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12 Production Innovation for Sustainability in the Fashion Industry

Abstract: What are the possible avenues of transformation for the various players in the fashion industry's value chains to respond to the changes in consumer expectations and the environmental and social issues pointed out by their stakeholders? Given that the fashion industry has considerable environmental impact, this chapter considers innovative production for sustainability.

Keywords: production innovation, demand-driven model, sustainability, fashion

The fashion industry provides hundreds of millions of jobs around the world (Thomas, 2019), mostly in developing countries. Therefore, the social impact of this industry is colossal (Gereffi, 1999). However, the fashion industry also has considerable environmental impact. Approximately 1.2 billion tons of greenhouse gases are emitted by the textile industry each year – more than the shipping industry and international flights combined (Ellen MacArthur Foundation, 2017), making it the second most greenhouse gas-generating industry after the oil industry (Morgan and Ross, 2015). It also has other impacts, such as the release of toxins and the accumulation of end-of-life waste. If nothing is changed, the textile industry will account for 26% of global emissions by 2050 (Ellen MacArthur Foundation, 2017; International Energy Agency, 2016).

These are the consequences of the rise and industrial dominance of fast fashion over the past three decades (Remy, Speelman and Swartz, 2016), mass production and a rapid shift in trends that promote highly affordable products with accelerated obsolescence (Thomas, 2019). This results in the overuse of energy, water and raw materials and the accumulation of waste. Thus, embedded in a system of global value chains, the fashion industry must rethink its extraction, production and distribution channels, and the power or collaborative relationships with all the actors involved. A major challenge for the coming decade is to drastically reduce the carbon footprint and extend the life of clothing.

In contrast to fast fashion, the slow fashion movement is currently taking momentum (McKinsey, 2019), where the activism of consumer actors is echoed via social networks, and where the tipping point in terms of market power is moving towards digital natives who are more critically aware of the consumption of fashion products than their elders. In this sense, what are the possible avenues of transformation for the various players in the fashion industry's value chains to respond to the changes in

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consumer expectations and the environmental and social issues pointed out by their stakeholders? This chapter aims to answer this question.

State of Affairs

The global fashion industry accounts for 2% of the global gross domestic product (GDP).

After the slump due to the COVID-19 pandemic, this sector is expected to recover its level of activity as early as 2023 (USFIA, 2021), and apparel production volumes are expected to grow by 2.7 percent per year by 2030 (McKinsey, 2021).

The abolition of the Multi-Fibre Agreement (MFA) in 2005 (Martin, 2007) profoundly changed the dynamics of markets and configuration of supply networks (Abernathy et al., 2006). Many regions in Europe and in the United States have been hit hard, while other countries, mainly located in Asia and known for their low labour costs, have gradually become new leaders in fashion production (Abernathy et al., 2006; Palpacuer et al., 2005). In 2021, China exported over USD 31 billion worth of clothing to the United States. Globalisation has become standard in the fashion industry (Spicer, 2006).

The massive reliance on production from Asia has been viewed as an opportunity by fashion brands and distribution networks that run supply networks. Large retailers and clothing brand owners are indeed the most powerful entities in these networks, regardless of their degree of resource ownership (Gereffi, 1999; Tyler et al., 2006). This new situation has allowed them to profoundly change the key success factors in the fashion industry. A report issued in 2021 by the United States Fashion Industry Association (USFIA) speaks volumes in this regard. A survey of executives from leading U.S. fashion companies emphasises the interests associated with relocating production to Asia, particularly in China. Most respondents of the USFIA survey (2021) still view China as a competitive and balanced supply base from a business perspective. Only a few other sourcing countries can match China's flexibility and agility, production capacity, speed to market and supply costs. China's role in the textile and apparel supply chain extends beyond apparel production, and continues to expand. Following these frameworks, it has become increasingly difficult to find alternatives to China.

Major U.S. brands and retailers do not plan to outsource their manufacturing to any region outside Asia. More than 85% of the respondents to the USFIA survey (2021) plan to increase sourcing from Asian countries in the next two years. India, Bangladesh, Indonesia, the Philippines, Vietnam and Cambodia were the most frequently cited countries. If trade disputes escalate, these countries will serve as alternatives to sourcing from China. Indeed, the surveyed executives consider "rising production and

supply costs" to be their second biggest trade challenge in 2021. They do not intend to leave a region where labour costs are among the lowest in the world.

