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**FASHION AND
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AMBIVALENCES**



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EDITORIAL #22

Fashion and Textile Ambivalences

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The theme of PAD Issue 22, titled “Fashion and Textile Ambivalences”, considers the nature of the changes taking place through the sharing of testimonies, case-studies as well as theoretical and design elaborations, on emerging issues. These not only affect current and future constraints but also configure the possibility of different scenarios in the fashion and textile sectors.

Among the emerging issues, *ambivalence*, in a general sense, represents a characteristic of contemporary life, crossed today by everything and its opposite. Namely, it is the manifestation of different aspects not necessarily in opposition, certainly to be interpreted in a relationship of invariable contrast or in a parallelism.

The differences between this concept and other similar ones such as “dichotomy”, “contradiction”, “dialectic”, “polarization”, etc. that refer to a family of categories that indicate a duality or a divergence of conditions, contrasting polarities, options, and meanings, do not represent the “dischronic” everyday life (Sbordone, 2020) of human feeling and acting. Conversely, the term ambivalence is the most suitable even if it originates in disciplines that scrutinize the mind and the human soul (Castigliego, 2022), which leads to the discovery of dissociation not in two people, but in several parts of the personality that coexist simultaneously. According to the Swiss psychiatrist Eugen Bleuler,¹ ambivalence constitutes a disposition of the human soul that evolves over time.

1 One of the most influential psychiatrists of his time, best known today for his introduction of the term *schizophrenia* to describe the disorder previously known as *dementia praecox* and for his studies of schizophrenics.

Its manifestations can represent a creative, artistic, and social potential, thus going beyond the boundaries of psychology, with its meaning becoming *transcultural*.

In the social sphere, it constitutes the medium for interpreting the constant inter and trans-generational contradictions; a central concept that assimilates, on the one hand, duplicity as a factor of knowledge, while on the other, it is a tool for understanding and interpreting the nuances of current events, that is to say, it helps to reflect on the multiplicity of events that are incessantly produced.

The most suitable interpretation of the ambivalence of experiences comes from Alain Finkielkraut when he states: “literature is needed to rescue the real world out of summary readings, be they those of easy sentimentality or implacable intelligence. Literature teaches us to be wary of the theorems of the intellect and to replace the realm of antinomies with that of nuance” (2012, p. 87).

Nuance like waste is an unconventional category since it is worthless according to the principles of modernity, it emerges as a new substance that adds to or replaces the value categories of late modernity, the reference to sustainability and circularity is a necessity.

In fact, a direct reference to modern society and modernity is testified by the existence of an explicit interpretative vein or “Ambivalence of modernity” (Longo, 2005) as an expression of its historical and social characterization. Some authors speak of the culture of modernity (Kumar, 1995/2000) in contradictory terms within the idea of modernity itself, as of an antagonistic culture that brings out polarized meanings, such as: reason/ imagination, artifact/natural, objectivity/subjectivity, etc.

Consequently, ambivalence as a category that best captures the transformations on evolutionary or involutionary internal dynamics that Bauman (1991/2010) chooses as a characterization of his “liquid modernity” (2011). Zygmunt Bauman reflects on those scraps and nuances or rather on “crude materials”, deemed unnecessary, inessential to support the idea of modernity, which are feelings. The lever used by Bauman is *consumption*, an emblematic act of late modernity, as an ambivalent example par excellence on which *dominion* and *freedom* are forcefully established. Buying is consuming and inevitably leads to the necessary consequence of contemporaneity, that is, the production of waste, of scraps that multiply since the dynamics are part of the mechanisms of reproduction and replication of the economic order that is reflected in the social. The lever is ambivalent feelings because they are the expression of *freedom* and *belonging*, established mechanisms in the world of fashion that does not dissolve the knot of consumption and waste production: are they reflected in the intangible dimension of the construction of the singular and multiple identity at the same time? *Consumption*, therefore, is an ambivalent expression of social phenomena and personal motivations in continuous transition that expresses a high performative potential that increases and qualifies the perception of reality. Hans Magnus Enzensberger (1988) observes, in relation to the change in daily life in Germany, a series of ambivalences completely detached from the social, economic and cultural context of the context of life:

[Hamlets, villages, towns] are populated by characters who even thirty years ago were absolutely unthinkable: butchers playing

golf, wives imported from Thailand, PR workers who cultivate a vegetable garden outside the city, Turkish mullahs, pharmacists active in committees for Nicaragua, vagabonds who drive around in Mercedes, self-employed workers with ecological crops, tax officials who collect weapons, direct farmers who breed peacocks, [...] (pp. 175-176)

The description if then extended to a global context does not change but is characterized by a strong accent of de-territorialization, and Arjun Appadurai (1996/2011) reveals an instantaneous immaterial nature:

When Turkish workers emigrated to Germany watch Turkish films in their German apartments, when Koreans in Philadelphia watch the Seoul Olympics thanks to satellite links from Korea, and when Pakistani taxi drivers in Chicago listen to audio tapes of sermons recorded in Pakistan or Iran, we are faced with moving images that cross de-territorialized spectators. (p. 11)

A mixture of elements that finds in the notion of “imbrication” used by Saskia Sassen (2008) the exact description of the relationship between “digital and real”, between “individual and social” which gives rise to a performative interaction that reflecting on more dimensions cannot be reduced to a polarization. The most useful term for deciphering the performative and ambivalent interaction lies in entanglement, a term coined by Neri Oxman (2016) with the intention of breaking the boundaries between disciplines and intertwining domains, reflects on the ability to graft and not subtract:

The goal is to establish a tentative, yet holistic, cartography of the interrelation between these domains, where one realm can incite (r)evolution inside another; and where a single individual or project can reside in multiple dominions. Mostly, this is an invitation to question and to amend what is being proposed.

Thus, the exercise of late modernity goes beyond the “effort to eradicate ambivalence: an effort to define with precision, and to cancel or eliminate everything that cannot be defined or cannot be defined with precision” that Bauman (2011, p. 75) notes as a distinctive trait in early modernity. Among other authors, Frenk van Harreveld, Hannah U. Nohlen and Iris K. Schneider (2015) describes the now consolidated mechanism of consumption that sums up the existence of contemporary man: “living in a consumer society in which your desires are continually teased and fulfilled but in very small doses so that you can never invest enough passion in any one specific thing”. If soliciting consumption means overconsumption, it entails on the one hand, more freedom, while on the other, more responsibility and awareness in exposing ourselves to apparently negative or positive actions that cannot be determined immediately. For Georg Simmel (1985/1910), as Lucio Perucchi comments:

[...] reality is built through a network of tensions, within which the relationship between the individual and society appears to be based both on factors of cohesion and disintegration”, in *Die Mode* (1911) he discusses “obedience” and “distinction” and if you expand into actuality you arrive at a conscious and emancipative conception of ambivalence. It is a question of observing through the lens of ambivalence a conflict in a nutshell that would tend to

redefine the political, social and cultural nature of contemporary societies. Philosophical thought attests to the conflict, setting the model of a “weak culture” from which the restart and therefore the overcoming innovates the foundations and orientates itself differently. If starting from the conviction that things are like this but could also be different or in another way, according to the notion of ambivalence, because they hold a value that must be established from time to time, there is an obligation to be able to imagine making a commitment to activate other options. Appadurai (1996/2011) speaks of the “ability to aspire” conceived as “a capacity for orientation nourished by the possibility of conjecturing and refuting on the real world [...]”. The faculty to “protest”, in Hirschman’s terms, and the completely cultural capacity to have aspirations, are mutually linked. (1996, pp. 73-74)

If this aspiration is then cultivated and enters the bed of the planned imagination, it is clear the objective that UNESCO (2012) intends to configure with the “Futures Literacy” program:

[...] the urgent need to transform human governance by empowering everyone to use-the-future more effectively and efficiently. This is not just about understanding how to prepare for potential crises or plan how to overcome grand challenges or realize the important goals of Agenda 2030. It is about moving beyond a dependency on the illusion of certainty and the fragilities this creates.

It is therefore essential to note, within the various contents of the papers received from the international scientific community, the majority dealing with the *New/Old* ambivalences which, revisited in the light of what emerged, has the flavour

of a continuous ready-made of the main theme that places one question at the centre: fashion and textile areas of production, discussion and unconditional creation of values that can be transmitted and therefore marketed, how do they respond to the challenges of the third millennium?

With reference to the theories and design practices in the *New/Old Advances* category, Margherita Tufarelli's contribution stands out for the direct comparison between the value of time in Fashion, reflecting on the evolutionary duality of the archives that highlight the Heritage, proposing a wider use, through a more conscious or digital action. In the paper by Gina Nadal Fernandez reference is made to the Emotional Experience linked to Sensory Perception which strengthens the value of direct experience in particular in tangible and intangible associations and connections, this implies that the object has its own emotional meaning and awakens past experiences by activating the personal memory of the materials and the attraction they arouse, especially with regard to textiles. The necessary evolution that makes its way in the *New/Old Advances* of the paper by Adriana Yumi Sato Duarte, Regina Aparecida Sanches, Rayana Santiago de Queiróz, Fernando Soares De Lima, reveals the ambivalence of technology that offers itself as a narrative on phases and processes involved in production (textiles), on the other hand, it offers a guide to users and producers in the post-use and recycling phase as a strategy to reinsert into a new production cycle and promote circularity.

Among the contributions that adhere to the *New/Old Production and Consumption Approaches* perspective, the paper by

Debora Giorgi, Renato Stasi, Margherita Tufarelli and Maria Claudia Coppola, discusses the textile production of one of the most important Italian textile districts, that of Prato, where the new does not exclude a millennial history of ancient production processes that used recycling techniques reinterpreted through the new model of “regenerated fabrics”. The paper by Jose Luis Gonzalez Cabrero, Ana Margarita Ávila Ochoa highlights a co-design practice that develops new strategies for the circularity of productions that echo the trades of ancient populations of Mexico rich in culture and artisan processes still intact, where tradition can contrast with the methods of co-design as well as with circularity. Beata Hamalwa’s contribution outlines various concepts of sustainability as a theoretical framework as well as for the mapping of design thinking which, through training and benchmarking, intends to formulate a series of competitive advantages in the emerging economy of Namibia.

The category of *New/Old Features* expands the scenario of possible imaginaries that ambivalence supports and sustains in order to formulate, as in the contribution by Maria Claudia Coppola, and Elisabetta Cianfanelli, tools to promote “reflective fashion”, a feature that can discuss in greater detail the potential paradigm shift towards a future “fashion forecast”. In the paper by Rosanna Veneziano, Francesco Izzo, Michela Carlomagno a new value chain comes to life from intrinsic characteristics of a specific sector, that of sportswear, analyzing the product from design to marketing, repositioning design within the entire production cycle.

Chiara Scarpitti concludes the *New/Old Features* category by proposing a substantial opening according to the meaning of Fashion that adheres to bio textile, the formulation of a new aesthetic, biocouture, that strengthens the ability of the new to influence the perception of materials through inclusive processes and reproductive of unconventional logics.

The issue ends with the presentation of an example of an Italian company, Maeko, devoted to sustainable, circular and above all conscious textile production. The basic idea that Maeko has been pursuing for years is to focus on environmental and human well-being, giving life to an integrated production ecosystem, of rich and complex ideas and knowledge. The openness to continuous experimentation to safeguard the values of the territories is achieved through the constant work of valorising the resources that fall within a framework of mutual interference and ambivalent possibilities.

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NEW/OLD ADVANCES

Fashion Heritage and the Value of Time: the Dual Role of Archives for Sustainable Acting

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Keywords

Fashion Heritage, Archives, Creative Process, Creative Sustainability, Fashion Times.

Abstract

The contribution proposes a reflection on the dual role of Heritage and the archive in the fashion system: if on the one hand, it has allowed the creativity of the fashion system to support the very rapid dynamics of pre-COVID-19, giving life, with revival and reinterpretation, to a faster and more agile creative process; on the other hand, it is still possible to recognize in the Heritage the possibility of accompanying the system towards a new future permeated with an awareness of sustainable action.

1. Fashion and Suspended, Expanded, Folded Times

Fashion as a global phenomenon includes all spheres of society; is inextricably linked to the concept of time, it occupies *the now space*, between the not-yet and the no more (Agamben, 2008), where the past hands over to the future. Fashion is cyclical and rapid, and it is acknowledged, but in recent decades it has been possible to witness a progressive increase in speed that manifests itself in the clothing system with business models - regardless of positioning - characterized by a quick response such as fast fashion and see-now-buy-now models (McKinsey, 2017; McNeill & Moore, 2015).

During the acceleration, some historic fashion houses were relaunched by leveraging their Heritage, making it a competitive tool for brand identity, to be spent in the highly dynamic framework of the globalized fashion industry (Pistilli, 2018). The relaunch of brands bases on practices known as Brand Heritage (Hakala et al., 2011; Wiedmann et al. 2011) and Heritage Marketing (Urde et al., 2007), demonstrating that the sense of the past strengthens the interest of consumers (Davari et al., 2017).

The recognition of a fashion brand focuses on a broad range of values that inspire products, strategies and communication; within this scenario, the corporate archives – custodians of the brand heritage – have assumed a priority role in the Heritage-creativity interplay to preserve memory and inspire new projects (Vacca, 2014).

The tendency to look at the past would seem to further consolidate in the face of the post-COVID-19 emergency recovery of production, economic and social dynamics, which requires

a significant change towards a “new normal”, preserving the positive relational aspects, overcoming some patterns rooted in the behavior of consumers and companies, for an ever more robust enhancement of social and environmental aspects. The Covid-19 pandemic has invested many sectors of the global economy, the globalized fashion system in particular (Sneader & Singhal, 2020) demonstrating the unsustainability of some production and economic dynamics. Furthermore, the pandemic is an epochal and transformational event and fashion, with its intrinsic ability to perceive social metamorphoses, demonstrates such a ferment as to grasp the change and suggest that it will never go back to the way it was.

This contribution aims to discuss the dual role of Heritage and the archive (as its container) in the fashion system: if on the one hand, it has allowed designers to support the very rapid dynamics of pre-COVID-19, giving life, with practices of revival and reinterpretation, to a faster and more agile creative process; on the other hand, it is still possible to recognize in the Heritage the possibility of accompanying the system towards a new future permeated with an awareness of sustainable action. Moreover, in a fragile ecosystem like the current one, where suspended time raises substantial questions for the entire fashion system: how can human creativity sustain these rhythms? The emergency crisis has amplified the transformative urgency, making it no longer ignorable. We are moving towards new patterns for the fashion system that can find in the past levers of innovation to give a new value to time, but a time that is “free from hetero-imposed deadlines that risk mortifying creativity” as Alessandro Michele stated (Fig. 1).



ROME - 7 APRIL, 2020

ABOUT WHAT WE WOULD NOT WANT TO BE THE SAME AS IT WAS

Now that the devastation caught us unprepared, we have to think about what we would not want to be the same as it was. Because the greatest risk, for our tomorrow, is abdicating our responsibility for a true and necessary discontinuity. Our history is littered with crises that taught us nothing. With economic collapses and social devastations that were tackled by imposing the same recipes from which they originated. With wounds that were not able to regenerate our minds. With a mourning that we were not able to live in order to change ourselves and our relationships.

This crisis represents a fundamental test for us all. It's a test, because there is sorrow, exertion, danger. But also because there is an evaluation and a judgment. Through sorrow we can look at our recent past with a critical eye. At our list of debts, misunderstandings, false notes, mistakes. At our missteps and recklessness. At the thunderous absence of thoughts we dared not express.

This present, then, entrusts us with important responsibilities. Everyone can take on responsibilities, according to one's role and actions, to play a part in a constellation of molecular and widespread changes. As for me, in my own small way, I feel the urgent need to change a lot of things in the way I work. I have always been professionally inclined to change, after all, bringing with me a natural and joyful creative restlessness. But this crisis has somehow amplified such transformative urgency, which can't be deferred anymore.



Figure 1. Gucci - Alessandro Michele's notes from the silence, Instagram post April 7th, 2020.

Thus, if Heritage embodies and strengthens the essential relationship of fashion with time, and the very rapid times of the production and distribution chains have shown the unsustainability of the whole system. Then, perhaps it is in the expanded time – but also folded or “pleated” (Serres, 2001) – therefore, in the overlap between past and future that it is possible to trace the ideas to build the foundations of a different future.

2. Fashion as Heritage and Heritage in the Fashion Business

Fashion, as an all-encompassing social phenomenon, is a complex system that summarizes the contemporary condition by representing the evidence of material culture and socio-cultural changes. Fashion is characterized by speed and has its peculiar relationship with the concept of time: it does not have a linear development, but strongly studded with diachrony that makes it both a mirror of the contemporary and a pool of suggestions for the future. With its specific languages, fashion can tell who we have been and where we are going, almost like a clock represents the spirit of time, sometimes changing its perception.

Fashion is cyclical and therefore returns, but in new guises incorporating continuous quotes, it lives in the past and the future simultaneously, and this leads it to circularly re-propose old forms in new ways. Fashion is always about to become something else. Still, it seems as fashion, while consolidating as one of the most profitable industries in the world, has disrupted its balance with time, focusing more on industrial times (Evans & Vaccari, 2019), increasingly rapid in the face of the globalization of supply chain and market processes.

2.1. Fashion as Heritage

The nature of fashion objects is twofold: they are consumer goods but also the material result of cultural and social changes, of creativity, of reflections, of a project; they can therefore be considered significant artefacts to be preserved and disseminated (Rendina & Franceschini, 2018).

Copying, pasting, getting inspired, quoting, reproducing and remixing are terms that have always belonged to the vocabulary

of fashion – as well as to the very nature of Heritage – which intervenes in the continuous process of creating a new culture. Heritage can implement new realities, through contingent processes of assembly and reassembly of bodies, technologies, materials, values, temporality and meanings (Harrison, 2016). Culture and creativity, therefore, coexist in the same ecosystem within which the cultural background generates creativity and the latter, in turn, generates new culture. The creative element derives from the cultural substrate from which it draws the stimuli to be recombined to intuit or imagine new associations, new ideas and new processes. Heritage for fashion is to be understood in a total, overall and systemic dimension; it is above all a resource to nurture with contemporary use of past messages that undergoes profound changes (Ashworth, 1999). Fashion has always reinterpreted the past, feeding on temporal contractions and dilatations (Fig. 2), but also on transfers and overlaps: with “the tiger jump into the past” to which Walter Benjamin (Benjamin et al, 2010) referred, fashion invents its own times, precisely because it presupposes a time that does not exist. The Heritage of (and in) fashion represents a source for the creative and combinatory thinking of designers, in which the creation process makes use of the practice, know-how and skills, joining the intangible Heritage, in fact, “The fashions of the past are also rich sources of design inspiration to fashion designers” (Mete, 2006). Pre Covid-19 fashion also feeds on the past. Still, due to the conditions created by the highly competitive complexity of the globalized world the sector has been profoundly transformed (Bertola & Teunissen, 2018).



Figure 2. Cover of MET exhibition About Time, Fashion and Duration (October 2020 – February 2021).

It appears, therefore, that fashion as an industry has gradually lost the ability to “find what is current wherever it moves in the thick of the distant times” (Benjamin, 2010). The creativity that resides in the Heritage represents an operational practice, but not in its original *revolutionary* dimension which is not limited to the remixing of elements from the past, but reinterprets, reinvents and innovates by building new cultural codes for society.

The Western cultural tradition, indeed, has at least one distinctive peculiarity, to be traced in a continuous alternation of “deaths” and “rebirths” that Ernst Howald (1948) has defined

as the “rhythmic form” of European cultural history. “Creative reinvention makes use of discrete elements fished in the past, chosen as a paradigm” (Settis, 2004).

The fashion sector makes this process evident: companies were among the first to recognize in the Brand Heritage a resource to be cultivated to grow towards a more profitable future, but perhaps in a sense emptied by ever-increasing speed. In pre-pandemic were therefore perceived the outlines of a re-interpretation paradox in which the speed of reaction required the entire system has given the Marketing and the data-driven strategies, the role of “manipulating creation, production, presentation and sales” (Edelkoort, 2015).

2.2. Heritage in the Fashion Business

The relationship between fashion and time in its industrial dimension (Evans & Vaccari, 2019) has made heritage a useful tool to maintain the incessant rhythms of a creativity that is increasingly stressed by the speed of temporal architectures with narrow meshes, albeit arbitrary (Fig.3).



Figure 3. Alber Elbaz at the Lanvin Fashion Show Finale, Paris, March 5, 2015.

Agnes Rocamora (2013), for example, discusses some ways in which time has been constructed, appropriate and represented in the field of fashion to argue that with the rise of technologies a new fashion time has emerged defined by acceleration and immediacy as an integral part of digital fashion.

