. The production processes, and in particular the phases of dyeing, drying and finishing, make intensive use of chemical products and natural resources and generate a high environmental impact (Brito *et al.*, 2008; Pal and Gander, 2018). The textile sector has experienced significant environmental problems linked to the production process, which is characterised by the intense use of chemical products and natural resources (Lakhal *et al.*, 2008). But also the relevance of Supply Chain Management in contributing to environmental sustainability even in Fashion production must be considered, even if this kind of industry is typically studied from other perspectives (e.g. Brand management, marketing and retailing) (Caniato *et al.*, 2012).

Fast moving trends mean extremely short product life-cycles that create intense pressure on manufacturers to rapidly create and supply an ever changing array of new product lines. In such circumstances being able to respond to changing demand for products with different aesthetic attributes is critical. However, this can make the fashion customer a challenging one to service sustainably (Mont, 2008). Activities such as the use of monomaterial garments to increase their recyclability, or of creating modular clothing designs that can be updated or renewed, can place limitations on the responsiveness of the firm and the aesthetic aspect of

customer value. The life cycle of a product mainly includes 4 phases: procurement, manufacture, use and disposal, and Eco Design can help in reducing the ecological footprint, which is the measure of human impact on Earth's ecosystems. In the Fashion world, Eco Design can be applied choosing sustainable materials, such as cotton and wool, instead of synthetic fibres and selecting processes that don't impact the environment, substituting damaging chemical substances with natural ones (Cimatti, et al., 2017). The sustainable raw materials driver contemplates the development and adoption of different types of environmentally-friendly raw materials such as organic cotton, hemp, bamboo, lyocell, and recycled fibers. As a driver of innovation and sustainability in business models, it mainly impacts the key activities, key resources, and customer relationship parameters by requiring technological development, reliable access to a source of materials, and communication of brand commitment to sustainable practices (Todeschini *et al.*, 2017).

Life Cycle Assessment is a methodology for assessing the environmental impacts and resource consumption associated with the existence of products throughout their entire life cycle "from beginning to the end". Starting from raw material extraction, it considers materials processing, manufacture, distribution, use, maintenance and repair, and disposal. Life Cycle Assessment is an important tool to help managers to make production choices in order to increase sustainability (Westkamper et al., 2000).

The "6R" concept (Reduce, Reuse, Recover, Redesign, Remanufacture and Recycle) is a recent version of the traditional "3R" concept (Reduce, Reuse and Recycle), forming the basis for sustainable manufacturing. The "6R" concept allows for the transformation from an open-loop, single life-cycle paradigm to a theoretically closed-loop, multiple life-cycle paradigma (Jayal et al., 2012)

Recycling can be easily applied to increase sustainability in Fashion production. Recycling is the process of collecting and processing materials that would otherwise be thrown away as trash and turning them into new products with zero waste. In the case of Fashion, stored unused fabrics, leather and other components are waste that can be recuperated by this methodology, obtaining new products. The methods and techniques above described are mainly focused on the environmental dimension of sustainability. But sustainable fashion also involves an important social issue, related to the perception of the garment by consumers (Cimatti *et al.*, 2017).

The idea of sustainability was first defined in 1987 in a Report of the World Commission on Environment and Development: "Sustainability means being able to satisfy current needs without compromising the possibility for future generations to satisfy their own needs" with zero waste (Brundtland, 1987; Cimatti, Campana and Carluccio, 2017). Dimensions of sustainability have been introduced through the concept of the Triple Bottom Line:

Environment; Economy; Society (Elkington, 1997). Zero waste is a driver based on the notion of minimizing material waste in apparel production. It generates innovation for sustainability by reducing the use of raw materials through the development and adoption of novel and more efficient production processes, such as additive manufacturing. Adopting zero waste requires innovation in key resources, key activities, and cost structure parameters (Todeschini *et al.*, 2017).

Omitting the true cost of these business models blunts the innovation incentive to discover and develop new more sustainable ways of creating and capturing value in fashion apparel production. Fashion apparel manufacturers and their customers are not, of course, unaware of the environmental consequences of its dominant business model and new, more enterprises are indeed emerging that attempt to operate according to sustainable principles (Stubbs and Cocklin, 2008). However, the question around these business models is, given the omission of the full environmental costs of production and disposal, can these new logics of business become sufficiently widely adopted by mainstream fashion labels so as to effectively challenge the dominant and highly unsustainable fashion industry paradigm.

