Fashion design matter: the role of design in guiding a sustainable transformation in europe

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Abstract

Today, sustainability is one of the main, most dynamic, and influential topics, for all sectors. The growing emphasis on sustainability is relevant to everyone, as today, there is a need to focus on sustainable objectives, approach them, and consider all the modern processes to implement sustainable development and value-creation strategies. As underlined by several scholars, over the next few years humanity needs to adopt a paradigmatic change from a consumeristic society where well-being is measured in terms of economic growth to a new society that can reach the same levels of prosperity but consuming less and relying on renewable resources (Vezzoli et al., 2021; Keitsch, 2015; Thackara, 2005; McDonough and Braungart, 2002). It is, therefore, necessary to change the way demands are met and to develop sustainable consumption patterns and lifestyles that are based on better consumption of far fewer resources. There is an urgent need to move towards new socio-technical systems capable of operating within the planet's limits. This means operating inside the nine planetary boundaries that are the spaces within which humanity can continue to develop and thrive for generations to come (Rockström et al., 2009). These systems will address not only the technological sphere but also the environmental, social, cultural, institutional, and organizational ones. The proposed understanding suggests that sustainability is the defining concept of the whole system and not a characteristic of its individual elements. Therefore, achieving sustainability requires a process-based approach, sustainable development, which must be intrinsically applied systematically and in different dimensions to plan new virtuous paths. In the presented scenario, the Fashion industry is one of the main actors as it influences ecosystems making a sizeable contribution to climate change, resource exploitation, and systemic pollution. But it also shapes cultural developments, their driving forces, and patterns of change (Bertola et al., 2016). According to the above, the presented paper discusses the fashion necessity of facing the challenges of sustainability - and the related complexities – with a radical transformation of the current development model. Through the analysis of different case studies, possible directions for the sustainable transformation of fashion systems are defined and presented. Specifically, such direction addresses how it becomes essential to review development paths with the aim for the fashion sector to dissociate sustainable innovation from the notion of exploitation of resources through a strong focus on proposing material and meaning that are alternatives to the very notion of "new".

Author keywords

Fashion Design for Sustainability; Sustainable Development; Industry Transformation.

Introduction

Today - fashion is one of the most significant, dynamic, and influential industries, as well as one of the most impactful due to its highly invasive processes, especially the ones involving environmental aspects and consumption of the finite resources of our Planet (EU, 2022; EMF, 2017). Moreover, this industry profoundly influences with its approaches and practices the environmental and economic dimensions due to its vocation to codifying current patterns of change (Bertola et al., 2016). In this context, it also strongly impacts changes related to the social and cultural spheres. As argued by Kate Fletcher (2018), the fashion industry is a powerful cultural driver which influences the consumerist economic model based on mass production that currently characterizes the economies, even if our experiences of fashion are now dominated and limited by this same model that involves fashion in essential issues.

Niinimäki et al. (2020) argue that the industry consumes vast quantities of water, land, and raw materials. For example, the fashion sector produces 8% of all carbon emissions and 20% of all global wastewater, with an anticipated 50% increase in greenhouse gas emissions by 2030 (Bailey et al., 2022). The sixth annual State of Fashion report by The Business of Fashion and McKinsey & Company (2022) reveals that globally, the fashion industry is responsible for around 40 million tonnes of textile waste a year, most of which are either sent to landfill or incinerated. This can be attributed to the current development models promoted by the industry that encourage an increase in clothing consumption and, therefore, fashion production. Pro-capita fiber consumption almost tripled from 1950 to 2008, increasing from 3.7 kg to 10.4 kg per person (Sanchis-Sebastiá et al., 2021). From 2007 to 2014, textile fiber production increased by an additional 20.2 million tons to 90.8 million tons, and this number is expected to grow by 3.7%, compounded annually (Pensupa et al., 2017). These phenomena are the direct results of the economic model based on the linear development of the fashion sector (Dissanayake and Weerasinghe, 2021). This model is dominant, a legacy of the first industrial revolution, which is based on so-called cradle-to-grave dynamics that exploit natural resources and then directly dispose of them without taking into account their regeneration potential and