In fact, in literature it is possible to find evidence of how designers use brand archives, guardians of their heritage, as a source of inspiration for the design of fashion collections (Clarke & De La Haye, 2014; Riegels-Melchior & Svensson, 2014). This type of derivative investigation is found to affect the design choices of fabrics, silhouettes, shapes, as well as the technologies used in the execution of the collection (Almond, 2020).

The relationship of brands with Heritage according to a nostalgic dimension (Blanchard, 1999; Brown, 1999) has been deepened in the last twenty years, in particular by the economic disciplines that have achieved important empirical results by supporting that the history of the past can represent an element of amazement for consumers (Dion & Borraz, 2015; Merchant & Rose, 2013; Rose et al., 2016) and that the Heritage that leverages nostalgic values is a key factor for marketing activities (Wiedmann et al., 2011), which explains why some brands even come to design their own past (Hartmann & Brunk, 2019).

A second stream of research discusses the relaunch of historical brands (Cattaneo & Guerini, 2012; Davari et al., 2017; Dion & Mazzalovo, 2016; Närvänen & Goulding, 2016). These brands integrate past and present, juxtaposing new creative elements nourished by nostalgic associations (Brown et al., 2003; Davari et al., 2017). Finally, the third relevant line of

research is in the sociological literature which highlights how nostalgia can be simultaneously melancholic and backward-oriented, or forward-looking and utopian, making nostalgia a multimodal phenomenon (Higson, 2014; May, 2017; Pickering & Keightley, 2006).

Hence, thanks to digitization as the first widespread manifestation of technological evolution, fashion brands have built their own physical and digital archive, sometimes even by repurchasing garments and accessories from the vintage and second-hand market. The company archive was not created with a commemorative intent or solely to consolidate the corporate image, but – by fully grasping the opportunities – as an active resource to be used continuously by integrating it in the construction of the brand identity and the development of new product collections. With the fast pace of the system, historic luxury brands have thus continued to grow using Heritage to solicit emotional responses from customers (Morley & McMahon, 2011). This path has led to a history continuously underlined to strengthen the brand identity: they are not brands with Heritage, but “Heritage brands” (Urde et al., 2007) which therefore cultivate, maintain and protect their Heritage to generate corporate marketing – and consequently a higher income – (Urde et al., 2007; Fionda & Moore, 2009).

Therefore, if speed is already perceptible in fashion products, designed precisely to be consumed quickly, it is natural to question what could happen in a dimension in which fashion reduces to pure consumption. Li Edelkoort (2015), for example, in her anti-fashion manifesto, argues that designers work on clothes and no longer on fashion, they “are no longer concerned or interested in change for change’s sake, unanimously

declaring newness a thing of the past. With this lack of conceptual innovation, the world is losing the idea of fashion” and also attributes to the unbalanced use of marketing the role of the executioner “the perversion of marketing that ultimately has helped kill the fashion industries” (Edelkoort, 2015). As extreme as Edelkoort’s position may be, it touches a crucial point in the creative practices of the pre-covid fashion system. If today’s creative and interpretative work will contribute to building the fashion Heritage of the future, the culture and values that fashion holds risk being progressively destroyed (Frisa, 2015). The contemporary work of fashion designers, therefore, seems to be reduced to continuous recycling of past trends, which probably due to the speed required by the system, suffers from the lack of reinterpretation: “luxury brands determine design with the principles of marketing, design becomes synonymous with creating a monetizable product” (Frisa, 2015).

3. Now and Fast!

As anticipated, we are facing two distinct phenomena: the element of nostalgia that feeds on Heritage as a pivot point for marketing strategies aimed at soliciting emotional responses and leading to more significant incomes, and the speed inherent in the fast model that it does not allow creativity the right processing times and which, assisted by technological evolution, is “blurring the line between technology and creativity” (Mc Kinsey, 2018). The designers’ creativity faced these steady rhythms with difficulty, and the archive represented a source from which to draw on in order to develop new proposals.

Companies, traditionally known as luxury, have invested in the collection and construction of a historical archive to exploit their capital reputation and capitalize on their wealth of know-how. It is possible to find examples of these processes in the historical brands' *restructuring*, implemented by defining specific past codes chosen as a paradigm. One of the first was Chanel with Karl Lagerfeld who defined tweed, pearls, gold, beige, pink, black, as cornerstones and elements of recognition of the French brand. These types of values have been instrumental in defining the growth pattern of other historical brands for the years to come.¹

Although not many academic studies have devoted themselves to the use of fashion Heritage archive, its use in the practice of fashion design is acknowledged. Many designers declare that they continuously use the archive as a source of inspiration, and several fashion brands have plundered their archives in order to reinvent products for the contemporary marketplace (Almond, 2020). The use of archival material as an “invaluable research resource for many fashion designers” (Murphy, 2011) is also evident from the emergence in recent years of both university and professional studies, aimed at training fashion archivists. Therefore, new professionalisms have been born that hybridize the traditional archival profession with the sensitivity necessary for fashion studies, demonstrating that the investment in a living archive and perennially

1 Angelo Fiaccavento BoF 2015, *Miuccia's Children* in a revitalised Milan Fashion Week, rising names – from Gucci's Alessandro Michele to Marco de Vincenzo – are all the children of Miuccia Prada; working with references, aesthetic and a postmodern pastiche.

involved in the creative processes of the brand allows to speed up the design process and time-to-market (Cianfanelli et al., 2018) also in the fashion sector.

The ultra-competitive and hyper-rapid context of globalized fashion hence brings back the centrality of the concept of time in fashion studies. In this regard, again Agnes Rocamora (2013), in her survey on the new *Fashion Times* underlines how time has become an economic good and speed a profit factor, observing a space-time compression (Rosa, 2010) in the creative practice of industrial fashion at all levels, not just the one called *fast*.

It then happens that on the one hand, fast fashion designers work on three collections at the same time – the current season, the following season and the next year – with a cycle between design and collections in stores that takes a few weeks (Soula, 2011). On the other, the mix of fashion and digital, for example with the live streaming of the fashion shows that allows the immediate possibility of purchase (see-now-buy-now strategy), sees all fashion industry embrace speed and immediacy (Rocamora, 2013). In recent years, designers have repeatedly confronted this problem that has produced dissatisfaction and ferment regarding a change that is sometimes considered necessary (Fig. 4).

With the spread of the feeling of being “stuck between the old and the new rhythm” (Evans & Vaccari, 2019), the designers have split into two *factions*: those like Tom Ford said that the traditional calendar does not work anymore, emphasizing the need for getting even more timely responses to market demands by adopting the see-now-buy-now model; and who,

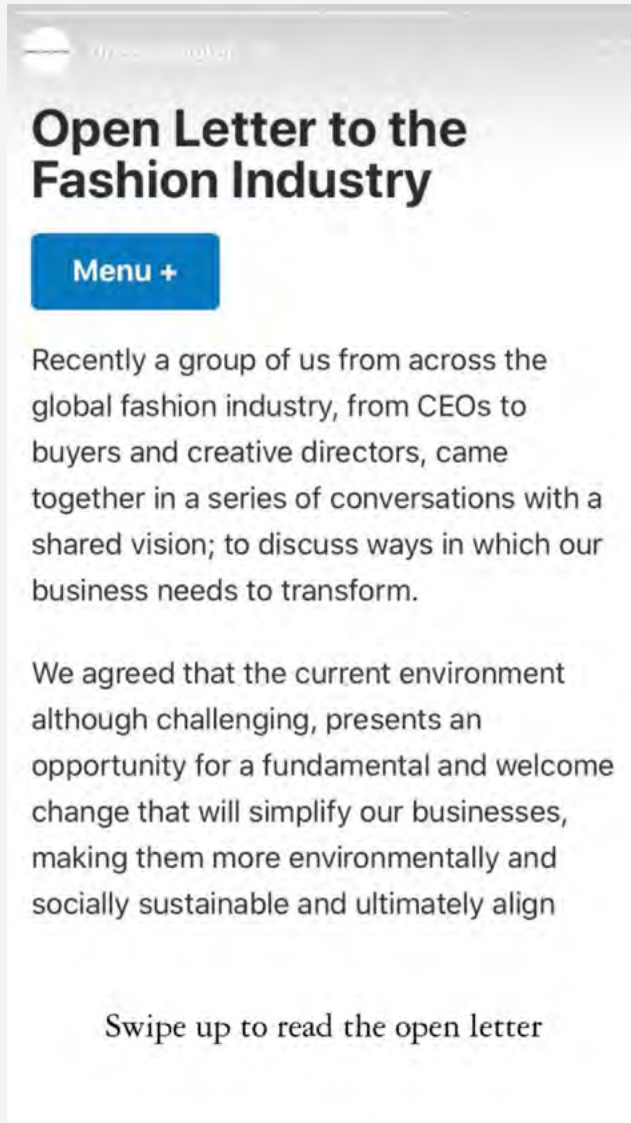


Figure 4. Letter signed by 250 brands in which the fashion system is asked for radical changes.

on the other hand, assumes the considerations that led Raf Simons to leave the creative direction of Dior in 2015 – where he was required to present six shows a year – declaring that he needed more “incubation time for ideas” (Horyn, 2015). From these numbers, it is not difficult to understand that the rhythms of industrial fashion also see luxury brands often mired in the same very rapid dynamics (Kapferer, 2010) of fast fashion retailers.

In 2015, on the occasion of his first men’s collection as creative director of Gucci, Alessandro Michele (Amad, 2015; Marchetti, 2015) reinvented the brand using the archive. Beyond the result of Michele’s work for the brand in recent years, it is interesting to dwell on this aspect to reflect on how brand heritage archives have represented an essential tool to support globalized and speed in fashion.

It is a dynamic that has always existed to create the new by reinterpreting the past. However, it seems as if in recent decades the consolidation of the fast model has taken this phenomenon to an extreme: here we are facing the boom of revival and rebranding, and a Heritage made bargaining chip for a fashion market that, although becoming democratic, remains highly polarized, with a heritage often used instrumentally as an element of competitive differentiation and marketing strategies that leverage sacredness. Here is that hyper-documentation as a contemporary condition, combined with extreme speed in acting with the consequent contraction of creative processing times, has led to this phenomenon of continuous re-mixing of the expressive codes of the past, without however a re-elaboration: “The craving for novelty creates an insa-

tiable hunger for change that cannot be satisfied indefinitely because aesthetic innovation [...] is subordinate [...] to the exhaustion of ideas” (Reynolds, 2011).

4. Heritage and Archives towards New Futures

The emergence of the fast model for fashion is due to the profound changes that have affected the sector in recent decades, which for the sake of synthesis can be traced back to two factors: on the one hand, the reduction of the purchasing power of customers, the diffusion of both production and communication technologies is another (Bhardwaj & Fairhurst, 2010). According to this perspective, we could argue that nowadays we are in a similar transformative dimension, with more than ample opportunities manifested by technological means. On the other hand, the prolonged state of emergency accentuates the crisis dimension of the dominant models (Fig. 5), already perceptible pre-pandemic. Nevertheless, it is precisely in this dimension of crisis that fashion appears willing to reinvent itself, showing itself ready to rediscover its relationship with time.

With the COVID-19 pandemic, the fashion system has manifested the awareness of having to slow down: reduce the speed at which they work, cut the number of seasons and shows. In general, remove some of the over-reliance on fast-moving trends that has defined fashion for the past decade. The pandemic has therefore reinforced the problems on the tyranny of industrial time, raised years ago by Raf Simons “When you do six shows a year, there’s not enough time for the whole process [...] you have no incubation time for ideas, and incubation time is very important” (Horyn, 2015).



ROME - 7 APRIL, 2020

ABOUT WHAT WE WOULD NOT WANT TO BE THE SAME AS IT WAS

Now that the devastation caught us unprepared, we have to think about what we would not want to be the same as it was. Because the greatest risk, for our tomorrow, is abdicating our responsibility for a true and necessary discontinuity. Our history is littered with crises that taught us nothing. With economic collapses and social devastations that were tackled by imposing the same recipes from which they originated. With wounds that were not able to regenerate our minds. With a mourning that we were not able to live in order to change ourselves and our relationships.

This crisis represents a fundamental test for us all. It's a test, because there is sorrow, exertion, danger. But also because there is an evaluation and a judgment. Through sorrow we can look at our recent past with a critical eye. At our list of debts, misunderstandings, false notes, mistakes. At our missteps and recklessness. At the thunderous absence of thoughts we dared not express.

This present, then, entrusts us with important responsibilities. Everyone can take on responsibilities, according to one's role and actions, to play a part in a constellation of molecular and widespread changes. As for me, in my own small way, I feel the urgent need to change a lot of things in the way I work. I have always been professionally inclined to change, after all, bringing with me a natural and joyful creative restlessness. But this crisis has somehow amplified such transformative urgency, which can't be deferred anymore.



Figure 5. Gucci - Alessandro Michele's notes from the silence, Instagram post May 2nd, 2020.

The need to slow down has spread: Giorgio Armani (2020) wrote it in the open letter to Women's wear daily, Alessandro Michele supports it with "I would like to abandon the arsenal of acronyms that have colonized our world: cruise, pre-fall, spring-summer, fall-winter. They seem strange and undernourished words to me. Initials of an impersonal discourse of which we have lost the meaning", and the Belgian designer Dries van

Noten (2020) also endorses it, in the letter signed by 250 brands in which radical changes are asked of the *fashion system*.

However, the fashion system is also made up of these brands and therefore these positions already represent a significant result in a world that requires attention to sustainability, but not from an exclusively environmental point of view, as it is multidimensional that also reaches and involves the sphere cultural and creative. Can the archive and the heritage stored in it, therefore contribute to the rediscovery of creative sustainability? Academics in the discipline of archival science have argued that the use of corporate archives can improve internal performance. However, the use of heritage in the entirety of strategic business dynamics has not yet been fully theorized (Vaara & Lamberg, 2016), its role as a marketing tool and as design support can be considered consolidated. However, it is believed that the use of past messages cannot be reduced to a reassuring *totem* to be repeated continuously to arouse nostalgic feelings, but should be welcomed in the design processes as a living root to be reinterpreted. If therefore, having been is a condition for being (Braudel & Gatto, 2002), the past can be subject to different approaches since fluidity is a natural characteristic of memory itself. By seizing the opportunities to plan a rebirth of the fashion system protected by this new transformative dimension, the heritage contained in the company archive can move away from an exclusive celebration of the past, deprived of the ability to evolve, renew and reposition itself. The use of the archive can be useful in addressing uncertainty, contributing to the new familiar practices necessary for sense-giving and sense-mak-

ing design (Manzini, 2015; Krippendorff, 1989) for a world that changes intensely. On this basis, the use of the archive can find strength in the power of analogy and reinvention, leading to a strategic renewal. The archive represents the possibility of new openings. It is not accumulation; it is not a place of conservation but production “the unstable and insecure space of continuous creation” (Zuliani, 2014). Taking up Jacques Derrida (1995),

The question of the archive is not, we repeat, a question of the past. [...] It is a question of the future, the question of the future itself, the question of a response, of a promise and a responsibility for tomorrow. The archive: if we want to know what that will have meant, we will only know in times to come. Perhaps.

So, if the fashion system reclaims time, the idea of the future can only be shaped by the present, because even the most fervent imagination takes shape from reflections and re-elaborations of contingent reality.

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Analysis of *Emotional Experience* related to *Sensory Perception* of Woven Textiles based in the UK

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Keywords

Emotional Experience, Sensory Perception, Woven Textiles, Tactile Sense, Visual Sense.

Abstract

This paper examines how sensory perception can elicit emotional experience to textiles. The Repertory Grid Technique, a qualitative tool, is used to analyse the bi-polar constructs generated by the participants at the time to evaluate the sensory perception of twelve woven textiles.

The first section examines and discusses current debates on emotional experience through artefacts, highlighting differences in the terminology used and points of agreement; notably that emotional experience refers to the intangible meanings, associations and connections that an individual transfers onto their object during their relationship. Emotional experience implies that the object has an emotional significance and becomes a vessel for past events and experiences. The second part looks at the evidence generated during the practice-based investigation of this research.

A three-domain framework – sensory, cognitive and emotional domains – was created based on the literature review to categorise the bi-polar constructs provided by the participants. The data shows that tactile sense has a higher rate of eliciting emotional experience when evaluating woven textiles.

1. Introduction

The exploration of the intimate proximity of clothes to the body and the self has been studied for more than two decades (Fleetwood-Smith et al., 2019). Among material culture literature, Sophie Woodward's (2007) study looks at the wardrobe of British women, pointing out that clothes constitute the *self* of a woman. She asserts that the wardrobe can be seen as what a woman *is*, while the outfit accentuates the attributes and capabilities of the woman. Under the umbrella of fashion sustainability, Niinimäki and Koskinen (2011), have explored the intangible connection that people place on their clothing to examine longevity of ownership. In design, Chapman (2009) develops the Emotionally Durable Design framework, in which the design durability paradigm has implications beyond the sole longevity of an object's physical endurance. However, there is little research exploring the specific relationship between woven textiles and individuals. Within woven textiles Seo (2015) presents aspects of emotional durability in textile design.

The paper examines and discusses current debates on emotional experience through textiles, highlighting differences in the terminology used and points of agreement. Subsequently the theory extracted from the discussion is reflected on the data gathered using a qualitative methodology.

The paper structure is as follows: after comparing different frameworks of emotional experience through textiles, it presents the method and methodology of the research followed by the participant's profile. The data gathered is then compared and contrasted with the current literature of emotional experience, and finally the conclusions and contribution to knowledge are presented.

2. Review of Literature

This paper presents the contextual review of two studies that have explored and understood emotional aspects of textiles from different perspectives, and the framework of this research.

2.1. Applied Textiles

In her doctoral thesis *Emotional Value of Applied Textiles - Dialogue-oriented and participatory approaches to textile design* (2010), the design researcher Anne Louise Bang examines the emotional value of applied textiles. Bang (2010) looks at the work of Norman (2004) and Jordan (2002), with the addition of Desmet's (2002; 2008) research to approach emotional value within product design.

Bang (2010) first presents the work of Donal Norman (2004), a cognitive, computer and UX researcher. Norman (2004) distinguishes three aspects of design that relate to the three levels of human cognitive and emotional system of processing information, acknowledging the oversimplification of Norman's theory. He states that at the *Visceral level* individuals have a universal reaction; they perform in the same automatic manner when feeling pleasure or fear, yet the *Behavioural* and *Reflective levels* are sensitive to experiences, training, education and person's background. The *Behavioural level* controls the everyday behaviour and actions of the individual, how the person reacts in stressful situations or in enjoyable moments. The contemplative part of the brain is linked to the *Reflective level*.

Relating these three levels to the design field, *Visceral design* is concerned with the appearance of the object. This design is related to nature because humans coexist in the environ-

ment with other humans, animals, plants and so on. As a consequence of this coexisting nature, individuals are open to receive powerful emotional signals from the environment that are transmitted automatically at a *Visceral level*. The basic principles of *Visceral design* consist of designing across people, engaging the senses such as touch, smell and sound the dominant aspects. *Behavioural design* is related to pleasure and effectiveness of use. *Behavioural design* is all about performance, where appearance and rationale are not important. The four components of good *Behavioural design* that matter are function, understandability, usability and physical sensation. While *Visceral* and *Behavioural design* relates to appearance and use, *Reflective design* covers a huge territory. It considers the intellectualisation of the object, one's self and one's memories. For one individual, it could be about the meaning and the personal remembrance an object evokes; for another, it is about the projection of their self-image and the message an object sends to society. Bang (2010) notes that Norman does not go in deeply enough to develop the idea of *Behavioural design*. His amplitude definition does not help to give a clear understanding on this level, and some aspects might be better seen as part of *Visceral* or *Reflective design*. There appears to be a lack of information regarding social aspects when using Norman's framework to address aspects within emotional product design.

Bang (2010) points out the association that Norman (2004) does when comparing his three levels of design framework with Jordan's (2002) notion of a pleasure-based approach to human factors. Jordan, a marketing, design and brand strategy consult-

ant, defines pleasure with products as “the emotional, hedonic and practical benefits associated with products” (Jordan, 2002, p. 11); understanding emotional benefits as those belonging to how products affect a person’s mood. “The hedonic benefits are those belonging to the sensory and aesthetic pleasures associated with products” (Jordan, 2002, p. 11). Pleasure with products builds up from the relationship between the individual and the object. Jordan’s pleasure framework is based on the work of Tiger (1992), an anthropologist, who identified the four pleasures of the human condition.