In other words, decisions about where to locate the production of fashion items are guided by (1) the manufacturers' ability to adapt quickly to changes in brand and retailer demands, (2) the manufacturers' ability to implement large volumes of production, (3) the production speed, and (4) minimising production costs. Thus, the fashion offered to customers in developed countries is largely comprised of mass-produced, low-quality products with rapid obsolescence (McCarthy and Jayarathne, 2012). Should we consider that consumers consent to this system of supply and also indiscriminately absorb what is offered to them? As José Neves, founder and CEO of Farfetch, stated in July 2020 on *The Business of Fashion* podcast, "the industry has an overproduction problem."

According to McKinsey (2021) 25% of clothes produced will never be sold. Furthermore, a significant part of total production will find a buyer after the seller grants a discount. Therefore, the search for a minimisation of production costs is used to provide significant markdowns that will be made on each collection. In addition, manufacturers discard 12% of the raw materials used in the production process, and only 1% of unsold garments are recycled (McKinsey, 2021).

Despite its economic value, the fashion industry has negative social and environmental impacts, such as worker exploitation, resource overuse and waste generation (Fletcher, 2007). Widely expanded due to the abolition of the MFA in 2005, the standard economic model of the fashion industry imperfectly meets the demands of consumers in developed countries. Furthermore, the rate of raw material waste during production seems to be excessive.

The Environmental Impact of the Fashion Industry

While the fashion industry contributes to 2% of the global GDP, it produced approximately 2.1 billion tons of greenhouse gas emissions in 2018, which is equivalent to 4% of the global total (McKinsey, 2020). Approximately 70% of the fashion industry's emissions come from upstream activities, such as the production, preparation and processing of materials. If the dominant business model for this industry does not change, the increase in greenhouse gas emissions will follow the growth in apparel production volumes. If the target of 2.7% annual growth by 2030 is met, greenhouse gas emissions from the textile industry will reach 2.7 billion tons by the end of the decade.

Therefore, ensuring industrial growth without increasing greenhouse gas (GHG) emissions is a challenge. Decarbonised production and process efficiency improvements, such as initiatives in spinning, weaving and knitting; a shift from wet to dry processing; a transition from coal to electric power; and increased use of renewables in the value chain can curb the increase in emissions related to fashion industry

growth. However, these initiatives cover only 43% of the growth target without additional GHG emissions (McKinsley, 2020).

Reductions in the overproduction and rate of raw material waste during the manufacturing process can also help move the industry closer to its goal. The desire to reduce both calls for challenging the standard economic model and replacing it with a model having sustainable development concerns (Haq and Boddu, 2017; Kong et al., 2016). The development of the textile and apparel industry has focused on the aspects of technology and cost. Moreover, the focus has been on keeping the price of the final product low and increasing production efficiency. Products are designed and manufactured according to regularly changing trends that allow for quick profit rather than radically rethinking ways of designing and manufacturing an offer that is based on consumer needs and the principles of sustainable development (Niinimäki & Hassi, 2011). Business models should be tied to more than sales and production volumes. Therefore, more sustainable consumption is seen as leading to reduced volumes and lower profitability of production, not as an opportunity for a new type of green business (Allwood et al., 2008).

The concept of sustainable development is used to indicate that the current economic, social and environmental needs are balanced with the needs of future generations. Sustainable development "meets the needs of the present without compromising the ability of future generations to meet their own needs" (UNWCED, 1987). Companies that integrate these requirements must adopt policies, ideologies and action plans that share a common worldview (Bridges & Wilhelm, 2008) regarding sustainability (Savitz & Weber, 2006). Corporate sustainability indicates that all aspects of corporate performance are sustainable (Schaltegger & Wagner, 2011), from individual employee behaviour to performance along the value chain (Fiksel, McDaniel, & Mendenhall, 1999).

The terms "ethical fashion" and "sustainable fashion" are often used interchangeably in the literature, among other terms, such as "eco" or "green" (Cervellon & Wernerfelt, 2012; Lundblad & Davies, 2016). In academic literature, environmental concerns have taken precedence over the social and societal dimensions of sustainable development. This has led to a narrowing of the analytical framework, reducing the principles of sustainable development to its green dimensions. For example, Green Supply Chain Management (GrSCM) is defined as the integration of environmental thinking into "supply chain management, including product design, materials sourcing and selection, manufacturing processes, delivery of the final product to consumers, as well as end-of-life management of the product after its useful life" (Srivastava, 2007). Choi and Hwang (2015) emphasised the importance of DfE and leverage investments by maximising the recovered value of end-of-life waste. Ecodesign, which includes product life management, may improve reputation and may lead some consumers to pay more (Choi & Hwang, 2015).