the possibility of reusing them in the next production and/or consumption cycle (Braungart and McDonough, 2009). This fuels the phenomena of production overabundance, compulsive consumerism, physical and semiotic obsolescence of the fashion product, and disaffection culminating in irresponsible behaviors of serial accumulation and early disposal of garments. This context is so alarming that it prompts the Global Fashion Agenda, a leading forum for sustainability in the fashion industry, to conduct a study to quantify global fashion consumption in the Pulse Report (2017-2019). The purpose was to return a numerical figure that would allow manufacturers, and their consumers, to compare their impacts. The study estimated that if current trends remain unchanged, apparel consumption will increase 63% to 102 million tons by 2030 (Global Fashion Agenda, 2019). Since consumption is no longer focused on satisfying a need but on fulfilling a desire, it is bound to remain unavoidably insatiable by its very nature. This realization is also the direct consequence of a garment's semiotic and physical impoverishment. This deficiency allows production costs to be drastically lowered. And the consequent lowering of prices will enable buyers to purchase garments more easily. In this landscape, the logic of waste is established as a direct consequence of a supply chain that turns out to be excessive, misleading, and distorted. Waste becomes an entity in this context and acquires all its characteristics: value, importance, and impact (Binotto and Payne, 2017).

Considering what has been discussed, reviewing linear development paths is essential. This can be done by adopting more sustainable models of development, such as the circular economy model, which is to date recognized as the leading entrepreneurial model for meeting the goal, for the fashion industry, of decoupling sustainable fashion innovation from resource exploitation through a strong focus on proposing alternative materials and meanings to the notion of "new" (Dan and Østergaard, 2021; Rathinamoorthy, 2019; EMF, 2017). In this context, this paper investigates how, from a design perspective, new trajectories are being defined in the contemporary fashion industry to contribute to the development of a closed-loop system in which the goal is to recover or recycle secondary raw materials in multiple stages of the supply chain (Muthu, 2018).

Methodology

The article aims to present the result of an investigation conducted on how fashion companies are pursuing circular initiatives, making it possible to create strategic actions that can stimulate a new understanding of what virgin material is and encourage a reinterpretation of the concept of new. The data analyzed were extracted from the knowledge repository produced by the – *Fashion in Process* - Research Lab. at the Design Department of Politecnico di Milano of which the author is a member. The data were generated from: (1) the research conducted by the research Lab (DGGROW, Mapping Sustainable Fashion Opportunities for SMEs, 2019; Erasmus+, FashionSEEDS, 2019) and (2) the doctoral research of the author (D'Itria, 2022). According to the authors' investigation, a mapping of "secondary" raw materials-driven circular practices of European fashion companies is carried out through an iterative process: an initial desk research phase followed by applying a case study methodology. This process allowed the selected research field to be narrowed into topics that emerged from the analysis and codified the main approaches to circularity that inform the definition of directions for addressing sustainable development issues. Defining the directions allowed the boundaries of the study to be identified. A selection of best practices is presented among the case studies identified. The author focuses on specific cases and uses them as a sample of the context of interest. However, as Johansson (2007) discussed, such a methodological approach includes many variables and qualities for reworking explanatory knowledge.

Methodologically, three phases were conducted: (1) the first phase was desk research to identify current practices in the fashion industry. This mapped current sustainability practices and identified best practices; (2) the second phase was an in-depth qualitative analysis of the best practices identified during the desk research; (3) and the last phase systematized the previously produced knowledge to define business directions for implementing sustainability through practices of recover or recycle of secondary raw materials at multiple stages of the supply chain, from design to retail and waste collection. The mapping led to the identification of 68 companies located in 21 nations in the

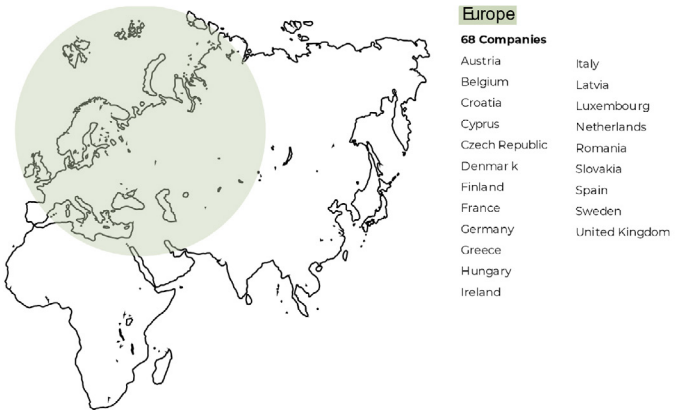

Figure 1. Companies' locations.