Jordan (2002) distinguishes the following categories: *Physio-pleasure*, *Socio-pleasure*, *Psycho-pleasure* and *Ideo-pleasure*. The *Physio-pleasure* is concerned with the physical body from anthropometrics and ergonomics to the sensory perception’s positive feedback of the object. *Socio-pleasure* is drawn from aspects of the object that represents social status and helps to construct a personal identity that allows to enter a desirable social group. *Psycho-pleasure* refers to the individual’s cognitive interaction with an object and their subsequent emotional reaction. *Ideo-pleasure* relates to individual’s values such as political and religious.

For Norman (2004), *Physio-pleasure* combines aspects of *Visceral design* with some from *Behavioural design*. *Socio-pleasure* derives from interaction with others, therefore it combines elements of both *Behavioural* and *Reflective designs*. The pleasure that acts upon peoples’ reactions and psychological state during the use of a product is *Psycho-pleasure*, which resides at a *Behavioural level*.

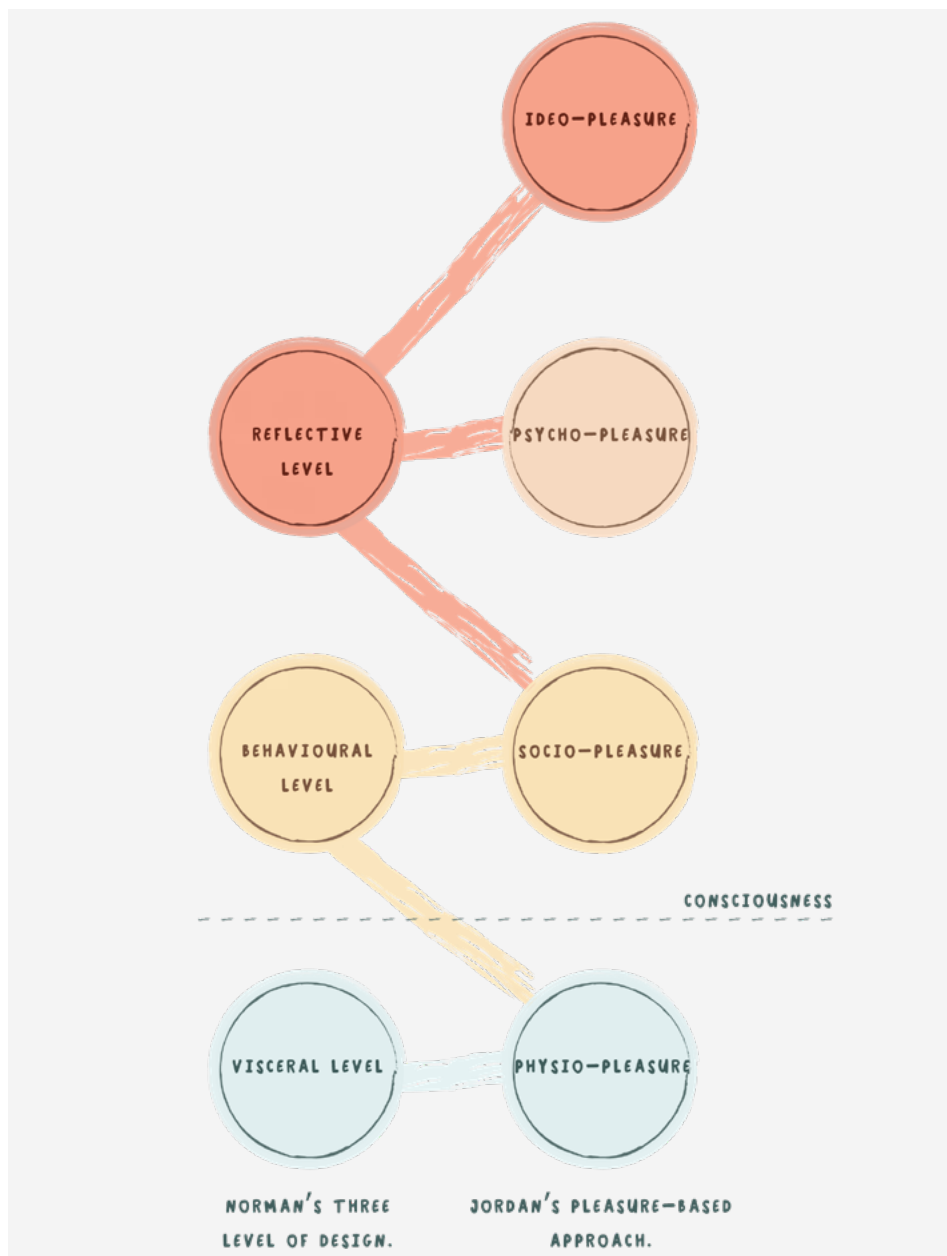


Figure 1. Gina Nadal, interpretation of the connections of Jordan's (2002) pleasure-based approach and Norman's (2004) three level of design, 2021.

Finally, *Ideo-pleasure*, where the value of objects come from and the statement they make, clearly lies within *Reflective design* (Fig. 1). Bang (2010) uses the four categories of pleasure framework to invite participants to explore the personal experiences about the expectations to applied textiles.

Later she points out that emotional value is the emotion causation as a result of body feedback with the combination of cognitive aspects. She argues that four categories of pleasure (Jordan, 2002) can function as a common platform for establishing, substantiating and exploring emotional value of applied textiles. According to Bang, this concept is in agreement with Damasio (2000) and Prinz (2004), when they understand that an emotion that is felt – emotional experience – is literally the emotion. They add to this by saying that pleasure is strongly connected to the emotional experience, although it is not “an emotion” per se.

2.2. Textile Aesthetics

The Language of Textiles: Description and Judgement of Textile Pattern Composition by Siri Homlong (2006), an artisan and textile design teacher, investigates emotional aspects of textiles. The purpose of her research is to focus on personal aesthetic experiences and aesthetic judgements of textile pattern composition in the surrounding environment. She states that the notion of aesthetic qualities in her research is based on patterns of colours and shapes due to the fact her research only analyses the visual sense through verbal communication of the participants.

According to Homlong (2006), an individual's visual perception and aesthetic appreciations are affected by emotions.

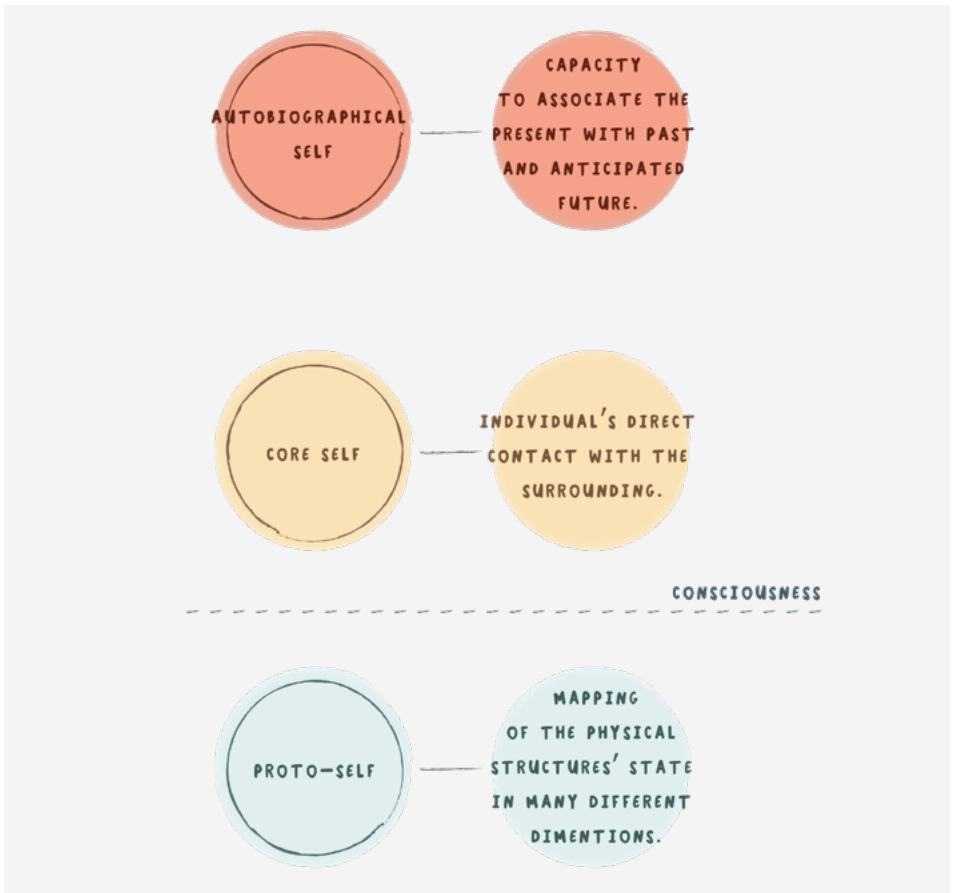


Figure 2. Gina Nadal, interpretation of Damasio's (2000) three types of the self related to the types of consciousness, 2021.

She refers to the types of consciousness and the relation to the three types of the self that Damasio (2000) builds in his book *The Feeling of What Happens: Body and Emotion in the Making of Consciousness*, to relate emotions to the surrounding environment. Damasio presents three levels of the self: *Proto self*, *Core self* and *Autobiographical self* (Fig. 2). Homlong (2006) only uses the conscious level, *Core self* and *Autobiographical*

self, to develop her research. She postulates that through the *Autobiographical self*, the individual gains their own subjective experience and judgement of the surrounding environment. Remarking that each individual appraises the same object or situation in a different way because of their own subjective experience.

Damasio's (2000) theory of the three types of self is closely related to Norman's three levels of design, where both authors recognise an unconscious level and a top-level sensitivity to experience.

While Bang (2010) connects emotion value of applied textiles to Norman's (2004) and Jordan's (2002) work, Homlong links Buchanan's (1985) and Desmet's (2002)¹ work to individual's visual perception and aesthetic appreciations. According to Homlong, Buchanan divides design rhetoric into three elements: *Logos*, *Ethos* and *Pathos*. The first element, *Logos*, is the technological reasoning, in which the design practitioner manipulates the processes and material to technically solve a problem. The second element is character or *Ethos*. Buchanan refers to this element as the representation of the design practitioner in the object, not essentially as they are but rather who they wish to be. The third element referred to argument, emotion or *Pathos*. Buchanan says that *Pathos* connects the physical object to the mind creating fulfilling experience for the user.

1 Desmet's computer programme, PrEmo, to guide designers in controlling emotional responses to their design based on nine basic emotion into five groups.

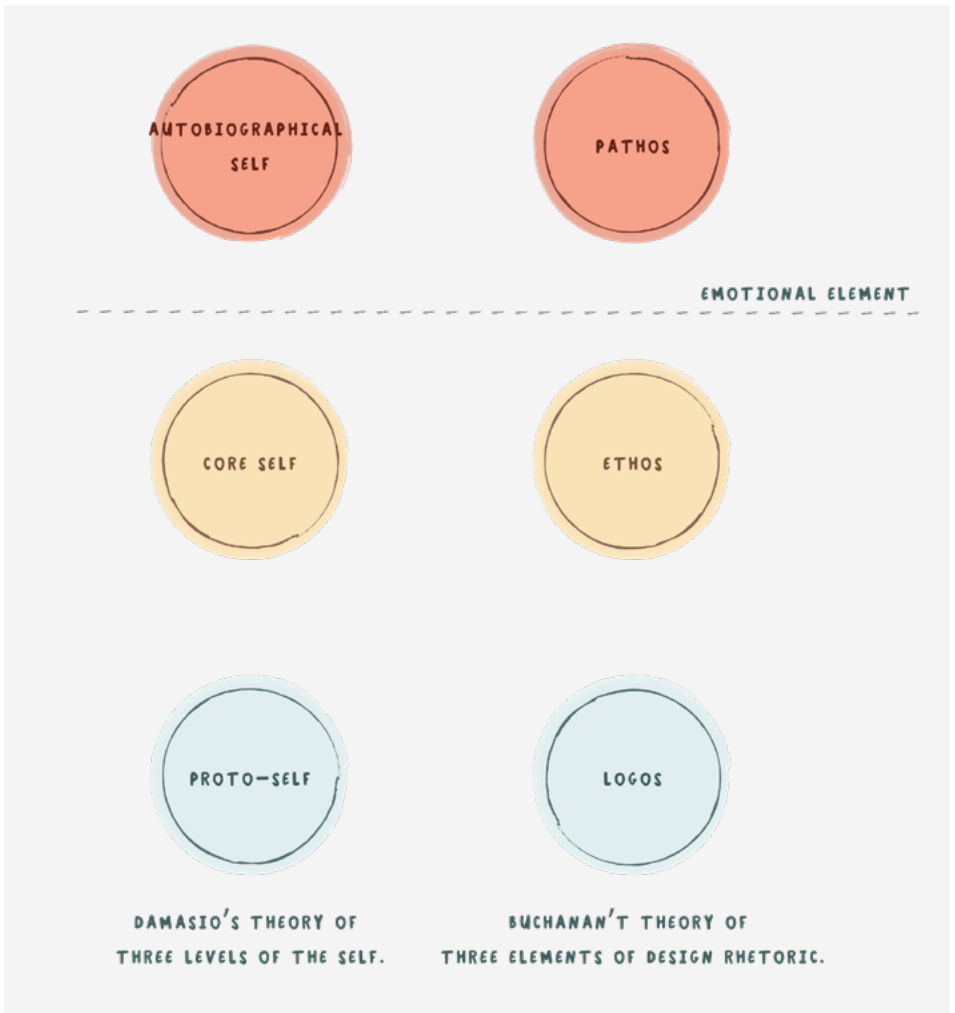


Figure 3. Gina Nadal, comparison of Damasio's (2000) and Buchanan's (1989) theories, 2021.

Damasio's (2000) theory of three types of self and Buchanan's (1985) theory of three elements present three levels, where the bottom one is the essential, the middle one is the subjective and the top level presents an emotional element or experience (Fig. 3).

In perspective of Desmet's (2002) model, Homlong (2006) points out that most of the emotions in his PrEmo were expressed when participants were visually judging the printed textiles. She suggests using Desmet's PrEmo to categorise emotions and mapping emotional concepts to obtain a general view at the end of the study. As Bang (2010) posits, this study argues that Desmet's groups of emotions is insufficiently elaborated on to function as a structural approach to *Emotional Experience*.

2.3. Textiles & Emotional Experience

In this study the term *Emotional Experience* refers to the intangible meanings, associations and connections that an individual evokes on their object during their relationship. *Emotional Experience* implies that the object has an emotional significance and becomes a vessel for past events and experiences that in turn can trigger *Emotional Experience* itself. The paper *Consumer-Product Attachment: Measurement and Design Implications* by Schifferstein & Pelgrim (2008) presents connections between consumer-product attachment and frameworks originated in design literature. They examine and define the construct of consumer-product attachment as:

the strength of the emotional bond a consumer experiences with a durable product. Consumer-product attachment implies the existence of an emotional tie between a person and an object. An object to which a person is attached is considered to be special and typically means a lot to that person. (Schifferstein & Pelegrim, 2008, p. 1)

Schifferstein & Pelgrim (2008) analysed Greenwald's (1988) four-facets of person's self-schema. According to them, if an individual experience elicits an attachment to objects because they help to reassure their self and enhance individual's feelings, then the four facets of a person's self-schema can help to indicate the variables that influence the degree of attachment between an object and a person. The four facets presented by Greenwald are *Diffuse self*, *Private self*, *Public self* and *Collective self*.

Schifferstein & Pelgrim (2008) connected Greenwald's (1988) four faces of a person's self-schema to the study of Norman (2004) and Jordan (2002) to further elaborate consumer-product attachment concept.

This study further compares the Greenwald's, Norman's and Jordan's frameworks with Desmet & Hekkert's three level of product experience. Desmet & Hekkert (2007) refer to product experience as the whole set of affects aroused by the interaction between a person and an object, "including the degree to which all our senses are gratified (*Aesthetic experience*), the meanings we attach to the product (*Experience of meaning*) and the feelings and emotions that are elicited (*Emotional experience*)" (Desmet & Hekkert, 2007, p. 59). These three levels have their own processes, the *Aesthetic experience level* can delight one or more of a person's sensory modalities, for example, sound and smell. They point out that this level has a specific focus on the tactile and kinaesthetic, rather than on the visual aesthetics. At the *Experience meaning level* cognition plays an important role, assessing personal and symbolic significance of the object. The cognitive process in this level

is subjective to the individual's background. Finally, *Emotional experience level* refers to those that evoke an emotional reaction, those affective phenomena typically considered in emotion psychology.

It is important to note that these four frameworks are correlated and have some agreements and discrepancies. In all four frameworks, the first and more basic level involves direct sensory gratification, where the top level involves higher level of cognitive elaboration linked to an emotional experience. According to Schifferstein & Pelegrim (2008), in the intermediate level socio-pleasure can be associated to the reflective design process. On the contrary, this research argues that socio-pleasure is not only associated to the reflective level but also to behavioural level as Norman (2004) mentions. Drawing on Desmet & Hekkert (2007), they point out that at the experience meaning level objects can play a class status, hence here exists a direct correlation to socio-pleasure and the public self.

The main discrepancies between frameworks seem to occur at the remaining levels. Norman's broad definition of *Behavioural* and *Reflective levels* created difficulties at the time to associate them to other frameworks. While *Behavioural design* is related to pleasure and effectiveness of use, *Psycho-pleasure* drives from products' cognitive demands. Although these are as partly overlap, *Psycho-pleasure* may involve complex cognitive elaboration that may not be part of *Behavioural design*.

Fig. 4 shows how Desmet & Hekkert's framework can be associated to Greendwald's, Norman's and Jordan's frameworks.

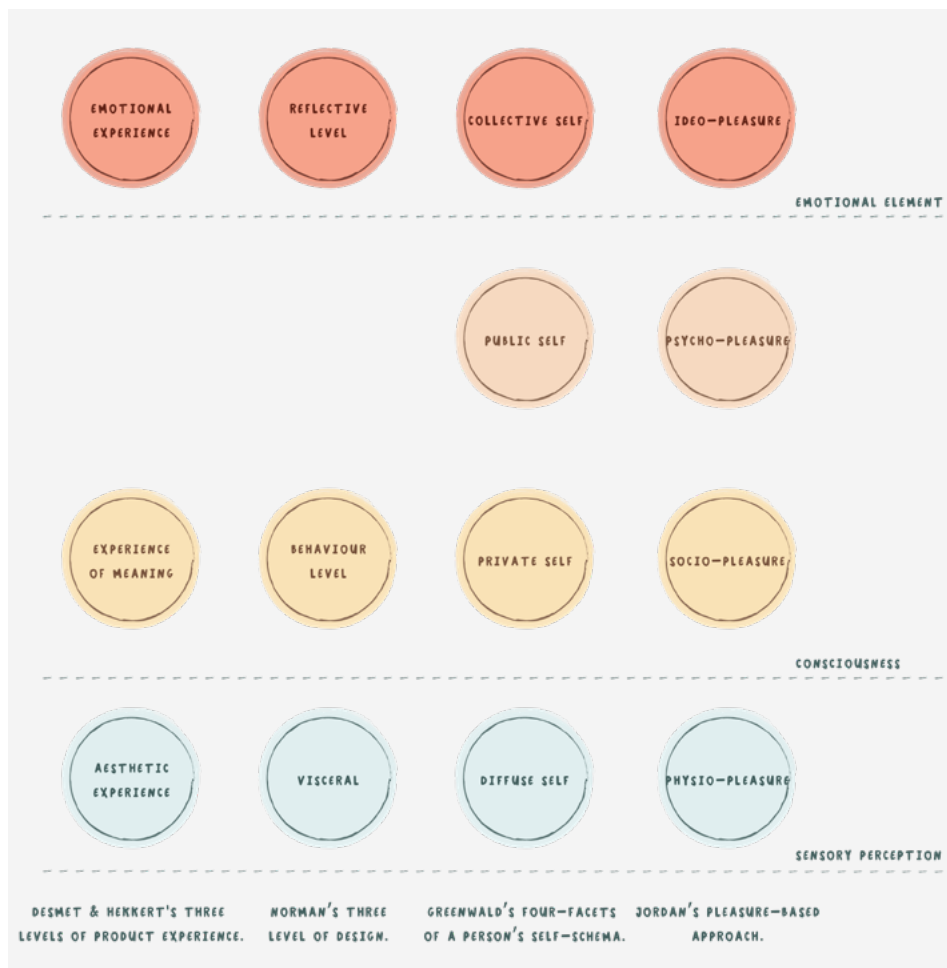


Figure 4. Gina Nadal, connection of the four frameworks, 2021.