The consideration of sustainability requirements begins with considerations that guide product design (Seuring & Muller, 2008). Decisions made during new product development (NPD) processes significantly affect the degree of product sustainability.

NPD by apparel brands or retailers can often be conducted in collaboration with product developers who are employed by their suppliers. This collaboration can help the former to leverage the synergies of their suppliers and enhance or improve the environmental integrity of their materials (Thabrew, Wiek & Ries, 2009). Following Goworek et al. (2020), the integration of suppliers into the new product definition process and the creation of cross-functional teams leads to collectively addressing the principles of sustainable apparel design as described by Curwen et al. (2012). This co-design leads to the diffusion of core values guiding new product development from downstream to upstream in the value chain. It is also expected to widely disseminate the knowledge held by each other, and it should help in optimising the use of raw materials and intermediate goods (Gam et al., 2008).

Reconciling Fashion and Sustainable Development

Sustainability is an important challenge in the fashion industry (Rutter et al., 2017). According to Mathiyazhagan et al. (2021), the relationship between sustainability and fashion business has become a central debate at the national and international levels in both developed and developing countries. There is growing pressure on the apparel industry to make its products more sustainable. However, we note that only a few concrete measures have been taken so far. In addition, these measures would not reduce the consumption. Given the characteristics of this business model, the reduction in consumption would directly impact the profits (Friedrich, 2021).

We suggest, however, a significant reduction in the environmental footprint of the fashion industry is achievable. The WRAP (2012) report notes that most of the carbon, water and waste impacts are related to the production of clothing rather than its use and care. This report indicated that extending the average life of clothing by one–third could reduce its environmental footprint by more than 20%. Extending the average life of clothing by just three months of use per item could reduce carbon, water and waste footprints by 5–10%, which would result in cost savings for producers and consumers (WRAP, 2012).

Does the above mean that the quest for sustainability relies exclusively on the adoption of best practices by manufacturers located, almost exclusively, in developing countries? The definition of new products concerns brands and retailers located in developed countries, which control the upstream part of globalised value chains. Production volumes are also determined by these brands and retailers, and a quarter of these products will never be sold (McKinsey, 2021). Finally, the fashion industry's devastating effects on the environment questions consumption habits. Regardless of the consumers' nationality, they cannot be exonerated from all responsibility.

The Actions of Brands and Retailers in Favour of Sustainable Production

Large retailers and clothing brand owners are the most powerful entities in fashion value chains (Gereffi, 1999; Tyler et al., 2006). They thrive on a combination of short product life cycles, high levels of impulse buying, fashion influence in all product categories, increased product variety, and continuous in-season refreshment (MacCarthy & Jayarathne, 2012). In addition, the demand for a quick response from manufacturers to their requests puts strong pressure on their suppliers (Goworek et al., 2020).

This model, however, is exhibiting increasingly obvious limitations. Even before the COVID-19 pandemic, the fashion industry had approached a dangerous threshold. Excessive inventories and widespread markdowns proliferated to the point where only 60% of clothing was sold at full prices, creating billions of dollars in lost revenue and margins. In addition, inventory turns dropped by 33% in the first three months of 2020.

These findings make it easier to adopt new and environmentally friendly practices. Indeed, the limitations of the current business model tend to accelerate the evolution toward a demand-driven model, the reduction of assortment complexity and the recalibration of the price-volume equation (McKinsley, 2021).

A Demand-driven Model

Unlike standard practices in many industries, brands and retailers in fashion rely little on technology and data analytics tools to gauge consumer sentiment before releasing new products. However, fashion is the largest business-to-consumer (B2C) e-commerce market segment and is estimated to be worth USD 752.5 billion in global size by 2020. Moreover, the market is expected to continue growing at a rate of 9.1% per year and reach a total size of USD 1,164.7 billion by the end of 2025 (Statista, 2021). Consequently, the key players in this industry, especially retailers, have access to a wealth of data. These data should allow them to make finer segmentations of the markets, unveil new consumer typologies and anticipate their expectations.