European continent, which have addressed aspects related to new sustainable development models by using secondary-raw materials in their practices (Fig.1).

The choice to focus on the European region was driven by the interest in investigating a context undergoing a solid transformation due to policy initiatives put in place for the sustainable transformation of the examined sectors (Green Deal, https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_it; EU Strategy for sustainable and circular textiles, https://www.interregeurope.eu/news-and-events/news/new-eu-strategy-for-sustainable-and-circular-textiles), by reasons of geographic proximity, and by past experiences of collaboration with local companies. The composition of the company was heterogeneous. They were textiles companies (24%) and brands of shoes (9%), apparel (60%), and accessories (7%). Of the 68 companies mapped, 6 were selected as case studies (Table 1).

Table 1. Case studies list.

Country	Name of Initiative	Description of Initiative	Sector	BIG	MEDIUM	SMALL	MICRO
France	Vestiaire Collective	Online marketplace for second hand high-quality designer fashion.	Apparel			X	
Italy	Fulgar	Sustainable textiles brand.	Textiles	X			
Italy	Manteco	Sustainable textiles brand.	Textiles	X			
Sweden	Filippa K	Longer technical life, lease, sharing own product take back.	Apparel	X			
United Kingdom	Christopher Raeburn	The RÆMADE ethos in particular has pioneered the reworking of surplus fabrics and garments to create distinctive and functional pieces.	Apparel			X	
United Kingdom	Helen Kirkum	The studio ethos in particular has pioneered the reworking of surplus fabrics and shoes to create distinctive pieces.	Footwear				X

All these companies stand out for the way they are pursuing implementations of sustainable practices within their system, often adopting a design-driven approach as support. The following phase consists of further desk analysis to prepare for long-distance interviews with representatives from selected companies. These companies have distinguished themselves for their approaches to designing waste out of the system, using it as new raw materials or products. This phase allowed for exploring possible theoretical relationships and allowed for a deeper understanding of the subject through the use of these case studies (Tellis, 1997). The third phase focused on data interpretation. This phase supports the author in understanding the criteria a company must meet when working on design-led sustainable practices to move to new circular development models for better use of available resources. These aspects are now linked to the concept of waste recovery and lead toward circularity, decoupling economic growth from increasing environmental problems by imagining and implementing processes and practices with sustainability characteristics with three particular approaches at different stages of the supply chain: (1) *reducing/sourcing*, redesigning materials, products, and services so that they are less resource-intensive; (2) repurposing/manufacturing, recycling waste, and scrap, without destroying them, to create products that have more value; (3) and reusing/retailing, making products and values last by transferring them to another user.

The Directions

This paper codifies the data collected to identify the directions that drive current design-led practices related to a new concept of waste in the fashion industry. This section discusses the results of the presented methodology by introducing several case studies that illustrate the main approaches identified by the study. Such approaches could inform and foster relevant new directions in sustainable fashion design. This paper aims to define potential pathways for developing a closed-loop system that aims to either reduce resources exploitation, repurpose secondary raw materials, or reuse the fashion product - at different stages in the supply chain (Fig.2).

From an operational point of view, the work identified three macro directions in the approach to sustainability through design-driven practices that emerged from the case analysis. Companies such as Manteco or Fulgar are acting upstream in the supply chain. They are working to improve their strategies to capitalize on the circular distinctiveness of their products. They are now pursuing actions to develop

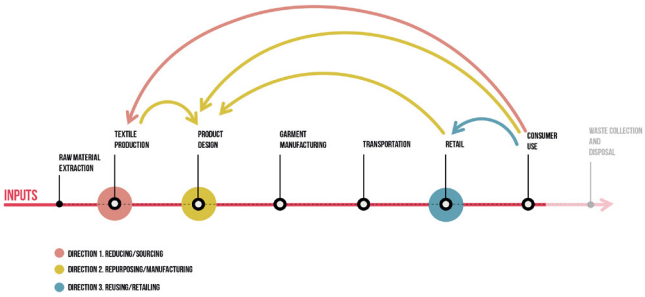

Figure 2. The directions model.