There are already some companies like Valérius and like Valérius 360 project, that present as innovative proposal the sustainability during the development of textile substrates. Preza is a Brazilian startup whose original value proposition lies in transforming industrial waste in highend fashion accessories. Preza's main product is a line of designer sunglasses made of wood waste from the local luxury furniture industry. Its value creation practices are illustrative of the vegan and upcycling drivers, as all raw materials and production inputs are fully environmentally friendly (e.g., solvent-free resins extracted from Brazilian plants) (Todeschini *et al.*, 2017). Ecoalf is a company which creates clothing and accessories from fishing nets, plastic bottles and even coffee grinds. It is a pioneer business into the high end fashion market with their "trashion" concept. Each recycled material is processed and turned into new products in the region it originated. Percentil is an e-commerce that gives a second life to all the clothes that the customers don't want anymore, paying sellers for them and allowing customers to purchase high quality clothing at 70-80% of their original price. All the items Percentil receive that don't pass out quality standards to be resold, are donated to NGOs on behalf of the sellers (Gárgoles and Susaeta, 2016). Orange Fiber is a startup aiming to create sustainable textiles from citrus juice byproducts. In Italy alone, more than 1 million tons of citrus by products are wasted every year. Orange Fiber came up with the original and inherently sustainable idea to reuse this waste (like orange, lemon, and grapefruit peels) by transforming them into cellulose fibers, thus developing an innovative fabric to be used later for manufacturing clothes. To do so, the startup designed, developed, and patented a process based on nanotechnology that replaces highly polluting raw materials with natural elements. The

resulting sustainable textile represents a brand new opportunity for Italian tradition in high-quality textiles and fashion. The Orange Fiber business model leverages and resembles the sustainability drivers of sustainable raw materials, recycling, local sourcing, and zero waste (Todeschini et al., 2017). Continental clothing, a UK-based fashion brand, has developed an EarthPositive collection that is 100% organic and reduces CO₂ emission by 90% during manufacturing. The reduced impact on the environment is achieved through a combination of low-impact organic farming, efficiency in manufacturing and transportation, and the use of renewable energy instead of fossil fuel, thus saving around 7 kg of CO₂ per T-shirt (Pal and Gander, 2018).

4. Circular economy

The main idea behind the socioeconomic trend of circular economy is to base economic production on purposeful restoration and regeneration. A circular economy is restorative by design and aims to keep products, components, and materials at their highest utility and value at all times. This model strives to decouple economic growth and development from the consumption of finite resources. To do so, it distinguishes between technical and biological materials and focuses on effective design and use of materials to optimize their flow and either maintain or increase technical and natural resource stock (Todeschini *et al.*, 2017).

Through the use of technology, the new generations are leading the way from an ownership economy to a circular economy, driven by sharing, recycle and collaboration. They don't necessarily want more material possessions but rather, more meaningful experiences that help them live better (Gárgoles and Susaeta, 2016; Kopnina, 2018).

By other hand, the architects McDonough and Braungart (2002) set up the concept of "circular economy". These authors describe Circular Economy as an economic system that is an innovation engine that puts the 're-' back into resources. It allows for continuous benefit to be provided to all generations by the reuse of things, material, energy or water (Kopnina, 2018; McDonough and Braungart, 2002).

Circular economy comes from the idea of reusing each component and each textile material, so that they can have a new usefulness and these negative environmental effects can be reduced by promoting an association between fashion, science, technology and sustainability. This phenomenon is based on economic production, allowing the restoration and regeneration of materials, making the products, components and materials with greater utility, quality and value. Through the use of science and technology, the new generations are boosting a circular economy, driven by sharing, recycle and collaboration, promoting sustainability. According to Stella McCartney, "Only 1% of clothing is recycled. What are we doing?"

(Kopnina, 2018; McDonough and Braungart, 2002).

The circular economy provides opportunities for innovation in product design, service, and business models; as a result, it establishes a framework and building blocks for a long-term, resilient system. It challenges fast fashion by drawing a sharp distinction between consumption and use of materials, advocating the need for a functional service model characterized by manufacturers or retailers increasingly retaining product ownership and acting as service providers. This paradigm shift has direct implications for the development of efficient and effective take-back systems and the emergence of new design practices that generate more durable products and facilitate disassembly and refurbishment (Webster, 2015).