The digitalisation of the market also accompanies the development of made-to-order models, where the customers' pre-orders drive the production release process. Sharma et al. (2010) argue that a made-to-order strategy can reduce unsustainable oversupply, but requires changes in internal processes and information sharing. The technical feasibility of the new product, the time required to manufacture it and its cost must be fully defined before the prototype is offered as a pre-order to potential customers. This leads to a better consideration of the constraints borne by the various participants in the value chain, and to the creation of cross-functional and inter-firm teams capable of arbitrating feasibility, lead time and cost requirements (Ismail & Sha-

rif, 2006). The new organisation of the value chain strategies, induced by "made-to-order," has led new players in the European fashion industry – including Asphalte and Bonne Gueule – to call on manufacturers located in nearby countries, such as Romania or Portugal. Local sourcing also contributes to a reduction in environmental impact. Made-to-order concerns all segments of the fashion industry.

Made-to-order can also be used for end-product customization purposes in other mass-market segments (Deloitte, 2019), and it generates additional value for both customers and brands that know its implementation. Finally, made-to-order is the essence of the luxury segment, and contributes to its differentiation from the premium ready-to-wear segment. In the latter case, "made-to-order" contributes to the revaluation of specific skills held by production workers. The need to base the manufacture of luxury products on these skills led LVMH to form a partnership with the *Institut des Métiers d'Excellence* and *Compagnons du Devoir et du Tour de France* to train highly skilled workers.[1]

A Model Based on Increasing the Lifespan of Products

Around 65% of the consumers surveyed in McKinsey's (2020) study during the COVID-19 pandemic—consumer sentiment on sustainability and fashion in the COVID crisis—conveyed that they plan to buy more long-lasting and high-quality items. Furthermore, the consumers considered "novelty" to be one of the least important factors when making purchases. If this sentiment continues, the slow fashion movement, which respects resources and advocates slowing down the rate at which we consume them (Ozdamar Ertekin & Atik, 2015), is likely to appeal to a growing number of consumers. Former perceptions that consider sustainable clothing as not fashionable (Tomolillo & Shaw, 2003) have been disproved in recent years due to the growing awareness of slow fashion (Minney, 2016; Ozdamar Ertekin & Atik, 2015)

Slow fashion considers the needs of different stakeholders, focusing on quality over quantity, which is a more sustainable alternative (Cataldi, Dickson, & Grover, 2013; Fletcher, 2007; Henninger & Singh, 2017; Minney, 2016; Pookulangara & Shephard, 2013). The possibility of slow fashion requires designers to focus on the sustainability characteristics of new products. These question the properties of the raw materials and intermediate goods used in production. They also question aspects of the manufacturing process that lead to greater product sustainability. Once again, the implementation of products that meet the requirements of slow fashion requires

1 See the LVMH corporate website, https://www.lvmh.fr/talents/metiers-dexcellence/linstitut-des-metiers-dexcellence/les-programmes/cap-maroquinerie/.

greater collaboration between the various stakeholders in the value chain and greater sharing of knowledge to increase the lifespan of products. Within this framework, new product development for apparel brands or retailers can often be conducted in collaboration with product developers who are employed by their suppliers, and this collaboration can help customers to leverage the synergies of their suppliers and strengthen or improve the environmental integrity of products (Thabrew, Wiek & Ries, 2009).

Maintaining longer active use of clothing requires a proactive and visionary design approach (Laitala and Klepp, 2011; Niinimäki, 2012) to maximize emotional durability. Thus, it is not forbidden to appropriate certain attributes of the manufacture of luxury or premium ready-to-wear items. Good quality is generally considered as an intrinsic characteristic of luxury fashion (Achabou & Dekhili, 2013); therefore, designers dedicated to this segment are better able to design durable garments with fewer cost constraints than mass brands. Luxury fashion garments are occasionally referred to as investments, suggesting that they have a high level of value that may encourage their owners to keep them longer. This retention of value also facilitates second-hand resale and the proliferation of dedicated sites, such as Vinted, which will soon allow the rating of brands in the second-hand market. In fact, a single garment can create value repeatedly through sale and resale, repeated rental, or being sold, repaired, returned, refurbished or recycled, and resold again to start the loop over.