a new approach that can significantly reduce textile waste by rethinking sourcing practices through traceability. On the other hand, Christopher Raeburn and Helen Kirkum are experimenting with the designer's role in reworking surplus textiles and garments to create distinctive and functional pieces, underscoring their attributes of conscious manufacturing. Companies like Vestiaire Collective or Filippa K work down the supply chain. They keep items out of landfills, changing traditional retail's linear "take-make-away" model (EMF, 2017). So the author discusses strategies with a common pattern of avoiding waste and working on the meaning of "new." The study examines how these identified directions work for a common goal but differ from each other. The analysis offers insight that aims to describe the behaviors identified comprehensively. However, the author acknowledges that there are limits within which these behaviors are adopted. Although a common guideline is highlighted, the different cases need to be understood in the specificity of their context, territory, and actors involved. In the following sections, the selected cases are explored.

Reducing/Sourcing

The first direction refers to companies working upstream in the fashion supply chain. They work on their sourcing to achieve sustainable supply chains by leveraging their position at the beginning of the flow of goods and services. Companies rethink the system by redesigning the processes of buyers' access to materials, production, logistics, and transportation, and distribution. To achieve this, transparency in supply chains is critical to validate the origin of sustainable materials (Fung et al., 2021). For example, the Italian textile company Manteco launched Project43. This is a unique strategy based on circular economy principles. They aim to optimize existing materials and design pre-consumer waste out of the system by recovering offcuts from the garment manufacturers that

use their fabrics. The collected materials are then regenerated into 'new' fabrics. Manteco acts as a single point of contact between all the actors along the supply chain to monitor the material lifecycle. Project43 is now reducing and regenerating textile waste using the company's facilitates through a transparent system. (Fung et al., 2021). By addressing the critical issue of traceability, Project43 is also a tool capable of overcoming the linear waste model and providing the fashion sector with a different understanding of "new" materials. Another company that is making a significant contribution on this front is Fulgar. It is a leading manufacturer of synthetic yarns. It is now experimenting with the traceability of its eco-friendly Q-nova yarn. This is an environmentally friendly fiber made exclusively from raw materials regenerated through a mechanical process rather than a chemical one. A special ingredient in polyamide, the innovative traceability system called ID (Identity), makes it possible to verify the authenticity of the recycled origins of the yarn. The ID system allows third-party organizations, such as consumer groups and governments, to verify the reliability of the data provided. All the presented companies working on this first approach recognize that traceability is a crucial aspect of supply chain sustainability (Naden, 2017; Sodhi and Tang, 2019). While for some companies, traceability helps to identify environmental issues and is a starting point for the improvement of the entire supply chain, which is actively involved in the process of mapping the existing material, in other cases, the monitoring process takes place directly within the company, acting on the material, in the intimate mixture, to generate a cascading effect on actors inside and outside the fashion supply chain.

Repurposing/Manufacturing

The second direction characterizes the rising strategies fashion companies adopt through a project approach that enhances the use of discarded goods' materials and components to transform them into new, high-value products. Christopher Raeburn is a pioneer of upcycling in fashion. He started his eponymous brand in 2008 using British Army parachutes as his primary fabric source to create new garments. Since then, he has developed expertise in reconstructing military surpluses, such as parachutes, parkas, and military jackets. This process is called reappropriation by the designer. The designer's approach is guided by research on the garment and the process of deconstruction itself; even the shape and silhouette of his designs are developed based on the source of the fabric rather than being cut and shaped on the design. Designer Helen Kirkum carries out similar experiences. Through her work, Helen Kirkum is hacking the footwear industry using waste as a raw material. The designer uses recycled and dead stock materials as sourcing. These materials are transformed into sneakers crafted to provide an individual experience to consumers. The design philosophy applied to these products is to mix the components of the "repurposed" products, allowing the seams between the different parts that compose the final shoe to be visible. Accentuating these points of connection aims to stimulate emotional value to allow the user to own something inherently personal and unique. The approach developed positions her as a pioneer of the "deconstructed" aesthetic in the sneaker industry and at the forefront of the sustainable footwear movement. In all the cases presented in this section, the circular link with the development of products made through innovative and disruptive craftsmanship becomes a challenging tool for maturing the meaning of consumption and the way we interact with the products we own. Moreover, creating a story around the product gives additional intangible value to the object.