The circular economy is characterized by 3 key steps. The first step is the upcycling, that refers to the use of wasting materials to generate new goods of equal or higher perceived value, utility, and quality than the products originally developed, being able a source of advantage. It is characterized by generating sustainability by reusing resources that would be discarded as raw materials for new products, thus extending their lifespan and decreasing the need for natural resources. The next step is the recycling. This step is based on converting materials from existing products to create different products. This process is an important alternative to implementing circular economy principles as it reduces the need for new materials and natural resources consumption. Adopting recycling in a business model implies transformations in the cost structure, key activities, and key partners parameters as firms in the fashion industry tend to acquire recycled materials instead of processing them themselves. The last but not the least step is the vegan. Vegan refers to an approach to fashion production that deliberately refrains from using raw materials of animal origin. By doing so, it aims to reduce overall energy consumption within the whole system, as extracting and processing animal material tends to require high amounts of energy (Dissanayake and Sinha, 2015; Todeschini et al., 2017).

One way of doing this and trying to understand what the circular economy consists of is to look at the flow of materials in the fashion system and shift the sector's attitude from the largely linear model of production, sale, use and disposal to a more circular model of reuse and reintegration. To apply this notion of flow and insights gained from a more circular or 'looped' approach to the study of fashion value chains, the paper draws on influential research (Bocken et al., 2014). This body of work conceptualizes three methods to reduce natural resource usage and lessen environmental damage; narrowing, slowing and closing the resource flow. 'Narrowing' the resource loop means increasing the efficiency of the production and manufacture process so that fewer natural resources are used. The objective here is to reduce the amount of resources (material and energy) used during the design, manufacture, distribution, use and disposal of products. 'Narrowing' is achieved through modular production systems, demand-driven approaches to production, or low impact energy use during

production. 'Narrowing' through low energy production processes involves investing in specialist machinery, computerized systems and new technology solutions (Bocken *et al.*, 2016). 'Slowing' the resource flow uses the reuse and extension/repair of products to lessen overall environmental damage. Strategies for slowing down the resource flow and thus reducing overall natural resource usage and environmental damage, involve creating longer-life clothing thus extending the period the product is used and hereby reducing overall demand for the product. The clear benefit of 'slowing' down the flow is to reduce production, thereby creating less excess, and accordingly less waste. The slow fashion model comes in the form of highly durable garments, and the introduction, or re-introduction, of tailoring services to refit and repair, adjust and perhaps augment treasured and long lasting pieces. 'Closing', which is connected to the wider movement of circular economy and refers to the switch in logic from viewing production and consumption as separate ends of a pipe to attempting to connect them together to form a loop where resources cycle (Pearce and Turner, 1989; Linder and Williander, 2015). Closed loops or circular systems are a highly attractive alternative to less sustainable linear systems of production, consumption and disposal (Geissdoerfer *et al.*, 2017; Urbinati *et al.*, 2017). In its ideal form, resources, or the majority of those used to create the garments, are 'rescued' from disposal and reintroduced into the production/consumption process. There is of course a declining return each loop made by the raw material. Strategies for attempting to 'close' resource flows include a range of social and technological resource recovery activities (Stahel, 1994; McDonough and Braungart, 2002).

The creation of a closed cycle of resources comes in different forms, from the chemical or mechanical processes that recover part or the entire material used in the clothing and reintroduce it into the manufacturing loop (Stahel, 1994; McDonough and Braungart, 2002), through simply reclaiming the garments and reselling them as they are, to remanufacturing by upcycling or reworking the products. Closed loop logic is thus a principle of sustainable production and consumption that is awaiting technological innovation, a shift in social attitudes and institutional change. Technological innovations in fiber recycling are needed to make it applicable to the varied production materials and processes that make up the current fashion product, a social revolution is needed for fashion consumers to adopt a non-owned style of relationship with their clothing (Armstrong *et al.*, 2016), and institutional changes are necessary in design approach and transfer of design production knowledge in companies and institutes. Though distinguishable as different approaches, they are not mutually exclusive. These different logics can be applied together in combined ways that reinforce the effort towards establishing a more sustainable value creation model. For instance, 'closing' the loop activities can in fact narrow resource flow through the principle of substitution, while 'slowing' can be achieved in conjunction to 'closing' the loop (Stahel, 1994; McDonough and Braungart, 2002;

Pal and Gander, 2018).

5. Valérius 360

Valérius, established 1987, offers its customers creative and technical skills for the accomplishment of high quality products at a competitive price. Closeness, adaptability, flexibility, trust, social responsibility and environmental awareness are some of key features valued and implemented by Valérius to achieve the high standards quality of products and services. Valérius has as main market Europe namely contemporary fashion and ready to wear global top brands.