In this context, blockchains can protect consumers from fraud and counterfeiting. The recorder of the initial purchase in a store with the right to sell the brand ensures product authenticity. This information can be permanently stored. The certificate of authenticity is updated by integrating the transfer of product ownership to the blockchain. Using an internet of things (IoT) device, such as a sensor, the product, its certificate of authenticity and its legal owner can be linked to the blockchain at any time. The characteristics of the latter guarantee the reliability of the information (Yanisky-Ravid & Monroy, 2020).[2]

Many other ways to reduce the environmental impact of the fashion industry are available to brands and retailers. The fragmented nature of the fashion ecosystem—no single player represents more than 1% of the market (McKinsey, 2021)—makes it unlikely that standardized solutions will emerge. However, initiatives would possibly multiply and provide fragmented responses to problems. Several of them have already caught our attention. The observed decrease in the inventory turnover rate is a powerful motivation to reduce the number of stock keeping units (SKUs) because complex assortments are inherently problematic to manage. These assortments are the source of the long SKU trails that are difficult to fill. These long lines require manage-

2 Yanisky-Ravid, S., & Monroy, G. (2020). When blockchain meets fashion design: Can smart contracts cure intellectual property protection deficiency? *Economics of Networks eJournal*. Available at SSRN 3488071.

ment efforts that are unrelated to the sales that they generate. They contribute by making the in-store offers less clear. The discounts granted for their disposal divert customers from better-priced products and obscure the analysis of data concerning customer expectations. Finally, these long lines create bottlenecks in the value chain and constitute important cash flow assets.

Another way for brands to streamline their assortments is to break the chains of the traditional fashion calendar. Indeed, the current number of collections in the seasonal calendar is increasingly viewed as a barrier to a demand-driven approach. Off-White, Tory Burch and Mugler are among the brands that have announced their abandonment of the seasonal calendar, allowing them to regain control over store delivery. Gucci announced that it would reduce the pace of its collections from five to just two in a year, reflecting a growing movement toward seasonless fashion among retailers.

Manufacturers' Actions in Favour of Sustainable Production

The fashion industry's value chains are dominated by brands and retailers. The latter rely heavily on manufacturers that are located in low-wage countries to reduce the costs of labour- and capital-intensive products. The USFIA report (2021) highlights the nature of the relationship between brands and retailers and manufacturers, which are guided almost exclusively by searching for the lowest production costs, and the former are able to quickly reorganise their supply chains to take advantage of new opportunities or avoid the consequences of trade wars.

The relationships between brands and retailers and manufacturers reflect the power relationships of the former over the latter. These relationships focus on cost reduction rather than responsiveness, trust and commitment (Johnsen & Ford, 2006). The adoption of sustainable practices by manufacturers requires the sharing of financial, human and technical resources along the value chain (Formentini & Taticchi, 2016). This sharing can only be envisaged in the context of long-term relationships, and organizations with power over their partners are less likely to form and maintain long-term relationships with their suppliers (Casciaro & Piskorski, 2005). These long-term relationships would lead to the establishment of mutually dependent relationships.

Power relationships govern the relationship between brands and retailers on the one hand and manufacturers on the other. The commonly accepted definition of power in supply chain relationships is provided by Emerson (1962), who identified power as "the ability of one actor to influence another to act in a way, he would not otherwise act." Rajan and Zingales (1998) clarify the means of this power by linking it to the notion of access: manufacturers agree to specialise their human capital to meet the needs of brands and retailers to gain access to critical resources held by the latter.

These include brand awareness, the ability to influence market trends and consumer behaviour. Regulating the access to these resources provides a strong incentive for manufacturers to make the right investments, those that prioritise the needs of the companies controlling the access. The latter also explains why brands and retailers do not need to integrate upstream into the value chain. Through the regulation of access to critical resources, brands and retailers have control over the investment and specialisation choices of manufacturers' human capital (Maglaras, Bourlakis & Fotopoulos, 2015). Simultaneously, they retain a high degree of production flexibility that allows them to switch manufacturers when new opportunities arise.