Reusing/Retailing

The third direction addresses sustainability issues related to bringing second-hand clothing back into the market, creating a circular system. Fashion companies in this category must devise and implement innovative business models that reflect the changing landscape and evolving consumer behaviors. One example of a company engaging consumers in using products as long as possible and keeping them in the market loop is Vestiaire Collective. This online platform, launched in 2009, allows customers to buy and sell secondhand fashion items. Sellers place items on the marketplace and, after validation by Vestiaire's team of curators, the items become available for sale. Vestiaire is exploiting the enabling power of digital technology to recontextualize the concept of new applied to unused clothing items. Providing these products to new customers increases the number of uses, giving a second, third, or even fourth life to existing products. In addition, through the creation of a community the company has created a sense of belonging among those who share values and actively choose to enter a circular system. Filippa K proposes a different approach to this direction, which involves - in its practices - actors within its supply chain such as logistics departments and retail. In 2008, the brand opened its first second-hand store in collaboration with a local entrepreneur, Judit's Second Hand. The initial model operated as a consignment store where customers returned their Filippa K clothes, shoes, and accessories for resell. What characterized this initiative was the fact that the customer maintained ownership of the product and after the product was sold, the customer received 50% of the profit. If not sold, the product was returned to the owner again or donated to a charity. The success of this resale initiative allowed the brand to recognize the program's potential to enable a circular business model. The company's pilot program was scaled up to become the "Preowned" program. This program is now running only in Sweden. Customers return a used garment from the brand to the store, or if the physical location cannot be reached, the customer uses the brand platform. In return, the customer receives a monetary incentive. Garments brought to a physical that are ready for resale are machine or dry-cleaned using environmentally friendly cleaning processes. Users that post garments on the platform earn either cash and receive 60 percent of the resale price, or they can choose to receive 100% as a credit toward the purchase of Filippa K garments from the current season. The cases presented here discuss how the same product creates revenue multiple times by offering new ways to involve stakeholders, both when consumers resell their clothes and when different actors along the stages of the supply chain (logistics, retail, collection/waste management) engage in reintroducing "new" second-hand clothes back into the market.

Conclusion

From what has been illustrated, the rethinking of waste and its connotation of "new" emerges as a strategic factor that is now leading the transformation of fashion companies towards a sustainable development model. Here are presented

the opportunities that have occurred, for fashion companies, to trigger innovative processes that favor iterative activities to disrupt the linear economy logic of waste and nurture a change in operating models. Such models could inform directions toward a circular paradigm enabled by adopting design-led practices in the European fashion industry. One of the most critical levers the fashion industry can pull to preserve non-renewable resources and eliminate waste is to design it out of the system. The different approaches suggest that to reach this goal, the link between circularity and design-driven innovation in the fashion field is related to a systemic perspective. The one illustrated here represents a system that is now starting to be rolled out at scale, promising to limit the extractive production of virgin raw materials and decrease textile waste. As these approaches mature, companies will need to embed them into the design phase of product development while adopting reducing, repurposing, and reusing processes. The key element linked to this systemic transformation is the reorganization of the supply chain to achieve the goal of eliminating the concept of waste by involving all stakeholders, from designers to consumers. Each company connected to the supply chain must develop company-specific strategies. Directions for further development of the work based on this study are being outlined within the specific framework of the Italian Recovery and Resilience Plan (https://www.mef.gov.it/en/focus/The-National-Recovery-and-Resilience-Plan-NRRP/). The author is involved as a researcher at her institution in SPOKE 2 - Circular and Sustainable Made in Italy. The material presented here provides the initial impetus for the work that is being developed on the investigation of possible directions for the evolution of waste reduction practices towards the complete reintegration of materials into production flows and design-led strategies that impact upstream through the decisions of designers (e.g. choice of materials, garment construction, and finishing) that could implement design practices to plan waste out of the system by intention. Directions for further development of the work based on this study are being outlined within the specific framework of the Recovery and Resilience Plan presented by Italy, in which the author is involved as a researcher at her institution in SPOKE 2 - Circular and Sustainable Made in Italy (https://www.mics.tech/). The material presented here provides one of the initial knowledge inputs for the work that is being developed on the investigation of possible directions for the evolution of waste reduction practices towards the complete reintegration of materials into production flows and design-led strategies that impact upstream through the decisions of designers (e.g. choice of materials, garment construction, and finishing) that could implement design practices to plan waste out of the system by intention.

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