The implementation of circular design and economy requires researchers and entrepreneurs to reflect on the resources used and the processes of production. The Valérius 360 project focuses essentially on the ‘closing’, which is connected to the wider movement of circular economy. How much more closed or circular the loop is, the more efficient the use of resources will be and consequently less damage to the environment occurs. A number of research and company-driven initiatives in fashion such as FIBERSORT, Relooping Fashion, Worn Again, Pure Waste aim to create such closed loops of production and consumption. For example, UK-based ‘Worn Again’ is developing a chemical ‘textile to textile’ recycling technology and have partnered with fashion companies such as H&M and Kering. A Finnish brand, Pure Waste, has partnered in the Relooping Fashion initiative, and is involved in process in recycling material from industrial waste (using a cellulose dissolution technology), which is then sorted by color, ‘refibered’ and finally spun into yarn that is used to produce garments. Even though recycling of textiles can be achieved at scale, the more complex the product is in terms of material content the harder it is to recycle due to a current lack of technology for the separation of the blended fibres. Fashion remanufacturing is however largely restricted by issues of scale and scope, due to challenges related to material and process repeatability and standardization on one hand and consumer acceptance on the other (Dissanayake and Sinha, 2015).

Valérius 360 project is innovative and wants to achieve a superior “quality” dimension in textile recycling, starting from the conventional six steps process – garment collecting, sorting, grinding, re-born yarn, knit and apparel. In the first step it occurs garment collecting from internal production defect or overproduction and from customer’s unsold products of the cliente, so that the greatest possible reutilization possible of all the existing textile substrate and that has no utility for the final customer. One of the most important steps is the second, sorting, that allows the incoming garments are hand sorted by type of material and colour, the colour sorting means that there’s no need to re-dye the recycled yarn/fabric. This occurs so that its reutilization achieves the highest possible yield in terms of reuse. In the process of grinding,

the garments are grinded in a continuous process and transformed into raw material for the spinning process, thus allowing the preparation for the production of new yarn and yarn with a higher quality and a greater scale of use by the textile industry. In the step of spinning process, yarn production, proceeding to the cleaning, orientation and twisting of the recycled fibres. This process promotes to production the new yarn with the desired qualities and characteristics. In the knit step it was used knitting technology using the yarn produced with recycled fibres, includes as technology partners, international technological companies. Finally, in the sixth step we have the apparel process, since the fast fashion system motivated over-production and over-consume. By recycling garments, textiles and fibres, we're contributing to reduce the use of natural resources, raw materials, energy, etc. We're contributing to reduce environmental impacts. Valérius 360 process intends to develop yarns with thinner counts and high-performance – presenting increased durability and resistance – at competitive prices to satisfy the new conscious customer expectations. All of these initiatives vary considerably in the type of technology employed, degree of resource intensity used/reduced, and amount of value regenerated along multiple loops of product recovery options. The underlying causes for this variability can be linked to differences in kinds of fiber being treated and, by extension, in intensity of activity required based upon the condition of the collected post-consumer textile waste. Throughout the recycling conventional technologies and proceedings for textiles, some wastage can't be return to this industry, so this project introduces the idea of reusing these pre-consumer short fibers textile materials for the paper industry. Valérius 360 includes as partners, international technological companies – LaRoche, Trutzschler and Schlafhorst – and Portuguese academic institutions – Minho University. Accordingly, Valérius 360, 10 years investment project with a budget 20 Million Euros, pretends create 50 new employments. This project was born in 2017 and had as main stages the research about the processes/technologies with possible partners. The first stages of industrial testing for each phase of the process in the respective partners, as well as their validation, are and will be performed between 2018-2019. Between 2020-2021 will be carried out the acquisition of all the equipment and implementation of the industrial process. In the 2020-2024 period new R&D projects are planned and will be carried out with Portuguese universities for the research and innovation of textiles yarns and paper processes. The overall project will be consolidated between 2024-2027.

6. Conclusions

Growing awareness of the damaging environmental consequences of the fashion industry have encouraged the emergence of new more sustainable models of organizing production and consumption.

Valérius 360 intends to co-create a circular fashion system with their stakeholders,

encouraging to building a greener future and sustainable environment. Thus, Valérius 360 process intends to recycling the partner brands and group clothing waste over production and stocks in order to produce yarns, textiles, garments and paper, co-creating a circular fashion system!

Thus, these logics and exemplary cases of narrowing, decelerating, and closing the cycle of resources present in the circular economy certainly provide a direction for the development of more sustainable business models for the fashion industry, thereby reducing the global environmental impact by promoting sustainability. However, despite the change in organization and the attitude required for sustainability to be significant, there are still many obstacles that need to be overcome and Valérius and the Valérius 360 project, together with their employees, aim to outdo them.

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