These emotional design frameworks share a communality of three main domains: a sensory domain, a cognitive domain and an emotional domain.

Based on the previous frameworks analysed during the literature review, this study elaborates three-domain framework for *Emotional Experience* (Fig. 5).

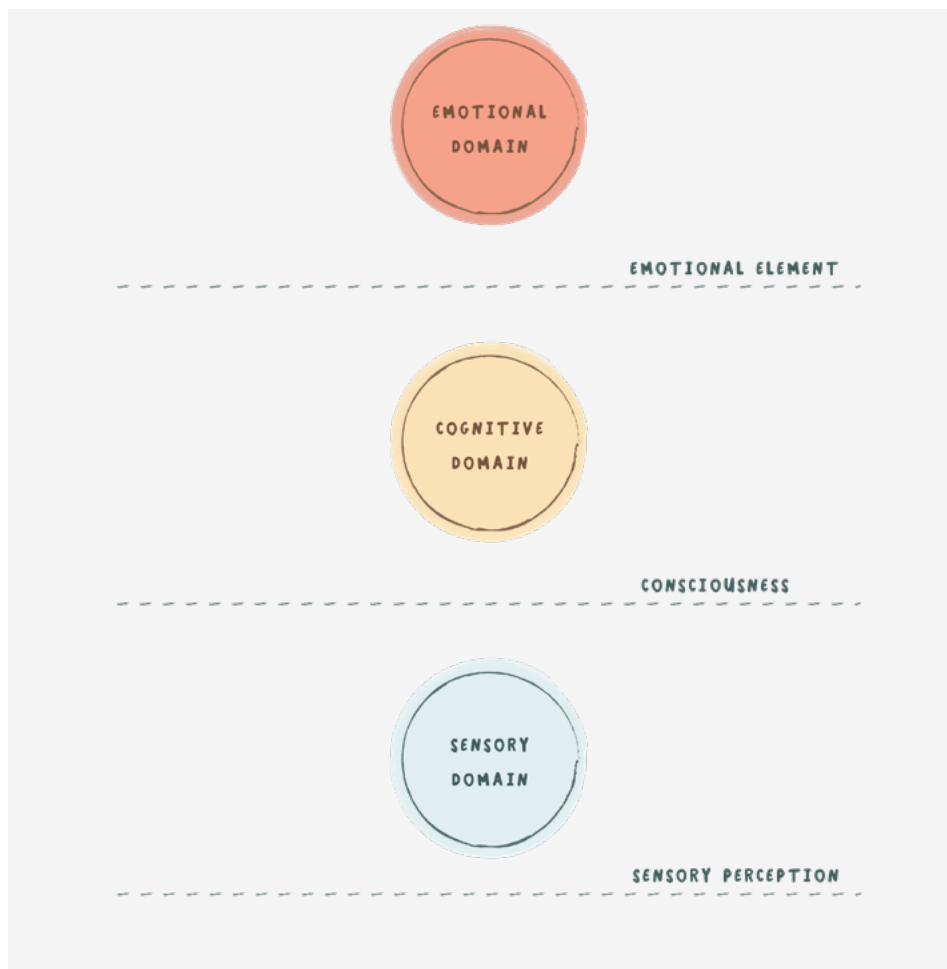


Figure 5. Gina Nadal, emotional experience's three-domain framework, 2021.

Sensory domain is the most basic level and involves direct sensory pleasure or pain. The *Conscious domain*, positioned in the middle, is the conscious recognition and satisfaction of an object. This level is subjective to the individual's background. The top level, *Emotional domain*, refers to the cognitive elaboration linked to an emotional experience, event, memory or person.

To arouse an *Emotional Experience* can be done in both ways, bottom-up or up-bottom.

3. Method

This study invites ten participants to analyse twelve woven textiles using sensory perceptions in order to assess the *Emotional Experience* in accordance with the three-domain framework. To gather and analyse the data a qualitative method, Repertory Grid Technique, is used.

3.1. Repertory Grid Technique

The Repertory Grid Technique (RGT) is a method to proceed a highly structured interview, using the interviewee's own words and construction of the world. It was created by George A. Kelly (1955), an American psychologist, therapist, educator and personality theorist, to elicit constructs when investigating patients' personal relationships and situations in life under the umbrella of Personal Construct Theory.² Kelly introduced the idea that all individuals are experts in matters concerning themselves, acting on the basis of specific expectations (Baber, 1996; Bang, 2007).

The RGT requires the researcher's objectives to be determined during the general planning phase among other decisions that might affect the capture of data. As it is not completely standardised, different disciplines have adapted the core of the RGT to capture specific data. The RGT consists of:

² Personal Construct theory is based on the development of people's theories about the world. In order to understand people's environments, they act as *Personal scientists* (Shaw, 1980; Zuber-Skerritt & Roche, 2004).

- (a) the *topic* of the interview, in this study the topic is *How sensory perception of woven textiles can elicit emotional experience*, which should represent the researcher's objectives and determines what the interview is about.
- (b) The *elements*, which represent the content area under study and illustrate the topic, twelve woven textiles are the elements of this study.
- (c) A *set of personal constructs* are created by the interviewee to compare and contrast the elements or presented by the researcher. The personal construct is the most important component of the RGT due to it describes what the interviewee thinks about the topic. The personal *Bi-polar construct* is presented as opposite ends of the pole. Zuber-Skerrit and Roche (2004) state that *bi-polar constructs* might have a clear opposition, but it is not a necessary requirement of *bi-polar constructs*.
- (d) The *rating system*, usually a rating scale based on 1-5, evaluates each element based on the bi-polar construct (Feixas and Cornejo, 1996).

The RGT is not postulated to the investigator's theoretical construct, rather it can be more accurately described as a personal-centred approach because it involves the study of a person's own theory and personal construct (Feixas, 1989) through interviews. Therefore, this technique can be a rich source of qualitative data as it allows people to express themselves in their own terms.

Yet, the RGT combines qualitative and quantitative methodologies as it can be analysed statistically because of the use of a rating scale.

4. Participants

The participants in this study have been selected based on the following premise: eight young adults ages 18-35. The young adults are HE students from Art, Design and Media courses in the UK. They are required to attend 3 sessions over a period of a month.

5. Textiles

The twelve woven textiles studied in this research are the following (Fig. 6):

1. Silk yarn with satin weave structure
2. Angora yarn with twill weave structure
3. Merino yarn with twill weave structure
4. Alpaca yarn with diamond weave structure
5. Cotton yarn with plain weave structure
6. Cotton yarn with twill weave structure
7. Linen yarn with diamond weave structure
8. Angora yarn with half basket weave structure
9. Linen yarn with herringbone weave structure
10. Angora yarn with twill weave structure (pointed draft)
11. Merino yarn with satin weave structure
12. Merino yarn with diamond weave structure

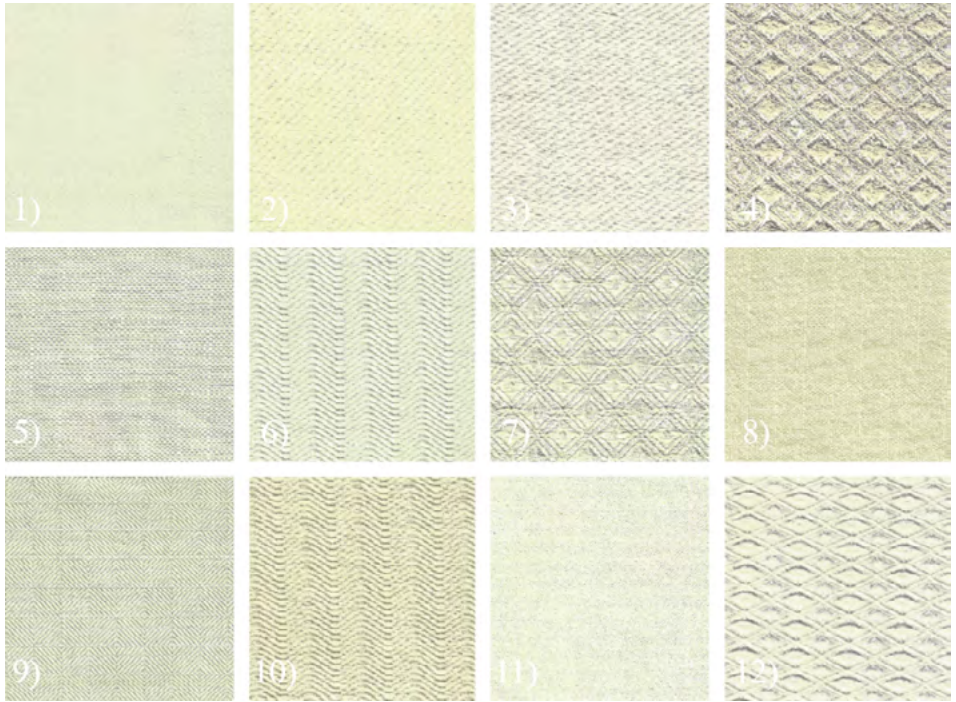


Figure 6. Gina Nadal, textile analysed during this study, 2021.

6. Sensory Perception

Sensory perception refers to the holistic process of interaction with materials, not only sensory properties of materials but individual's feelings beyond the sensory domain, including emotional and semantic domains (Karana et al., 2014).

While visual perception of materials includes colour of the surface and patterns, the tactile impression includes the object's weight, warmth, elasticity and softness (Overliet et al., 2016; Karana et al., 2014). During Schifferstein & Cleiren's (2005) research looking at similarities and differences between the roles of various senses in modulating multisensory prod-

uct experience, they point out that vision and tactile senses are equally successful in providing information about the object. Moreover, objects recognised by vision and touch are easiest to identify and associate with memories, people and places.

In a multisensory perception, the order of stimulus influences the final perception of the product. Vision is often the first sense to perceive certain object properties, the information received from other senses tends to satisfy the expectancies generated on the basis of the visual properties (Karana et al., 2014). For parity with previous research (Karana et al., 2014; Schifferstein & Cleiren, 2005; Overliet et al., 2016), the exploration mode used in this research for evaluating weaving textiles is first by touch, second by vision and third using both senses. In the tactile exploration, blindfolded participants are asked to freely explore the textile samples. In the visual exploration condition, the participants can only see but not touch the textile samples. Finally, in the visual-tactile condition, participants can use both senses together to explore the textile samples.

7. Results

The study aimed to create connections between the textiles, domains and evaluation mode. First the constructs were divided in the three domains framework developed for this research. In order to divide the constructs into the *Sensory*, *Cognitive* and *Emotional domains* the following considerations were accounted for. If the *bi-polar construct* showed a reference of the quality of the textile such as texture, yarn or colour then it belonged to the *Sensory domain*. On the contrary, if the construct showed a cognitive effort relating

the textile to a specific situation or place then this construct belonged to the *Cognitive domain*. Finally, if the construct showed an emotional element or connection then it belonged to the top level, *Emotional domain*. For instance, a *bi-polar construct* that corresponded to the sensory domain was “smooth, I feel I don’t have anything on my hands”; a *bi-polar construct* connected to cognitive domain was “they look like things I’d own”; and an emotional domain *bi-polar construct* was “reminds me of receiving a post, nice experience”.

The focus of this analysis was to select the bi-polar constructs that elicit an emotional experience to the participants, whether they belong to *Sensory*, *Cognitive* or *Emotional domain*. For instance, participant 8 created a bi-polar construct composed by the construct “an ice-cream cone trip with grandparents” and its contrast “no emotional response”, therefore the contrast *no emotional response* was excluded from the analysis. Another example is participant 13, who generated a bi-polar construct, where the construct was “I don’t like them that much, roughness” and its contrast was “a party shine classy dress, wearing it. Nice experience” (Cloyd, 2014 July 29). The contrast was the one that has been analysed, while the construct was excluded from it.

In order to understand the patterns of the participants towards the *Sensory perception* of the textiles, the *bi-polar constructs* were divided between the method of analysis, whether it was analysed using tactile, visual or both senses together. 48 *bi-polar constructs* belonged to tactile sense analysis, 48 *bi-polar constructs* to visual sense analysis and 48 *bi-polar constructs* belonged to tactile plus visual sense analysis.

Construct 1	Textile 1	Textile 2	Textile 3	Textile 4	Textile 5	Textile 6	Textile 7	Textile 8	Textile 9	Textile 10	Textile 11	Textile 12	Contrast 5
I don't like them that much, roughness	5	4	3	1	2	2	4	5	4	2	3	2	A party shiny shiny classy dress, wearing it. Nice experience

Table 1. Gina Nadal, example of selection of textiles based on the comments, 2021.

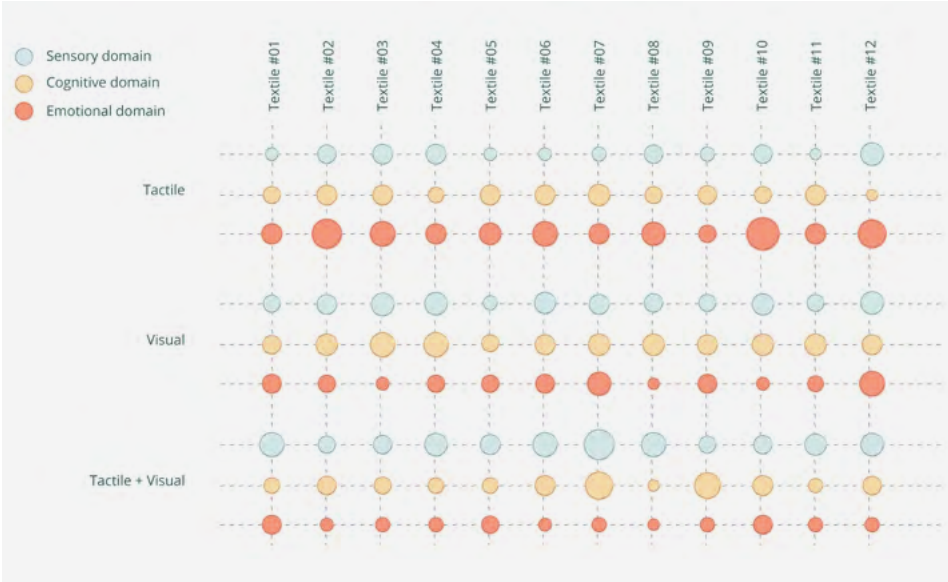


Table 2. Gina Nadal, connection between textiles, sensory properties and three-domain framework, 2021.

After the first division of the *bi-polar constructs*, the textiles with a close connection to the construct (1-2 scale-rate) and contrast (4-5 scale-rate) with emotional experience were selected. Table 1 shows an example of division based on one *bi-polar construct* of participant 13, where only the textiles that were given a number close to the contrast were selected. In this case, textiles number 1, 2, 7, 8 and 9.

Afterwards the *bi-polar constructs* were divided into the three-domain framework following the first analysis.

Table 2 shows the division between the evaluation mode (tactile, visual or tactile + visual), textiles and the three domains. The table does not provide a pattern to connect textiles to the domains and evaluation modes; instead it reaffirms the idea that the evaluation mode has an important role at the time to associate textiles to the *Emotional Experience* three-domain framework. For instance, during the tactile evaluation, the textiles were easily related to the *Emotional domain*, while the *Sensory* and *Cognitive domains* were stronger during the visual and tactile plus visual evaluations.

8. Conclusions

From the evidence of this study, it could be argued that Schifferstein & Cleiren's (2005) assumption of vision and tactile senses are equally successful in providing information about the object. In this study, participants showed that when analysing the textiles using both senses together *Sensory* and *Cognitive domains* had a similar impact, while *Emotional domain* had a higher number of constructs during the tactile evaluation. This research found out that each sense provid-

ed different information to the individual and challenges the idea that when objects are evaluated using both senses the identification and association of memories, people and places is similar (Schifferstein & Cleiren, 2005). The results from this study show that British adults in HE can relate easily to the *Emotional domain* when the woven textiles are evaluated using only the tactile sense, therefore it invites designers to introduce sense as a main element in their work and to understand which benefits of each sense in their projects. The sustainable action that designers can take from this research is that they first need to think and evaluate the individual's sensory perception and then create the product for the specific individual, therefore producing on demand instead of mass-production. The research also invites further study in the impact of introducing sensory perception as an important element of the design process on other geographical areas beyond the UK.

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Smart Tags as a Tool for Circular Economy in the Textile and Fashion Chain

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Keywords

Circular Economy, Smart Tag, Textile and Clothing Chain, Post-use, Discard.

Abstract

Fashion is one of the most important industries in the world. It is complex chain and involves other industries in its processes, making it difficult to make a complete comparison in terms of pollution and socio-environmental impacts with other sectors. Socio-environmental sustainability is a relevant variable for fashion consumption, currently consumers demand greater transparency from companies, seeking to know where, how and who produced the product.

The main objective of this research is to propose the use of smart tags for textile products, containing information on the steps and processes involved in the production of the textile article, in addition to guiding users and manufacturers in the post-use and recycling step as strategy to reinsert these products into a new production cycle.

The knowledge of the impacts of the processes inherent to this extensive chain, the need for production transparency, performance and lifecycle of these products are important to establish not only management policies and reduction of disposal of post-use textile products, but also the interface with an increasingly conscious, demanding and engaged consumer.

1. Introduction

From the prevailing logic of production and consumption in the Fashion system, environmental and social problems on a world scale have emerged. Based on productive systems of linear economic orientation (extract-transform-use-discard), the textile and clothing industry is one of the main responsible for large-scale consumption and misuse of natural resources (Clark, 2008; Fletcher, 2014; Roy Choudhury, 2014). Faced with this scenario, we are driven to seek solutions for the textile and clothing sector that can subsidize not only new patterns of production and consumption, but also more efficient textile waste management systems, based on a circular economy model. By definition, the circular economy is related to a sustainable cycle, from production to the reinsertion of the raw material for the manufacture of a new product (Avila et al., 2018). One way to connect the chain and supply information about the textile material produced is through the use of Smart Tags: tools that create traceability of the production process, connect the entire chain, in addition to allowing the user to access product information and how it was produced. In the disposal phase of this material, it is possible to identify the raw material that was used and thus return the product to the production cycle in an appropriate manner. In this context, the main objective of this research is to propose the use of smart tags (Smart Tags) for textile products, containing information on the steps and processes involved in the production of the textile article, in addition to guiding users and manufacturers in the post-use stage, applying recycling as a strategy to reinsert the discarded articles in a new production cycle.

2. Technology, Information and Communication Tools

Technology occupies a large part of modern life; we live in a networked society, in which information is considered the *raw material* of social systems. Currently described by Castells (1999) and Bauman (2001) as a networked society that takes advantage of the global highway, telecommunications, virtuality culture and breaking the models of time and physical space so that individuals are able to perform multiple tasks. Castells (1999) describes the existence of a rapid Information and Communication Technologies (ICT) diffusion and that information is considered a *raw material* of social systems. Production systems are changing due to a new industrial revolution underway. Having access to information and data does not necessarily mean that this content is representative and reliable (Desouza & Smith, 2014). The main challenge of this system is the creation of a mechanism that links data from different sources and that allows the real-time transmission of results from one module to another to create a database. Kamrani (2008) states that this is a problem that requires a quick solution, mainly due to the need to maintain relationships and dependencies between the different types of data collected. Smart tags are microchips that can be attached to products to allow their contactless identification using radiofrequency (Feldhofer, 2004). Associated with an enterprise information systems architecture, it can play an important role as a solution for a hybrid enterprise information systems architecture, consisting of IoT applications and a blockchain supporting transaction services within a global clothing business with several parts connected to the network. IoT is a smart global network of interconnected objects, which through unique ad-

dress schemes can interact and cooperate with their business partners to achieve common goals. Data obtained from IoT applications throughout the apparel business processes can greatly facilitate operational and consumer decision making (Pal & Yasar, 2020).

3. Fashion Chain: Production Processes and Social and Environmental Implications

The fashion production chain, unlike other value-added chains, has a large number of stages in the process, carried out by different successive industrial units. As shown in Figure 1, it comprises the following steps: fiber production, spinning, weaving/knitting, textile processing, clothing, wholesale/retail sales, use/consumer and disposal (Tobler-Rohr, 2011a).