The asymmetry of power in the relationships between large buyers and small suppliers within supply chains can positively influence the implementation of sustainable practices (Millington, 2008; Pedersen & Andersen, 2006). Pagell, Wu, & Wasserman (2010) suggest that the power relationships maintained by brands and retailers can be applied to achieve goals that are consistent with sustainable development requirements. Access to critical resources that are held by power holders would then become contingent on manufacturers adopting good environmental and social practices. Shi et al. (2017) proposed an analytical model to evaluate the economic and environmental performance of sustainable investments by different participants in a value chain of the fashion industry. The authors shed light on the optimal solutions for various cases associated with different power structures along the supply chain. While it is beneficial for both the manufacturer and retailer to make a sustainable investment, the power holder can capture a high economic benefit by making a low sustainable investment. The manufacturer, with low power, has a greater incentive to make a sustainable effort to achieve a higher profit. Moreover, the optimal amount of sustainable investment in the apparel manufacturer's investment case was higher than that of the retailer in most scenarios. In the model traced by power relations, the pursuit of greater environmental, social and economic efficiency commands manufacturers to make the large investments required to achieve the goals of sustainable development (Talay et al., 2020).

Shi et al.'s (2017) model does not account for the risk associated with the investments made by manufacturers to achieve the sustainability goals of brands and retailers. By making these investments, manufacturers increase their dependence on the inspiring brand or retailer, and reduce their opportunities outside of that relationship. It is possible that many of these manufacturers are reluctant to make such investments from which they derive reduced economic benefit, and which increases the degree of their dependence on a single counterparty (Cox, Chicksand & Palmer, 2007). Moreover, the power relationship linking the different stakeholders in the value chain may be reversed if the number of manufacturers adopting development practices remains limited (Runfola & Guercini, 2013). This raises the question of whether brands and retailers will agree to pursue sustainability goals that come with higher purchasing costs and reduced bargaining power (Gadde & Håkansson, 2001). There-

fore, it is questionable whether power relations along the value chain are a barrier to the fashion industry's adoption of sustainability practices.

Appropriate practices should be developed to minimize this pressure and the implemented incentives, to increase information sharing among the value chain stakeholders (Maglaras, Bourlakis & Fotopoulos, 2015). The prudent use of power, clearly incorporating the challenges faced by manufacturers, can support the goals of sustainable development (Maloni & Benton, 2000). Furthermore, some authors also advocate for a shift away from power relationships to collaborations that are deemed to be the best way to support the sustainability goals of value chains (Alvarez, Pilbeam & Wilding, 2010; Vachon & Klassen, 2008). In the absence of collaboration, companies with power over their partners will address issues unilaterally and force suppliers to adopt their codes of conduct (Pedersen, 2009). The transformation of old power relations into new collaborative relationships along the fashion industry's value chains calls for further research (Munksgaard, Johnsen & Patterson, 2015). Additionally, a lot of work needs to be done so that collaborative relationships become the norm in this industry (Mathiyazhagan et al., 2021).

Conclusion

The COVID-19 pandemic has not spared the global fashion industry; made up of a system of global value chains, the industry has had to adapt rapidly, and profound transformations are already on the horizon (McKinsey, 2021). This chapter aims to ask the question of whether these transformations, accelerated by the health crisis, tensions of logistics flows and globalisation, will be able to respond to the new expectations of consumers and to the environmental and social challenges facing the industry. In our opinion, the success of these transformations requires the active commitment of brands, retailers, manufacturers and consumers. We cannot consider isolated responses, but rather a solution that includes the collaboration—without mitigating the power relations at stake—of all stakeholders in the fashion industry.

Players in the fashion industry will have to adapt their strategies. Supply chain, logistics flexibility and operational resilience are key issues. Furthermore, data, data analytics and the use of blockchain technology would also play important roles. Potential energy savings can also be unlocked by moving toward non-conventional textiles (see Chapter 19 in this book).

As global value chains – primarily buyer driven – (Gereffi, 1999) remain under pressure, brands and retailers may have to secure production capacities and adopt a made-to-order production model, which is one of the solutions that we believe is the most complete and effective to respond to the problems of all segments of the fashion industry.

Thus, the industry will have to review the speed of marketing of its products, which, although produced more and with increased efficiency by reducing the carbon footprint, can never be considered sustainable if their obsolescence is not reduced and if their accumulation in landfills is not visibly reduced. The complexity of the assortments must also be reduced. Finally, the issue of local sourcing, manufacturing, repair and rental of clothing will be a key factor for the success of the industry, which will impact both upstream suppliers, manufacturers and subcontractors, and downstream retailers and consumer associations. Therefore, from an ecosystem perspective, we should examine the future paths for innovation in production for sustainability in the fashion industry.

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