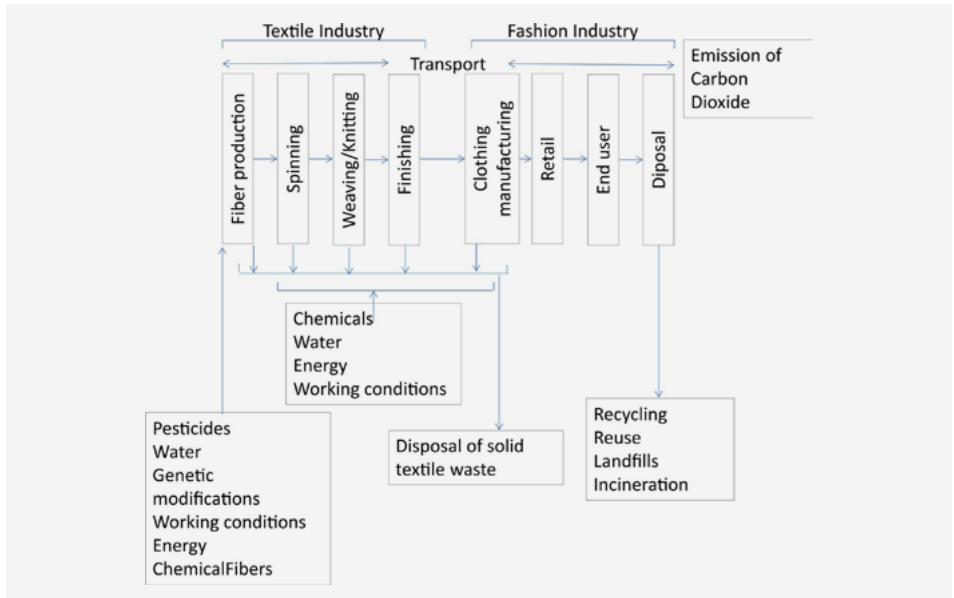


Figure 1. Flowchart of the fashion chain, main environmental and social impacts in fashion chain, adapted from Farias (2016).

Several of these units operate in a disintegrated manner, with different stages developed by different companies (Tobler-Rohr, 2011a). The complexity and fragmentation of this supply chain thus inevitably leads to a lack of transparency about the various stages involved in the manufacture of products and their potential environmental and social impacts (Roy Choudhury, 2014).

For the production of a simple clothing piece, it is necessary to trigger a large number of production processes that can generate more or less significant impacts. In the production of fiber, problems stand out both in the agricultural activity associated with the use of fertilizers, herbicides and insecticides, and by the extraction and conversion of oil for the manufacture of synthetic fiber (Fletcher, 2014; Slater, 2003, 2008; Tobler-Rohr, 2011b). In yarn production, environmental effects include those caused by chemicals used in washing, cleaning, bleaching, along with the emission of gases from drying machinery, opening and carding operations (Slater, 2003; Tobler-Rohr, 2011b). Similar problems are observed in the textile production, where chemicals, fiber residues and noise are also present. Finally, the stages of the finishing process concentrate most of the known impact activities, especially the dyeing and printing processes, which result in the contamination of a huge volume of water by products discarded such as toxic and/or carcinogenic dyes and other chemicals (Roy Choudhury, 2014; Slater, 2003; Tobler-Rohr, 2011b). It is important to note that, in addition to the problems mentioned, all material derived from the production of the textile and fashion chain industries, is generally discarded and causes impacts on the environment.

Lorenzetti (2018) reports that the textile sector in general produces little material waste in relation to its production, with many companies already reprocessing wastes. However, the manufacturing stage discards an average of 10% of all fabric used only in the cutting process.

When the product is in use, one of the most critical issues is its premature disposal, either due to its low quality, or because it no longer meets consumer requirements, for example, those motivated by fashion trends (Slater, 2003). Studies carried out in recent years show that for the fast-fashion model to support itself, the production of clothing has doubled in the last fifteen years and the average number of times each item is used has decreased by 36 %.

4. Circular Economy: Concepts and Definition

The productive process of the circular economy model contemplates the reduction, reuse, recovery and recycling of materials, in a sustainable cycle from production to the reinsertion of raw material for the manufacture of a new product (Avila et al., 2018). Figure 2 illustrates this model.

According to Pearce and Turner (1990), the concept of circular economy was conceived in the early 1990s; in this model there are no discards of materials or products produced, the destination and recycling of waste is defined in all stages of the process. Production process, from product design to post-consumer disposal. Leitão (2015) adds that the model is based on nature itself, it is implemented through innovation, design and processes that aim to reduce the consumption of raw materials, energy and water.

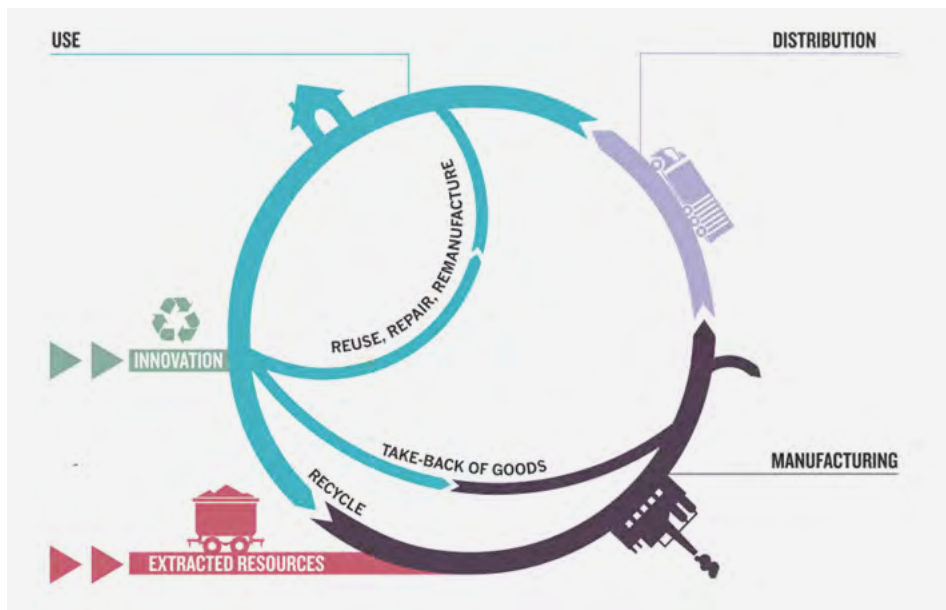


Figure 2. *Circular production model*, circular production dynamics with phases and gates, adapted from Stahel (2016).

The circular economy model and the concepts Cradle-to-Cradle (C2C) or Life Cycle Assessment (LCA) can be used as a strategy to reinsert the waste generated by industries in a new cycle, reducing its impact on the environment.

4.1. Circular Economy in the Fashion Chain: Problems of Post-use Disposal

In view of the environmental problems of the textile and apparel chain, associated with the consumption dynamics imposed by the fashion systems (such as fast fashion), many processes and inputs used in the fashion chain have been reevaluated and new production and consumption alternatives have been exploited (Fletcher, 2014), spreading the concept of conscious consumption more widely. There is also an engaged consumer

whose purchase is determined by a rigorous choice process. A Fashion product that follows the dynamics of technological developments and, at the same time, is manufactured from a new business model that prioritizes social, environmental and functional aspects, is a way to allow the union of these scenarios and meet the demands of both the producer and consumer. The fabrics used in garment production are generally produced by weaving and knitting techniques, that can be of natural origin – made from fibers obtained from renewable sources and decompose quickly in the environment – or produced from natural polymers, renewable raw materials that decompose quickly in the environment or from synthetic polymers, mostly petroleum-based, and take decades to decompose in nature. To change the linear economic model to the circular model in the textile and apparel chain, it is necessary to intervene in all its production systems. The textile fibers production is one of the biggest challenges of the sector, because instead of removing the raw materials from the nature it will be necessary to recycle textile products discarded by consumers. In this way, the textile articles can be transformed into recycled fibers, that will be used in the manufacture of the recycled yarns, and in the production of fabrics.

According to Fletcher and Grose (2011), the improper disposal of textile waste causes climate change, adverse effects on water and its cycles, chemical pollution, loss of biodiversity, excessive or inappropriate use of non-renewable resources, negative effects on health and harmful social effects on producing communities. The Ellen MacArthur Foundation (2017) points that about 100 billion clothes were produced in 2015, approximately 70% of these clothes were discarded in landfills or incinerated.

4.2. Circular Economy in the Fashion Chain: Recycling and Reuse

Discarded textile articles can be used in the manufacture of recycled yarns, through mechanical or chemical recycling processes. In the mechanical recycling process, the articles discarded at the collection points are sent to recycling cooperatives where the following steps are carried out:

- **Sorting:** to separate the types of materials used in the manufacture of the items;
- **Cleaning:** the articles are washed and dried in a industrial machine;
- **Disassembling:** the textile material is separated from the accessories (zippers, buttons, other materials, etc.);
- **Fragmentation:** the fabrics/knits are perforated to standardize the material to be recycled. The machine used for the fragmentation stage has metal detectors and perforates entire garments.

The perforated material is processed by a textile shredder machine, to transform the confection scraps into recycled fiber, which will be sent to the spinning mill and used in the manufacture of a new product (Amaral, 2016). In the chemical recycling process, the fabrics are perforated, dissolved and recovered, then sent to chemical spinning to be transformed into new fibers (Fletcher & Grose, 2011).

In this way, the garments discarded by consumers can be recycled using the circular economy model and transformed into new products; the accessories, separated at the beginning of the process, are normally used in the manufacture of handicrafts.

5. Proposal for a Smart Tag in the Textile Product

The lack of identification of the origin of the textile raw material is one of the factors highlighted as barriers to the implementation of the circular economy in the textile sector (Mangla et al., 2018). In this sense, the material to be reprocessed must be properly identified and stored so that it can return to the production cycle. In the circular economy paradigm, consumers should be encouraged to classify each type of textile fiber before disposal. The low reliability of the currently labels becomes a relevant factor in consumer participation in the classification of the textile (Jia et al., 2020), requiring a more robust and comprehensive system.

According to Pal and Yasar (2020), the scenario faced by textile manufacturing companies is challenging due to the volatility, uncertainty and complexity associated with constant changes in consumer behavior, where demand for lower prices, better service and mobile commerce are constant.

5.1. Smart Tag Guidelines: Consumer

The consumer plays an important role in boosting the application of the Circular Economy. This should put pressure on suppliers to be committed to aspects of economic, social and environmental sustainability.

For the consumer, access to information on the raw materials used, companies involved and engaged in socioenvironmental causes and a closer relationship with the people involved can generate added value in a given product and an identification with the brand. In addition, in the context of circular economy, it is important that the consumer knows what raw material is used in the production of the textile article to provide

a proper disposal. This can be done with smart tags attached to the article that communicate with smartphones and displays in stores, for example. This communication can generate a connection between the end user and the employee who worked on the production process of that product.

In this context, the smart tag can be used to provide information such as:

- A video containing an employee's report of the production process, generating empathy for the consumer, and connecting the consumer to those who were involved in the production process. In this way it is possible to generate identity with the brand and for the consumer the certainty that the process is socially correct.
- Information on the raw materials used, allowing the user to select products that are in accordance with their lifestyle in addition to guiding the appropriate disposal.

5.2. Smart Tag Guidelines: Manufacturer

With proper identification previously made by the consumer, the manufacturer is able, more efficiently, to track the use of certain materials and end-of-use of the textile article so that they return to the cycle of the circular economy, using the mechanical recycling process or chemistry as described in item 4.2.

5.3. ReUse Textile Recycling: Example of Smart Tag Interface

Based on the guidelines for consumers and manufacturers, an interface for the Smart Tag was simulated by creating the application ReUse – Textile Recycling, which indicates how manufacturers and consumers should proceed with

their clothing and conduct after use and recycling. For this, the Fabapp® platform was used to create the interface. The initial presentation of the interface is shown equally for manufacturer and consumer, as shown in Figure 3.



Figure 3. *ReUse Textile Recycling*, app home screen for consumer/producer, A. Yumi Sato Duarte, F. Soares De Lima, R. Santiago De Queiroz, R. Aparecida Sanches.

Figure 4. *ReUse Textile Recycling*, all app icons that describes each category, A. Yumi Sato Duarte, F. Soares De Lima, R. Santiago De Queiroz, R. Aparecida Sanches.

Figure 4 shows the application icon (A), as well as the icons for consumer (B), manufacturer (C), information on Circular Economy (D) and Textile Industry (E).

When selecting the “Manufacturer” icon (Fig. 5A), there is a description of the discarded part, specifically the fabric and origin of the raw material (Fig. 5B). When selecting the “Consumer” icon (Fig. 5C), there is a description of the part to be discarded and the correct orientation for disposal (Fig. 5D), as shown in Figure 5.

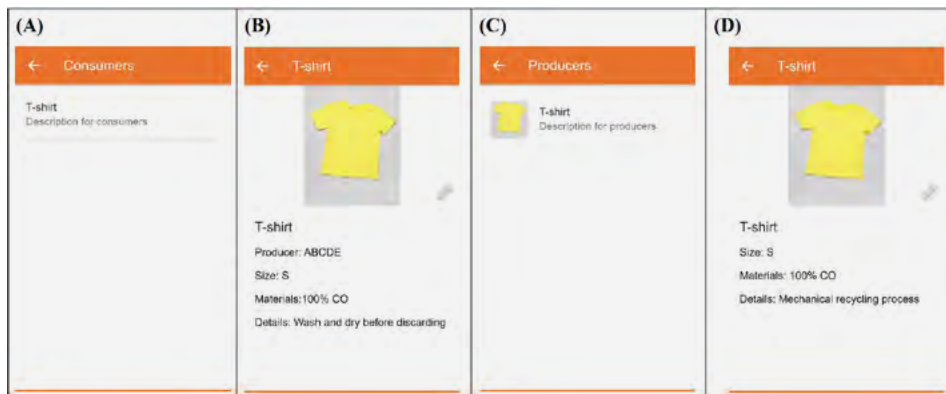


Figure 5. *Manufacturer and Consumer screen*, differences between manufacturer and consumer role, A. Yumi Sato Duarte, F. Soares De Lima, R. Santiago De Queiroz, R. Aparecida Sanches.

The QR Code (Figure 6) can be scanned with a smartphone to get access to the ReUse Textile Recycling interface.



Figure 6. *ReUse Textile recycling*, QR Code that can be scanned with a smartphone to access the App, A. Yumi Sato Duarte, F. Soares De Lima, R. Santiago De Queiroz, R. Aparecida Sanches.

With the information provided by the application through the smart tag to manufacturers, they will be able to process the material properly, mainly with a focus on the raw material that was used. With the information provided to the user, the user will be able to view data on the article's production process in addition to providing adequate disposal, connecting the consumer with the entire fashion production chain.

6. Conclusions

The fashion chain, following the linear model, has a large production capacity and is responsible for the disposal of a significant volume of solid textile waste and other inputs resulting from its production. Part of textile articles are discarded by post-use consumers at textile material collection points, and the other part is discarded directly in the environment, generating numerous negative effects. With the use of the circular economy model, the textile garbage discarded by consumers will be transformed again into textile fibers, to be used in the manufacture of new products, without removing raw materials from nature and with reduced consumption of water, energy and chemicals in the production process.

Having knowledge of the impacts of the processes inherent in the fashion chain, the need for transparency in the production, performance and life cycle of these products becomes important to establish not only policies for the management and reduction of textile waste, but also the interface with the consumer each increasingly aware, demanding and engaged. In this sense, for a greater integration of the chain it is necessary that the information of the processes and components are available, the use of smart tags being a proposal for making the information available, both for consumers and for manufacturers, for guidance in the post-use stages and disposal of textile articles.

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NEW/OLD PRODUCTION AND CONSUMPTION APPROACHES

Sustainability in the Prato Textile District: Vanguard and Tradition

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Prato Textile District, Supply Networks, Circular Economy, Sustainable Fashion, Sustainable Textile.

Abstract

The contribution takes part in the vast panorama of research and initiatives to investigate the way for a more sustainable, ethical, and democratic fashion system. The Prato District is acknowledged as “the textile district par excellence” (Becattini, 2000) thanks to its profound link to environmental sustainability throughout its history.

The district stands out since the Middle Ages for its ancient recycling techniques paired with its traditional figures, such as “cenciaioli”. Today the tradition has been reinterpreted in a modern key and strengthened by the birth of several new firms dedicated to the production or processing of recycled and regenerated fabrics.

The growing awareness of consumers on ethical and environmental issues offers this survey the possibility to suggest a development path for the circular textile industry to face the transition into the New Normal.

1. Detoxing Fashion in Prato: a Case Study

Sustainability in the fashion system is a broad field of study that has evolved from a vision focused on purely ecological aspects to a global meaning concerning how the social and economic dimensions of production and procurement processes can affect the territory and the value perceived by final customers.

In recent years, significant changes have emerged both in the competitive globalized fashion market and in consumer lifestyles (Bovone, 2015; Joergens, 2006), increasingly dedicated to the issues of environmental sustainability and circular economy, such as to push the development of new strategic and business models. Many studies have been addressing the environmental implications of the clothing industry (Claudio, 2007; Birtwistle & Moore, 2007), pointing at some interconnected factors as the most impacting ones: handling of raw materials, production processes, and disposal of products at the end of their very short life cycle, all fueled by a consumption model already recognized to be no longer sustainable (Fletcher & Grose, 2012). Since the first decade of the 2000s, when dramatic events such as the collapse of the Rana Plaza in 2013 gained visibility, fashion consumers increased their awareness of its risks to health and the environment, as well as of the impact on environmental and human resources caused by excessive clothing purchases (Kim et al., 2013). Scaling phenomena such as climate change, environmental pollution, and resource scarcity have thus intensified the need to take the path to sustainability in both products and production processes (Gazzola et al., 2018; Gazzola & Panova, 2019), as it is becoming increasingly relevant to the fashion industry.

Even before the COVID-19 crisis, it was possible to perceive a spark of fashion revolution (Greenpeace, 2011; WWF, 2017; Amed et al., 2020) driven by many activist initiatives promoted by NGOs. The Greenpeace campaign “Detox my Fashion” offers a great example since it pushes companies to focus on transparency and sustainability, addressing the entire production and distribution processes. However, the crisis induced by the pandemic has consolidated this process of change, demonstrating in a no longer negligible way the unsustainability of the globalized supply chain.

The starting goal of the Detox campaign was to reduce water pollution in the global textile industry, ensuring the commitment of some of the leading clothing brands – e.g., Levi’s, Inditex, Benetton (Greenpeace, 2016). More recently, Greenpeace has shifted attention to “slowing down” fast fashion (Greenpeace, 2018).

Currently, among the 80 companies endorsing Detox My Fashion, 60 are Italian, with a large presence of small and medium-sized suppliers. In particular, the Detox consortium promoted by Confindustria Toscana-Nord is remarkable, recruiting today 36 companies, 32 of which locates in the province of Prato, which, spontaneously joining the campaign, are planting the seeds of a “textile revolution” for suppliers (*GreenItaly Rapporto 2017*, 2017).

Joining a global campaign like the one promoted by Greenpeace requires the meeting of specific criteria in terms of certifications, emissions, and chemical additives. Therefore, the reduced company size of the suppliers of the Detox consortium compared to the other participating giants suggests an intrinsic sustainable capacity of the district di Prato.



Figure 1. *The king is naked* (2014) Greenpeace campaign against toxic fashion.

The contribution intends to investigate the reasons and roots at the foundation of this capacity. The research material was accessed at the Datini archive, a historical resource of textile manufacturing inherited by Francesco Di Marco Datini. The historic survey comes along with the analysis of the current organizational and production models adopted in the district, which favored the birth of new strategies while preserving tradition.

The Prato textile district, therefore, represents a valid field of investigation for the development of new forward-looking business models, which could lead to a substantial paradigm shift, where the future takes into account human and planetary limits.

2. Models in Comparison

The contribution assumes as its founding premise the given unsustainability of the globalized fashion system and the simultaneous possibility for small and medium-sized textile companies in Prato to join development programs based on responsible management of resources. In this framework, the research aims to suggest “flexible intelligence” (Micelli & Rulani, 2012) of Prato’s micro-entrepreneurship as a study model for social and environmental sustainability. Prato’s distinctive feature is found in its deep roots in the territory wherein circular production practices were introduced *ante litteram* and acted as featuring elements of its textile productions.

In particular, due to the globalization of markets and consumption supported by an increasingly fast production-sale-consumption model, many fashion companies have progressively outsourced their production processes, adopting global supply

and subcontracting networks. Many authors have recognized the core of new strategies for the fashion industry in a geographically fragmented production (Taplin & Winterton, 2004; Brun et al., 2008; Şen, 2008; Christopher et al., 2004).

Despite the recent internationalization and globalization phenomena, Italian SMEs have managed to preserve their distinctive and original knowledge, projecting it into a global logic that enhances their differences, mainly thanks to the deep-rooted manufacturing vocation and the peculiar connection among businesses.

The Italian manufacturing districts were the main drivers of the country's international opening (Brusco & Paba, 1997; Fortis, 1998), which are – and remain – strongly characterized by the set of small companies working in the same sector and by their territorial concentration, wherein the artisan tradition has never ceased (Micelli, 2011).

The articulation in productive districts also affects the fashion industry, structured as an archipelago of specialized territorial areas characterized by a strong fragmentation: these local systems specialize in textile manufacturing activities, clothing, or in both sectors. The companies working in these local systems collaborate enacting various practices of exchange, generation, and reproduction of intangible resources such as knowledge or trust (Becattini, 2015; Dei Ottati, 2005). The survey focuses on the Prato textile district, which develops in several companies engaged in the production of textile fibers and products. It is a remarkably complex reality in which different sectors coexist, from spinning to packaging, passing through weaving, and finishing, including the actors supporting the entire supply chain. The Prato textile district,

therefore, retains an organizational design based on an articulated division of production into small and medium-sized enterprises, each specialized in a single activity. Third party proceeding or subcontracting is the most widespread form of relationship between companies, and today it is still widespread in the Prato cluster (Lazzaretti & Capone, 2014). Therefore, the paper aims to investigate the underlying reasons that lead the Prato district to be excellent in terms of circularity, recycling, and responsible use of resources: the results could inspire meaningful ideas about the development of renewal strategies for an excessively fast economy. The pandemic seems to have highlighted the flaws of this model so that renovation appears now urgent. New models could gain an advantage from the geographical proximity of the supply network to trigger the knowledge and relational potential offered by places.

3. A Territorial Heritage

The historic Marshallian Industrial District (MID) of Prato (Becattini, 1990) is a crucial productive reality in the Italian economic fabric, where territorial culture meets the need for competitiveness. The value of tradition and the adaptability of companies emerge in a commercial system that historically supported the development of crucial regional manufacturing areas, allowing Tuscan companies to acquire market share and reposition themselves in times of crisis, building up a specific economic model (Becattini, 2000).

The Prato textile district extends over a geographical area of 7,000 sq km. Currently, it counts 46166 total employees in Textile Clothing, 6805 companies, a full production value

estimated at 7,500 million euros over an export value at 2540 million euros (Confindustria Toscana Nord, 2020).

In this section, the paper will cover the characteristics of the Prato district, investigating its territorial heritage. Here it would be possible to trace the reasons for the Prato textile district to offer itself as a model of sustainability. The research follows two interconnected paths:

- the first one explains the geographical, economic, and organizational features of the Prato textile district, ranging from a brief survey on the history of the territory to the analysis of the ecosystem composition.
- the second one explores the cultural heritage that permeates the territory, such as the tradition of regenerated wool, which roots in a recycling culture that has strongly influenced the DNA of local production.

3.1. The Textile District

The industrial firms of Prato are located in a favorable geographical area, which has provided the material foundations for the prosperity of a prosperous commercial environment, fueled by a historically widespread entrepreneurial attitude (Melis, 1989; Scarpinato, 2008). Although the geographical conditions have been strengthened and enhanced over time with critical infrastructural interventions, such as the construction of a dedicated industrial aqueduct (Bassetti et al., 2010), the presence of water, the abundance of raw materials, and the road connections favored the birth of a flourishing wool business in Prato since the Middle Ages (Melis, 1989), leading to the birth of one of the most influential Corporations in the city.

The Corporations themselves offer various points of argument, as they were associations permeated with a deep commercial culture combined with active participation in the political and social life of the medieval Italian cities (Melis, 1989). The figure of Francesco di Marco Datini, historical merchant of Prato, was a model of entrepreneurial spirit bound to inspire many generations to produce such wealth to lay the foundations of the upcoming Tuscan civilization of Renaissance.

Over time, a small and medium-sized “community of organizations” (Lazzeretti & Storai, 1999) arose, entirely dedicating to the Art of Wool, which represented the primary source of non-agricultural wealth: the wool cycle included several partial operations that eventually involved large groups of workers, allowing an extensive redistribution of incomes. For these reasons, the Wool Corporation grew in importance compared to other sectors of the economy, becoming the reason for critical future investments in infrastructure (Bassetti et al., 2010). The transition from artisan manufacturing to industrial production systems took place in the second half of the XIX century when the Fabblicone was founded: the industrialists from Prato took advantage of the innovations that shocked the textile industry by early-adopting spinners, gauze, trimmers, and mechanical calenders (Luganelli, 1992): hence the title of *Manchester of Italy* (Turi, 1992). Buying or renting those machines required a modest capital, resulting in the fast development of the district in the years between 1950-1980 (Lazzaretti & Storai, 1999). To differentiate from others and gain competitiveness, companies adopted different means of production: in this way, the district gradually hosted all the phases of the textile supply chain with-

in its reach, consolidating the ancient network of materials, processes, and knowledge.

Business-environment-territory relations strengthen thanks to the vital interactions between a wide variety of actors – technicians, experimenters, and entrepreneurs continuously. A crucial feature for the Prato district is the almost seamless integration between craftsmanship and research and development (R&D) capabilities: the “manual” dimension involved in the former ensures that there are moments of experimentation within the perimeter of the production system: in these “workshop” spaces innovation consists of the material and immaterial aspects of the product (Scarpinato, 2008), including its design and positioning, as well as quality certification and logistics services.

Subsequently, the challenges launched by the knowledge economy (Rullani, 2005) forced SMEs linked to the industrial district model to look for new paths of growth and development, suggesting the strengthening of the company’s identity and the values stemming from the territory (Dei Ottati, 2005). SMEs in Prato responded to internationalization by rediscovering in their own geographical dimension the strategic skills required to survive: exploration, learning, and adaptation. If the outsourcing practice did not occur extensively in Prato is also due to the collaborative relationships that take place among the actors of the textile value chain, as the activities of strategic importance and the processing of the garments entrusted to subcontractors usually happen within the industrial territory of the district. As a result, the district positioned itself as an exemplary model of a circular economy, gaining even more attention in light of the paralysis inflicted by COVID-19 on fashion’s globalized industry.



Figure 2. Storage of textile and finished products to be regenerated.

3.2. Genius Loci

The economy of Prato draws on an ancient cultural heritage, which has had a remarkable impact not only on the processing practices of raw materials and on the organizational models of its supply chain, but also and above all on the waste management practices.

Today recycling techniques are increasingly researched, but, in Prato, they correspond to a long tradition of care for the environment. The recycling attitudes of Pratesi is more of a vocation rather than a choice dictated by the tasks of the moment, as they are historically known to draw wealth even from scraps. Thanks to this attitude, Prato grew from a village to become the third-largest city in central Italy (Turi, 1992). The transformation of available resources has historically represented a significant development opportunity for

the Prato district, affirming its presence on global markets with its peculiar “regenerated” industry: a model capable of re-producing a yarn starting from waste from the textile supply chain, from packaging and, mainly, from “rags” which are available in larger quantities.

The nickname “capital of rags” has its roots in ancient times, when in 1512, Cosimo I Medici prohibited the manufacture of fine fabrics in Prato to protect the Florentine pannilans. The Pratesi families then specialized in the production of “rags,” less precious short-fiber fabrics on which they soon based an entire industry. In 1824 Giovan Battista Mazzoni developed the first machine for carding and spinning, starting the rags industry wherein “cenciaioli” started working (Luganelli, 1992). “Cenciaioli” are figures of enormous importance for the history of Prato, whose mastery is also cited by Baudelaire in his poems (1821-1867): their skills are the result of a sophisticated tactile experience, as the “cenciaiolo” knows how to identify the composition of the reusable rags with just a touch while testing the heaps of rags arriving in the city. Curzio Malaparte (1982) describes it well: “Prato, where everything comes in the end: the glory, the honor, the mercy, the pride, the vanity of the world.” Especially with the end of the Second World War, when Europe was in great poverty, Prato became the most critical and specialized center for the collection of rags on an international scale: vast volumes of rags from foreign exporters invaded the warehouses; the job of the “cenciaioli” was to sort them by color and material, which were subsequently used to create new yarn; after the sorting processes, more than half of the rags were then classified, packaged and shipped back abroad.



Figure 3. Prato's "cenciaioli" sorting rags by color and material.

In the past, the mastery of cenciaioli gained little appreciation and was often addressed with derogatory words because of the contact with dirt and waste. However, today the ability in recycling fabrics and knitwear scraps is being rediscovered as the successful path to apply a more sustainable economic model to an industry like the textile one, generally renowned for being one of the highest polluting industries (Claudio, 2007; Birtwistle & Moore, 2007).

4. Prato, a Circular City

The XXI century and its global events seem to demand even more urgently for alternative production models. In this framework, circular economy arose as a sustainable and feasible model compared to the linear one: the concept of regeneration envelopes its theoretical and operational processes, focusing on relying less and less on raw materials while generating better outcomes on both environments, economy, and society than the current development path (Remy et al., 2016). The textile district of Prato proves to be a successful case study as:

- it was one of the first Italian districts to adopt the circular economy model, implementing sustainable strategies in its business model;
- its specialization in the textile industry - one of the most polluting and resource-demanding in the world - is managed in a virtuous way, such as receiving several awards and recognitions over time.

The Prato textile district stands out thanks to a peculiar feature, being it the application of a circular model at a meso level: here the district's industries weave a complex network of interactions and exchanges of resources – matter, energy, by-products – enacting an “industrial symbiosis” (Ghisellini et al., 2016), triggering several economic and environmental benefits. This symbiosis in Prato takes place in one of the most wasteful industries, revealing itself capable of introducing “sustainable practices and circular economy-related eco-innovations, especially linked to wastewater management

and recycling” (Mazzoni, 2020). The district is supported by an industrial aqueduct built on a systemic scale, recycling about 4 million m³ / yr of water, a mass equal to about 1/3 of the industrial system’s needs (Bassetti et al., 2010): it is the first implant in Europe by extension and recycled water capacity (Confindustria Toscana Nord, 2016).

A virtuous circle of eco-innovation has been triggered and consolidated over time thanks to the availability of infrastructures, the reuse, and network culture, and the geographical proximity: this same circle is thus strengthened by a series of initiatives infused with a deeper meaning in the current context of growing sensitivity towards the global and interconnected nature of contemporary challenges, which cannot be managed without collaboration. The Italian Recycled Textile Association (ASTRI) brings together about 160 companies in the sector – from textile workers to old “cenciaioli,” from raw material traders to finishing products traders, clothing artisans, and wool millers – and proposes to “defend the past by trusting the future”, undertaking a circular approach with time and environment thinking about next generations: any wasted resource represents a cost to the economy, whether it is physical, or abstract, with repercussions on the environment and society. The different forms of pre-COVID activism today acquire an even stronger momentum, starting a virtuous circle of bottom-up and top-down practices to trigger and encourage consumption education, greater awareness, and behavioral shifts.

Rifò, a Prato startup founded by Niccolò Cipriani and Clarissa Cecchi in 2017, ranks among the initiatives with the most sig-

nificant resonance: specialized in the production of cashmere and regenerated wool garments, Rifò records substantial reductions in the use of resources in its production processes: 90% of water, 77% of energy, 90% use of chemicals, 100% of dyes and 95% of CO2 emissions. Skilled craftsmen from Prato produce the final garments thanks to the “calata” artisan method. Moreover, the Chamber of Commerce of Prato promotes the registration of labels such as “Cardato Recycled” and “Cardato” to certify products of excellence, assessing the commitment to pursue high quality in products resulting from the recycling of textile materials or virgin fibers: particular attention is paid to products’ life cycle since the earliest designing stages. Both labels require the satisfaction of specific criteria, such as production within the district, output realization with at least 60-65% of carded resources, and the monitoring of the environmental impact in terms of water, energy, and CO2 consumption. Moreover, Prato hosts numerous events of national resonance, such as Recò Festival, an annual event that gathers three Tuscan districts to promote an even more circular economy. This activism is part of a larger project, Prato Circular City, promoted by the European partnership of the Urban Agenda on the Circular Economy: a homogeneous production district strongly characterizes Prato, making it particularly suitable for a complete transition to circularity.

5. Conclusions

Even in times of crisis, Italian local production systems have “invented” their own way of producing and competing on international markets based on a convergence of constituent elements (Micelli & Rullani, 2012).



Figure 4. *Rifò*, regenerated wool result before spinning.

The peculiar Italian production model makes use of “the flexible intelligence of micro-entrepreneurship” (Micelli & Rullani, 2012) based on the proactive and innovative use of cultural resources and local know-how.

The crisis enacted by the global pandemic has exacerbated previous markets rules and pushed a meaningful momentum for districts and businesses, which are now starting a phase of experimental reactivity, giving a sign of an exploratory strategic and vitality (Rullani, 2005; Corò & Micelli, 2009). What kind of economies and businesses will the New Normal bring? If all the models adopted so far seem to be strongly questioned, what will it take for companies, people and territories challenged globally to gain their presence in the post-crisis world?

Italy provides several reasons to question these issues, first of all its “anomalous” capitalism made of small business working in traditional sectors strongly anchored to the territory, which seems to offer the basis for some “driving ideas”, stemming from those “immutable features” (Cianfanelli et.al, 2018) that Italian districts prove to possess: the recovery and enhancement of quality artisan traditions and their deep connection with the territory once again seem to help coping with the radical changes suggested by the New Normal.

Such change can be framed in the renewal of the local-global dialogue that should not be limited to Made in Italy, but whose analysis appeared relevant to the contribution as it suggests some good practices for alternative production approaches. Here, in fact, the flexible intelligence of micro-entrepreneurship manages to embrace change by outlining a

space in which the global and the local merge by the networking of specific knowledge deeply connected with the territorial context and the collective intelligence (Micelli & Rullani, 2012) held by the community of making.

In this moment of profound transformation, it is therefore even more significant to carry out case-by-case analysis for the fashion industry (Caniato et al., 2012) presenting the case of Prato as an exemplary case of circularity in textile production, achieved by re-inventing its own traditional production processes resulting in what Aldo Bonomi (2012, p. 86) addresses as “re-made in Italy”.

In conclusion, the analysis offered by the contribution might constitute an important starting point for the replication of these circular economy-related eco-innovations in other industrial clusters, especially in textile ones, characterized by similar resource consumption patterns.

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Product & Textile Design Interventions on Circular Sustainable Systems

Enabling Coherent Projects that Preserve a Balance within their Context

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Abstract

This paper aims to share methods used in design education, where new models of textile design have been developed by first recognizing “circular sustainable systems”. In the Huasteca region of México there are indigenous communities dedicated to textile production, they work in a circular sustainable system. The main characteristic of the system is that it shows a carefully developed balance of production using resources directly from its territory. This balance is usually reached, as in nature, with lots of years of molding needs and resources until it all comes together as a sustainable system. One of these communities was then used as a scenario for design students to develop new projects. The sustainable system allowed them to comprehend the cultural richness and the carefully balanced inputs and outputs of a community dedicated to silk: craftsmanship, knowledge, resources and their equilibrium established a different framework. The awareness of the circular sustainable system translated into interventions, co-design practices and participatory design, developing strategies for sustainability and circularity and coming up with textile products that supported and echoed the community’s already culture-rich crafts and designs. Starting in a circular sustainable system scenario, designers are encouraged to grasp the value of balance and sustainability, which leads to design only when the understating of the system fosters innovation from within.

1. Introduction

The objective of the following work is to communicate a methodology where the resolution of complex or wicked problems through products has a framework within a circular sustainable system. Where the ability of designers lies in recognizing the main elements that allow the equilibrium of the system so that they can participate in it and intervene without altering their balances, which is an ever more important skill in design students.

A general impulse that drives young people to study design is their desire to generate innovative, disruptive ideas, as part of their own search for identity. To make something in order to become someone (Anderson, 2014). But the grand majority of these ideas emerge from decontextualization, hence they are not linked to a concrete reality. Mainly with textile clothing and products. When the design ideas are developed without looking at the surrounding conditions and limits, it tends to become some sort of superficial solution or one that hardly contributes to the recognition of problems, which makes solving them much more arduous and difficult.

It would seem then that an essential aspect of design is that it is sustainable, however, our reality shows that much more often we overlook everything around us when we have to come up with projects intimately linked to their context. How can we bridge the extreme poles of desire and aspirations to create with the limits of what is necessary and possible to make? Thinking about the sustainability challenges resulting from our behaviors of creation, use and consumption of goods has been introduced to the curricula in design schools. But we have taken a theoretical approach rather than its practice and

repercussions, for that reason, we decided to incorporate a design practice, where we mixed the interest of design students in textile products but within a specific context, a community of silk workers who had a specific history and was in a continuous production, the craft of silk. This community had somehow managed to overcome many obstacles and had already take advantage of the whole production process in a complex circular system considered as a circle where the beginning and the end meet.

This paper aims to describe the importance of contextualization in design, as a first step to understand the value of sustainability in production processes. Then we will explain what we mean when we refer to a circular sustainable system, and the case study of the Santa Anita community where we were able to collaborate with design students in a project involving textile and product design, concluding with several considerations on what we can learn from this experience.

2. Designing according to the Context

Industrial design and product design have always been questioned by their sustainable approach or their lack of. The way in which a design object is created is to locate the solution inside a productive reality, that consequently leads the solution to become not only a single product but a series or a production run. Seems logic to solve that particular problem to several people, and eventually scale it up to an industrial level. Gloomily this does not necessarily is the start point from a sustainable vision. What happens to that product once it solves that problem? to what extent does the object really solves a problem if later will creates another (Walker, 2006).

In these cycles, products are called to consider whole processes not only one ended (from the cradle to the grave) but sustainable cycles capable of being renewed (from cradle to cradle) offering a method in which objects and products can be used whilst maintaining the balance of production and demand. This balance is rarely achieved on the realm of products but is a widely spread condition in our environment (McDonough & Braungart, 2002).

Designing according to a local context sets up a realistic scenario where we can find complex problems and where design intervention is not only relevant but necessary. But most contexts exceed in complexity since the factors that determine these balances are not easily spotted nor the changes or repercussions that are triggered when these factors are altered. In nature, all ecosystems are complex systems resulting from hundreds or thousands of years of iterative design and trial and error (Thackara, 2006). That is the main reason why many projects and products that at first glance seem to be good ideas end up having a damaging or even devastating impact in their environment when their scale and context are not taken into consideration and they are just industrialized and commercialized massively.

However, the methodology to design congruent and sustainable products in complex systems goes much further than applying already established tools such as Life Cycle Design or Life Cycle Analysis in products or just their materials. The relationship between existing problems and possible solutions, no matter how sustainable and eco-friendly they may be, do not guarantee flawless success in the complex system

in which they will begin to operate, even more so in the long term, they can unleash much more counterproductive factors that are not so obvious at first.

When the environmental variable is introduced into the design process, design becomes a more complex activity (Vezzoli, 2016), and it not only happens with design but with most disciplines faced with the challenge of developing sustainable projects. These ever more complex challenges demand systemic technological, social and cultural changes that in turn will call for innovations.

And despite the overwhelming complexity, the responsibility to take into account these complex scenarios and, above all, contemplate their level of interference when proposing new products in partially known contexts is and will continue to be for the designers. There must be a paradigmatic change in sustainable design, not only with the development of methodological tools to guarantee the product's sustainability and impact, but with new design practices and concepts.

Sustainable is often understood as just an attribute of the object and its materials, but truly sustainable considers the product within its context.

So much of what travels under the various headings of 'design for sustainability' focuses on the design object itself -the materials form which it is made, the amount of energy embodied in it, its ability to be recycled, and so on. Now, these things are significant, but they do not ensure that a contribution to 'sustaining ability' is being made by the object. This can only happen if the object being designed is overdetermined by the design of the relations in which it is to be situated. (Fry, 2018, p. 187)

3. The Circular Sustainable System

The circular sustainable system is a complex system with specific attributes that theorists such as Carlo Vezzoli, John Thackara and Michiel Schwarz have studied in their writings and methodologies. The way to visualize the circular sustainable system is through a gradual approach to the system in order to understand its ramifications and its core factors. It is a shift from a research-to-do methodology, recurrently starting by making or designing, to a more cautious method of first recognizing and acknowledging the system within all its complexity and then to design for it, always as a process of improvement, but in a responsible way deeply interconnected with the context that is about to be intervened upon. Some sustainable systems that surround us have characteristics that design is increasingly considering as qualities, such as localism as an attribute not only as a geographical location, the value of sharing among members inside a community, their level of connectivity and interdependence based on cultural values and shared visions and also dimensioning projects to a proportion or scale congruent with themselves (Schwarz & Krabbendam, 2013) (Fig. 1).

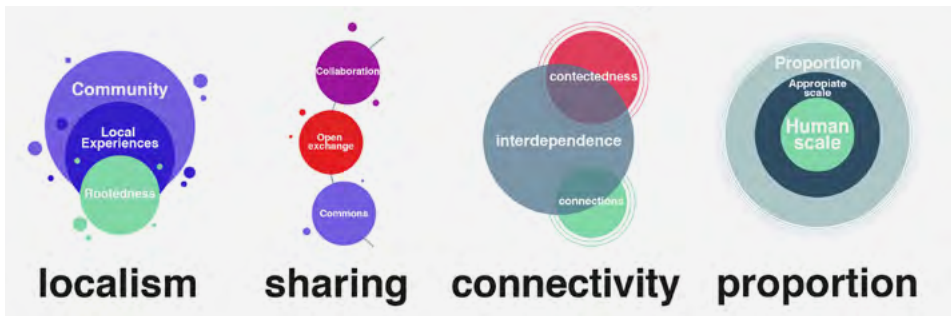


Figure 1. Circular Sustainable Systems diagram, author: gonzalezcabrero, 2020.

They then become circular sustainable systems when these attributes are manifested with variants linked to the longevity of the system. The more these variants have been acting upon a system, the better the system have had a developed balance. We can find clear examples linked to nature and the environment, like removing and then re-introducing species to a contained ecosystem, communities and environments where all its organisms have found the balance within the system to guarantee its sustainability, not as a productive demand but as an ecosystem in balance.

This approach of intervention is not something new in universities and design schools in Mexico. Due to the strong link between design practice and context some design teachers have developed these participatory design practices in circular sustainable systems collaborating with rural communities, starting from a scenario of theory and knowledge but always following up with an immersion experience in the context. A notable framework comes from Architect Oscar Hagerman, who in addition to being a professor at various design schools including the Universidad Autónoma de San Luis Potosí (UASLP), has surely strengthened the intervention and co-design approach.

Hagerman's work extends throughout the entire Mexican territory and one of the characteristics of his ventures is that they are born from collaboration with the communities where the buildings are located. Starting always from knowing the place, arranging work meetings where the resources of the territory are listed, both material resources as well as knowl-

edge of the community and even the cycles and availability of such resources. In this way at the end of all, the project is already intimately linked to the community, accepting it as part of them because they see it not as an idea implemented by someone but as a collective one. Schools, churches and rural hospitals tailor-made by the community, made with materials such as clay, wood and natural fibers coming directly from the territory and shaped by processes and techniques deeply engraved in the local culture is a new way of making architecture, an architecture made by everyone and for everyone (Hagerman & Vera, 2014).

This way of gradually recognizing the complexity of the system and only after identifying part of its complexity then propose design interventions, is what has inspired some of the methodology and design work carried out in the industrial design program at the UASLP, as an effort to educate design students on their important role while designing in complex systems. As part of their formation these industrial design students have a subject called Context Workshop in their sixth semester, where the main goal is to understand the relations between design and context, and its where we provide a circular sustainable system scenario for them to understand and design upon.

4. Textile and Product Design Interventions in Circular Sustainable Systems

The following case study started with an approach by professors and students of the Industrial Design program of the UASLP, who have contacted the community of Santa Anita in Aquismón, a municipality located in rural central México known as Huasteca.

This activity was conducted for academic purposes; however, it is backed up by design research carried out continuously by professors in the Huasteca region. Their research individuates material resources of a certain region and the local transformation processes from the perspective of the local inhabitants themselves. This is why, a key aspect that acquires relevance, is to recognize the very system that we call circular, which can be represented as follows (Fig. 2):

- First: the precise time in the right place, connecting with the context by collecting various stems, branches, leaves and recognition of the condition of the environment and its continuity.
- Second: the transformations that reveal materials, which means learn the processes to prepare and set up the materials to obtain their best qualities of flexibility and workability.
- Third: the dialogue with materials and processes, this dialogue consists of an application of different techniques in diverse materials as a permanent exploration of procedures culminating in utility elements or objects.
- Fourth: contemplation and use, meaning coexistence and consumption of textile products in the everyday life to evaluate their function and success.
- Fifth: prolonged time of use in a relocated place, reuse and/or readjustment of objects for the next stage, iteration and improvement design process.
- Sixth: when the end meets the beginning, development dis-use scenarios of textile products and their reincorporation into the environment.

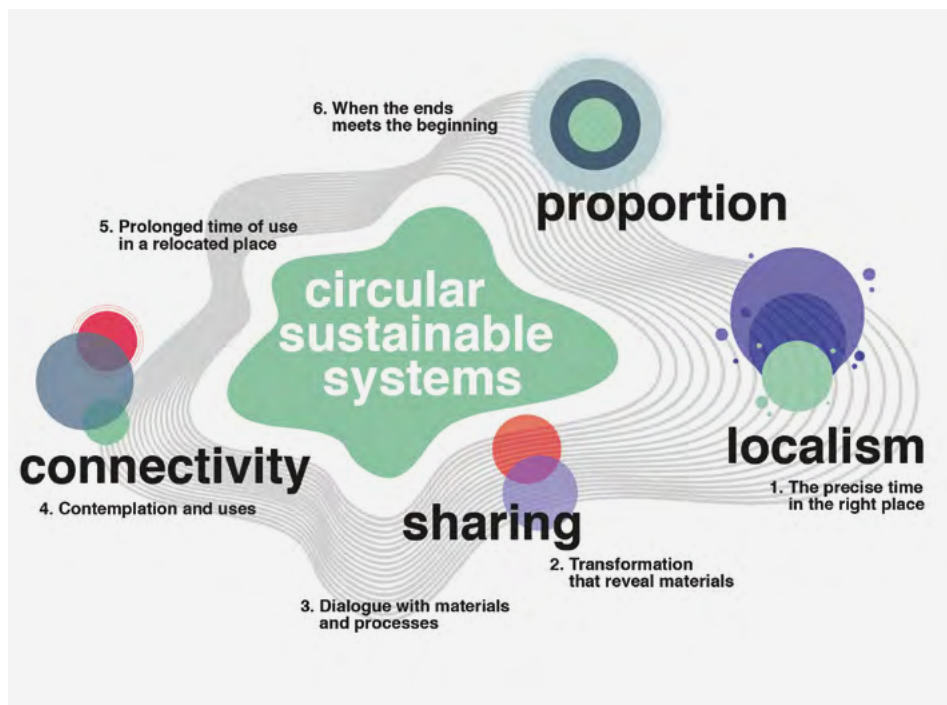


Figure 2. Circular Sustainable System methodology and implementation, author: gonzalezcabrero, 2020.

The path chosen was one where students could approach the knowledge of this circular way of living with the environment, it implied that is the community itself who adopts the role of instructor and the students are the ones who grasp experiences and knowledge. So, it was necessary for the students to live among the community in that environment. Thenceforth the resulting design of a textile product was a response to that dialogue between the possibilities of resources and the requests that arise from the activities where the designed object was used. The aspirations to accomplish this balance allowed students understand how their design proposal could be part of that circular sustainable system.

5. Santa Anita's Community, a Circular Sustainable System

This project starts from a paradoxical condition. In 1979, as part of a networking program between the governments of Japan and México, the cultivation of the silkworm *Bombyx Mori* was introduced to the Huasteca region in the east part of the state of San Luis Potosí, and various communities in this region were trained to produce silk.

The logic that led to this intervention was to provide silk as a raw material to another region of the state called Santa María del Río, where since the 19th century there is a strong tradition of craftsmanship knitting the rebozo, a long flat garment, very similar to a shawl, made entirely from silk. The rebozo is a feminine garment that covers the upper body, head, back and arms of women (Salinas, 2011). The production territories are linked in a vision of commercial exchange between two distant regions, where one is the one that cultivates the resources and the other, who can transform the material into a finished product.

The inhabitants of the Huasteca and in particular the municipality of Aquismón, where 64% of its population is Tenek,¹ are not only growers of materials, their system is circular, as they are also producers of a large number of textiles (Rocha Valverde, 2014) that have been constitutive of their native culture (Fig.3).

1 The Tenek are an indigenous community located in the Huasteca region of central Mexico. They are a branch of the Mayans and have established a particular culture strongly linked to their environment rich in water and biodiversity.



Figure 3. Tenek community of Santa Anita located on Aquismón, San Luis Potosí. A tropical weather located in central rural Mexico; region known as Huasteca.

Although the warm climate of the place favors the growth of the blackberry tree that feeds the *Bombyx Mori* silkworm species, obtaining the silk thread of a certain quality also requires special care and adequate tools.² Thus, far from being able to cultivate, produce and self-consume their own silk as raw material to incorporate it into the textile products that they know how to make and have a strong tradition in making, they only became suppliers of silk cocoons.

The Santa Anita community still practices sericulture or silk farming, but only as a secondary activity, because a large part of its day is occupied by self-consumption agriculture. They raise and grow the silkworms to the stage where they become cocoons, which they sell to a third-party intermediary who boils the cocoons and spins the silk for sale (Fig.4).

² The control of temperature, humidity, times and cleaning of the worms, the cocoons and the mulberry plant itself, guarantees the contribution of starch so that the strands are formed and reach up to 1500 meters in length in each cocoon.

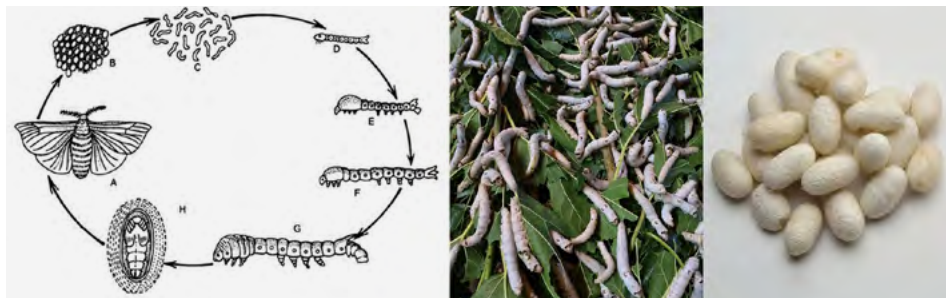


Figure 4. *Bombyx Mori* silkworm lifecycle, feeding from blackberry leaves, silk cocoons. Photos: gonza-lezcabrero, 2017.

What strongly propositioned the scenario as a circular sustainable system is how Santa Rita's community reincorporated this production cycle to their own cyclical conception of transformation, since a principle of sustainability is to recognize that everything that surrounds them is a limited resource. The community grows its own silkworms, and the way in which they retrieve new cocoons is what led to the reconstitution of the system.

Every year at the end of the incubation season they keep a certain number of cocoons in order to become butterflies, but when they hatch and leave the cocoons, they break the silk filaments in order to become butterflies. Those cocoons can no longer be unrolled and used as silk; however, they have found a way to use parts of the silk cocoons by designing earrings and jewelry, which they eventually commercialize. By not seeing these cocoons as garbage or byproducts, they recognized in them their potential as a new resource to create. And this scenario also allowed interventions at this stage of the creative process, a dialogue connecting their craft, their work and design (Fig.5).



Figure 5. Obispo family, part of Santa Anita's community and their jewelry and earrings made from silk cocoon shells dyed with artisanal pigments. Photos: Gabriela Trejo, 2010.

It was then a matter of recognizing that cycle together, they explore different processes to transfer the preform of the cocoons, which is a volumetric oval, to concave planes, to curved lines, which would open the imagination to textile products for other complementary accessories to clothing or jewelry, but above all to identify the best way to express the perception of their environment. In this way the designed textile products would be more profitable, fairly recognizing the community's work and craft in an equitable way.

Students then were also able to recognize the circular sustainable system of that group, because they realized to what extent they could design brand new objects, since they shouldn't radically change the market where the community was already commercializing their products and couldn't use more cocoons than the ones assigned, mainly because the community would

not release more butterflies than necessary, by spoiling more cocoons, they wanted to maintain the annual production cycle. This is how the students finally grasp the idea that the design of sustainable products has to do with keeping in balance the values of the system: locality, sharing, connectivity and the scale of production. In addition to considering that with the passage of time and the system's own evolution other ways of balance may appear.

Some of the results are shown below, all of them included a parallel work by design students and silk farming artisans documenting the natural fiber dyeing techniques (to be able to reproduce them), combining them with color palettes that, although they responded to new trends and coloring, were also tones extracted from the locality (Fig. 6).

There was also an extensive user research detailing which kind of consumer was buying the Santa Anita's products previously and what other products could match its lifestyle, for that reason accessories such as handbags were proposed that complemented the existing products of the community like jewelry and wallets.



Figure 6. Dying artisanal process and experimentation on silk cocoons for color trends in handbag collection. Design: Alejandra Terán, 2018.

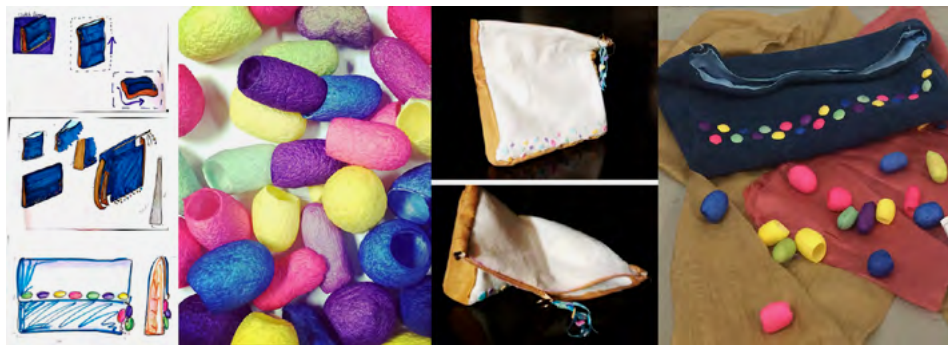


Figure 7. Sketches, 1:1 mockups and final product of a clutch cotton hand bag decorated with custom colored silk cocoons. Design: María José Vergara, 2018.

Teams of craftsmen and students developed new complementary products, such as bag collections with a clear objective: that possible new customers could appreciate the diversity and expressive unity of these textile products made only with a certain amount of hand-dyed cocoons (Fig. 7).

In this way, the scenario that at first was contradictory because silk as a raw material had been introduced externally to the Tenek ecosystem of the Santa Rita community, became a circular sustainable system when the sericulturists and silk farmers themselves found in the residue of the cocoons a new resource to recreate their imaginative skills and materialize it in textile products. Meanwhile design students were able to participate, while they understood the main factors that allowed the balance of this productive condition. The relentless search of new ideas in a frame of participatory design for the benefit of all actors involved was the main axis of the collaboration, meanwhile maintaining the coherence of the project: to create using only the right amount of resources, being aware of the context and without altering the circular sustainable system.

6. Conclusions

For designers, but especially for design schools, creation must be and usually is important. But from a sustainable starting point, the recognition of a proposed scenario and its limits helps to understand the design process situated in a given context. Methodologies such as transitional design, participatory design, and even speculative design, whether creating dystopian or utopian scenarios (Porritt, 2013), help to understand design as an act of reflection, then creation. In this case, when design participates within a circular sustainable system, it helps the students to recognize and cherish the balance that has been established and to tackle it in a gradual approach, trying to understand this complexity and, above all, recognize their responsibility as designers, when designing new projects and products.

Frequently, circular sustainable systems can be found in small communities whose main way of living is self-consumption agriculture. The complexity given in the relationships among all elements that constitute a territory can be widely affected by the work of the population that is also part of the territorial identity, however, the link is so close that reciprocity becomes an indispensable practice to live in harmony.

The design of textile products that each of these communities make are filled with identity traits from their locality, of a culture that values time, cycles, balance and even limits on its resources. They take advantage of this scenario and materialize it in elements of high aesthetic expression such as clothing, accessories or jewelry.

Sharing these creative experiences between the communities in the Huasteca region and design students has generated empathy and mutual acknowledgement, resulting in open feedback on what is proposed, what can be done, and what can be marketed and become part of the clothing or textile goods, even for other community that could acquire and use the textile products, incorporating them into their own circular sustainable system through new reflections and new searches.

A final conclusion would be that, just as there is a great interest of a maker generation to do and build for the simple fact of being able to do it, there is also a growing desire embedded in the new generations to do things in a more effective and better way. Countless publications, contests, projects and initiatives are based precisely on the desire to design increasingly sustainable products, fashion, textiles, not only in their configuration but in the entire extension of the projects.

Designers are agents of change and are asking themselves more frequently and incisively what it is that design can do in the face of these challenges (Lier, 2018). New generations of designers are seeking to be that agent of change and these interventions can help them understand the full potential and responsibility of design as a discipline.

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Unlocking Competitive Advantages in Sustainable Namibian Fashion through IK, Indigenous Materials and Design

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Keywords

Kalahari Wild Silk, Indigenous Knowledge, Sustainability, Design.

Abstract

A variety of sustainable fashion trends as an economic and ethical concept from the design and consumer perspective through sustainable materials and production processes to the product face challenges worldwide.

Sustainability is an approach for design and development processes pinpointing not only on environmental but also social, and economic factors, whereby significant global improvements are seeded in the minimum waste and slow fashion production. The colonial and apartheid eras forced the replacement of not only indigenous materials but also knowledge and designs. At times the heritage classified as “primitive” and “backwards” was dismissed in urban Namibia. However, the impact of “Negrophilia” (1920), a short-lived appreciation of African designs, later African Renaissance and current global fashion trends implemented the new dynamics around African indigenous materials, knowledge, and designs, whereby African and Western designs cross-fertilized each other.

This paper outlines several contextual sustainability concepts mapping possibilities of utilizing lived experience embodied as a re-contextualization of indigenous designs, knowledge and materials to unlock competitive advantages in the Namibian’s emerging fashion economy.

1. Introduction

Africa is seen as a cradle of humankind. The oldest proof of human decorating themselves comes from Africa and is presumed to be 100.000 years old (Gosine, 2006). Fashion design is one of the oldest forms of expression and communication, reflecting the development of humanity through design, a culture of creation reflecting wisdom and intentions of society's ancestral being (Hamalwa, 2012). This article will attempt to discuss sustainable fashion design with the hope that indigenous resources and knowledge can be seen as catalysts and advantage in implementing changes in the growing Namibian fashion industry.

In Namibia, the fashion design industry is very young. Over the years, industry growth is noticeable. Traditionally, indigenous attire was linked to natural resources. With time, traditionally eco-friendly tanned leather became replaced with cheap synthetic fabrics and polyester products, questionable in sustainable fashion enhancement.

2. Namibian Heritage: Tangible and Intangible Culture

People of Africa have had a distinguished relationship with their attire and ornaments for centuries (Hamalwa, 2012). The reconstruction of the historical path would help understand Namibian fashion's evolution from as far back as when it was first recorded. Beautiful Palaeolithic figures painted or engraved, some 26.000 years old, represent unique, historical documentation, giving clues about traditional Namibian attire. One of them, *White Lady* (Brandberg), is more than 2.000 years old. The rock painting presents a San hunter in traditional attire (Breuil, 1955).



Figure 1. *White Lady*, Brandberg. Author's own photo.

The colonial and apartheid-era inhibited traditional costumes and forced the replacement of indigenous materials, knowledge and designs, dismissing them as “primitive” and “backwards” in urban Namibia. The appearance of “Negrophilia”, a short-lived appreciation of African designs, enforced the new dynamics around African indigenous materials and knowledge, besides the global fashion trends, whereby African and Western designs cross-fertilize each other. Archer-Straw (2000) explains that for Picasso, African arts were “conceptual sophistication”; Brancusi valued the “conceptual simplicity” of African designs that he understood through the affiliation of arts and rituals (Archer-Straw, 2000, p. 137). Since Picasso’s “African moment”, many fashion designers from Yves Saint Laurent, John Galliano, to Jean-Paul Gaultier

and others have offered African fashion aspects in their portfolios, embracing “cherry-picking” from African arts. Gradually African designs became the inspiration of fashion trends (Pirotte et al., 2005). This inspiration was so strong and desired that it became cultural misappropriation, especially by fashion designers. Eventually, the African Renaissance and the decolonizing fashion re-contextualised lived experience embodied in indigenous knowledge (Hamalwa, 2012).

2.1. Sustainable intangible culture

According to Benneh (1996) sustainable development is not simply a question of managing resources (Okigbo, 1996). Sustainable development “is a strategy that regards the cultural heritage as a baton in a relay race handed down by the ancestors” (Wienecke, 2005, p. 58).

Indigenous knowledge (IK) is a diverse multi-layered concept passed through generations in a specific ethnic group and their geographic boundary. It follows a natural learning process where “nature is the centre of knowledge based on material culture, and evolutionary response to sustain” (Islam, 2012, p. 284).

IK is also a way for controlling waste. In industrialised societies, humans get jostled around with modernity and lose the strategies to adapt to the environment. In the consumerist paradigm, waste came into existence with inventions of non-degradable materials. It is the proof of social degradation, alienation from nature where, in traditional culture, nothing is “waste”. In this case everything is used, re-used, consumed and absorbed until it merges with the organic earth (Rodríguez-Martínez, 2010).

Today, the interest is growing to re-discover ancient techniques to secure the industry's sustainability. "Design is becoming hybrid: different disciplines mix and turn into a new one", explains Li Edelkoort, world well-known trend forecaster and the keynote speaker (Edelkoort, 2012). Therefore, the current generation duty is to ensure that the IK circularly transfers into a sustainable future (Wienecke, 2005).

2.2. Sustainable Tangible Resources

After global analysis, it is not uncontroversial that indigenous resources might be seen as a catalyst for sustainable fashion apart from traditional Namibian knowledge. Leather is often not considered an animal-friendly product because it is made from animal skin. However, in Namibia, the hide used to make leather comes from animals raised for their meat in a very ecological environment or from sustainable hunting controlling the food chain. As the industry claims, in that sense, it uses a by-product. For instance, the traditional vegetable leather tanning requires skilled artisans and has been a knowledge cultivated for generations, commonly used in ethnic attires. However, today is almost forgotten.

Swakara Karakul sheep bred present in Namibia since 1907, recently published a booklet, *Swakara – Sustainable and Resilience in Africa* (Swakara, n.d.), manifesting the social-economic sustainability of the company by following United Nation 17 Sustainable Development Goals (SDGs) fulfilled by 2030 (Munyai, 2014). Skirts, bangles and headdresses made from leather are decorated with beaten copper, shells, ivory, seeds, wood, bones, beads.



Figure 2. “This photograph was taken by Alfred Duggan Cronin in 1936 and shows the incredible headdress, e kori, of a married Herero woman in Namibia. Small hand-beaten metal beads are sewn in rows onto the cup, and ‘petals’ of shaped leather are sewn onto the top. Bands of slightly bigger beads are worked together to hang down the back” (Crabtree & Stallebrass, 2002, p. 31).



Figure 3. Author's own design. Model: Maria Hiwilepo. Photograph: Sigi Kolbe.



Figure 4. Swakara sheep's eco fur, 2021. <https://www.swakara.net/sustainable-fur>.

Bead making is a long-standing tradition based on skill derived from indigenous resources and designs and still present in Namibia since ancient times. For instance, the copper smelting and working were done by Damara Smiths (Goldbeck, 2012). The oldest *tuyeres* used to smelt and produce the metal beads have been found along Okavango River, are dated back to 840-50 AD.

Himba and Herero people create bangles of solid copper iron and brass, spiral bangles of solid copper iron and brass. Himba women also add anklets made out of metal beads and neck ornaments out of copper wire and solid metal pieces. Metal cartridges beaten flat are in use for decorations in Oruwanda headdress and Ohumba necklace.

Kwanyama women wear overskirt decorated with ostrich eggshells beads (*omutobe*) that consists of about 30 to 50 strings ostrich shells beads. *Ekipa* (a button) was made out of elephant ivory; today, instead of using ivory *Ekipa* is created out of ani-



Figure 5. Kwanyama women wear overskirt decorated with ostrich eggshells beads. *Ekipa* was made out of elephant ivory. *Ekipa* was made out of elephant ivory, worn by Kwanyama women on a leather back belt (Scherz et al., 1992, p. 49).

mals bones. It has got a striking design that survived for centuries. Lastly, Kalahari Wild Silk comes from the moth *Gonometa Postiga* dry cocoons collected in central east Namibia.

The breeding of Swakara sheep, leather production, bead making and collecting Kalahari Wild Silk creates a livelihood for local people in one of the world's harshest climate, not requiring additional land or resources for sustainable production (Torbitt, 2013; Swakara, 2021).

3. Kalahari Wild Silk

Kalahari Wild Silk Manufacturer (KWS) is a small factory in Leonardville, Namibia. The *Wild Silk Project* was initiated in 2001 by the NGO CRIAA SA-DC (Centre for Research Information and Action in Africa, Southern Africa-Development and Consulting). According to Saskia den Adel-Sheehama from CRIAA SA-DC, Ian Cumming and Dave Cole as the technical advisors, who understood silk as a natural fashion-forward fibre, harnessing its potential as a sustainable endeavour (2021, May 10).

KWS is an eco-friendly natural product that enhances the welfare of the animals and humans in Namibia's inhospitable areas. It comes from the moth *Gonometa Postiga* dry cocoons that inhabit south-east Namibia and the cocoons are harmless for wildlife. The region is populated by humans farming livestock, their animals while grassing feed on them. Once the animals swallow cocoons, cocoons expand in the animals' intestines, resulting in severe rumen impaction or death.

Thus after the *Gonometa Postiga* larvae pupate, the cocoons are collected. In the past, farmers burned them after seasonal collection; today, they can profit by collecting and selling

them to KWS. Through controlled harvesting and processing, the factory creates an eco-friendly, biodegradable product (Torbitt, 2013) aligned with the consumer shifting to perhaps more expensive but healthy fashion-forward.

Post-development or African Renaissance allude to the inclusion of indigenous knowledge and cultures. The production obeys responsible consumption: collecting, cleaning, thread extraction, spinning, dyeing, air drying and weaving are carried out by hand, without chemicals and minimum electricity use. The KWS community project primarily consists of Damara ethnic group. It creates jobs for women in the rural community, where working together on the handicraft is part of their tradition. In the past, their indigenous aesthetics involved leather. Today, colourful cherishing fabrics scraps are interwoven in beautiful designs.

3.1. Sustainable Design through Re-adapting of Cultural Model

The KWS project is an example of “design beyond form”, creating a positive and sustainable future. It is a design for togetherness characterised by sharing probed skills and experiences. An individualised community presents the social cohesion, sense of healthy belonging that builds resilience and helps develop solutions collaboratively to overcome the challenges. For instance, after the death of the KWS funder, the community tried collectively to run the project (Tjihenuna, 2013). “Indigenous science is participatory, fostering dialogue between humans and the rest of nature. It is a life-long task” (Wienecke, 2005, p. 57).

To be classified as a long lasting design, KWS ought to be re-created through the design thinking process.



Figure 6. Cloete Annatje (designer), Carmen Beriah Van Wyk (model), Nama patchwork. Author's own photo.

The long-term solution might be a marketable strategy and re-interpretation of old styles aligned with the Classic and Recurring Fashion Cycle phenomena. Fashion that always remains on the rise stage and never becomes obsolete.

For example, Coco Chanel Brand draws inspiration from its inheritance, reinterpreting its signature styles endlessly. Successful fashion design in commercial terms provides what consumers want. If a product sells well, a detailed reworking of the design takes place.

If the product fails, it will be unlikely to re-appear on the markets (Jackson & Shaw, 2001). Following current sustainable trends, with the moderation of technology, design and some details, the consumers will not get tired of the appeal cherishing the quality of the textile.

3.2. Kalahari Wild Silk and Global Sustainability Production Standards

Today in the West, there is a paradigm shift in production. By learning from past experiences based on practice knowledge, many fashion companies reflect in retrospection and take responsibility to develop a better sustainable future. (Matevosyan, 2014). From the conference, *Textile Tomorrow Summit* hosted by Aalto University Helsinki (2019) based on technology transfer and education became clear that globally, the mainstream fashion industry constantly tries to align with sustainable norms even though the pathway to sustainable fashion faces lots of challenges.

Globally, the eco-friendly fibre in a garment doesn't always translate into a sustainable product.



SUSTAINABLE FASHION

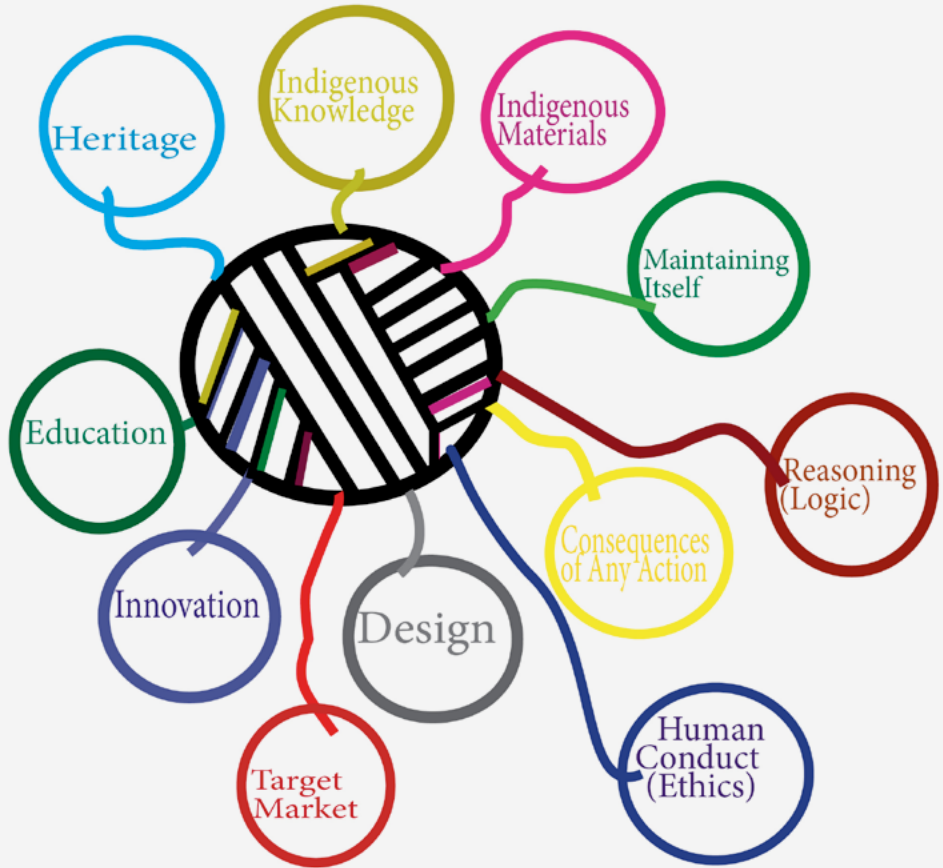


Figure 7. Graphic of the possible indicators of Sustainable Fashion.

The indicators of sustainable fashion such as Maintaining Itself, Consequences of any Action, Reasoning (Logic), Human Conduct (Ethics) are vital since everybody has to bear the repercussions.

Most of the development approaches have their origin in the West. Economic development and industrialization are among the leading causes for the current state of none sustainability (Wienecke, 2005).

Good On You (GoY) is a well known sustainability rating platform for fashion. Their vision is comprehensive ratings to empower consumers to know the impact of brands on the environment, labour and animals and be free to make conscious choices (*Rating brands on the issues that matter*, n.d.). Following the sustainable phenomena of the *Good On You* and global indicators, it appears that Kalahari Wild Silk community dynamics glories a meaningful eco-design.

1. Maintaining Itself

GoY – Accessibility – Consider each material issue

The factory eliminates the menace posed by the KWS through controlled harvesting and using it in the slow production process. The textile is durable therefore has a long life span quality of recycling ability (Ecostandards, n.d.).

2. Consequences of any Action

GoY – Efficiency – Impact across the product lifecycle

As mentioned, KWS comes from the moth dry cocoons. The dry cocoons are attractive for grazing domestic animals, but they are also deadly to them.

Therefore, the project collaborates with local farmers who are selling the collected dry cocoons to the project instead of burning them, as they had done previously.

GoY – Relevance – Impact on the environment

The cocoons are not processed with any toxic chemicals. They are cooked for an hour to separate the fibres; the water is recycled. After that, silk yarns are separated; they are span, dyed, and finally hand woven, all by hands. To eliminate hazardous chemicals, water-based dyes, natural pigments from plants - quite often indigenous, are used. Consequently, the textiles have got no microplastic. Therefore, the carbon footprint is minimal (Ecostandards, n.d.).

3. Reasoning (Logic)

GoY – Transparency – Consumers have a right to know

The information about the production process is on their website and the “green label”(Ecostandards, n.d.). Apart from that, visitors have a chance to tour the project. Members of this community project are keen to explain the production process and share obstacles and successes.

GoY – Truthfulness – Provide users with data that is accessible

The data is collected to provide information that the project does not cause any harm to the environment.

4. Human Conduct (Ethics)

GoY – Governance processes – workers’ compensation

What is not sustainable at the project is labour. From the very beginning, the project faced a fair wages problem,

primarily because of the distinction between the developed and developing world. As a part of adjusting the sensitivity towards workers wellbeing, new measures might readapt human needs, keeping in mind that we ought to support those who protect the ecosystem. Globally, similar ethical challenges appear frequently when involving workers in the rural area. It seems that from the very beginning, the women involved in the project didn't make a large amount of money. The explanation was that considering that they live in a remote area of Namibia, they can sustain themselves and their families and secure their children's education (Tjihenuna, 2013). Also, there is a lack of a proper governance system. The partnership between the community and local authorities should strengthen by clarifying the continuously debated ownership of the project. Self-leadership skills should be review.

As a market strategy combined with the production of added value products could be a buster for human sustainability as the project. Fashion Revolution Week (FRW), under *Good for You*, came about after the collapse of the Rana Plaza garment factory in Bangladesh on 24 April 2013, which killed 1.138 people and injured another 2.500. Over the years since the tragedy, Fashion Revolution has become a global movement, pushing the fashion industry to clean up its actions (Rating brands on the issues that matter, n.d.). The goal of FRW is to help eco fashionistas all over the globe be part of production transparency by finding who made their garments and what substances are hidden in them by following hashtag *#Who-MadeMyClothes?*, *#WhatsInMyClothes?*, on social media.

FRW will focus on three key areas: Rights, Relationships, and Revolution. Human rights and the rights of nature are interconnected and interdependent; we are part of the wider living world, and our right to a healthy environment depends on the health of our planet. COVID-19 has prompted growing numbers of people to reassess what's meaningful in their lives (Rautuier, 2021).

3.3. Shortcomings

As Namibia is a developing country, creating a new sustainable brand might surface in a more substantial magnitude, spirally slow down the production, and limit the quality and the business growth. Many shortcomings emerge for the KWS project can't be easily overcome: low prestige of rural life, limited business management skills, financial risks, ignorance, and finding the target market that stops more profitable living in this rural harshest climate. Over time several organizations, such as among other Spanish and Finish Embassies, contributed their assistance. Their overall objective was to align KWS with *Vision 2030* (Silk project improves standard of living, 2012). The supports were deemed necessary. However, the question begs if their role was not a "first aid bandages", covering temporary deeper entrepreneurial structural problems since Namibia was not ready for promoting the *Vision 2030* model of industrialization (Wienecke, 2005). Personal views of the project participants, management, local government and the stakeholders created constraints on running this enterprise. Due to the remote location, communication between the parties caused prolonged decision-making.

At times marketing tools and measures were inadequate. Namibian climate is scorching in summer or quite cold in winter, though for a very short period. Considering KWS wool-like current spinning qualities and the continent's hot climate, the thread in its current form is not very marketable in Africa. Therefore, KWS was displayed at a trade fair in Europe. However, at those fairs, the buyers expected to source more significant quantities. On the other occasion, KWS was exhibited in Botswana, the country that also produces wild silk.



Figure 8. Kalahari Wild Silk green label.

Each crisis tested the project's abilities to mitigate and reinvent its adaptation skills. Today the situation has worsened. The global COVID 19 crises cut off tourism to Namibia, which created a tremendous unexpected challenge that neither governments, companies or communities were prepared to handle. Like many businesses globally, the KWS project has found itself struggling to stay afloat, worrying about the uncertain future.

3.4. Sustainable Eco Design

In 2012, an attempt was made to create a KWS garment collection. The volunteer designer, Beata Hamalwa, conducted the workshop to up-cycle and re-design KWS production rejects and defected goods.

Considering that the KWS designs are rudimentary, the project has to deal with its quest for a better product through design and intervention.

The discourse of the definition of “design” term has a long history. However, the “design” is a multi-layered activity; its ambiguous meaning and role are debated in the contemporary world for decades. Today the “design” is put in a perspective of challenges of economic growth and sustainable development. Above all, the design is influenced and controlled by social economics and environmental dynamics.

Zhiqiang and Sotamaa (2011) point out that “design” is not just about beauty and individual happiness. It can also enhance the quality of life and create optimism about the future and the reason for human existence. Similarly, “design” is hope for improving the development towards sustainability that can secure economic, ecological, social and cultural benefits.

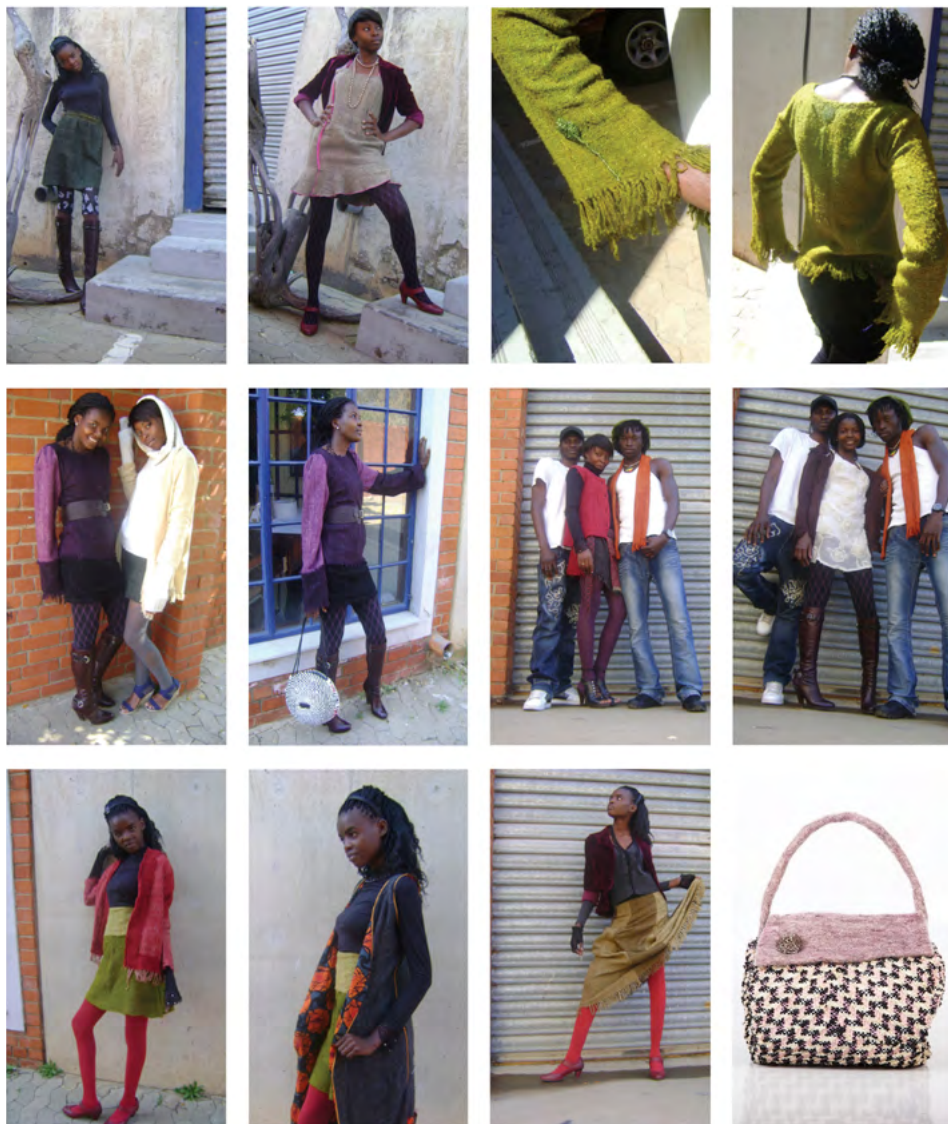


Figure 9. Author's own KWS 2012. Models: Albertina Shatimwene, Fiina Nghifikwa.

Perhaps it should be looked beyond the “form” even though the form is the base of understanding the design. Consequently, “sustainable design” based on indigenous society is a design focusing upon interrelation, interaction, rooted in the culture, and human behaviour passed through generations, preserving eco-friendly processes and identify in developing countries. In communities like this, creating a sustainable future through transparent production and slow fashion feels more relevant than ever, because without disturbing the harmony between the man and nature, community works with full participation (Tji-henuna, 2013), rewriting the indigenous community back into the narrative through uplifting the quality of life.

The focus on design, practical aspects, procedures and solutions might line up new developments to market KWS and directions so the product can meet the client desires. KWS fabric can stimulate creative ideas and vice versa (Udale, 2008). Currently, KWS is used to produce scarves and throws, but it can reach its enormous eco, long spam design potential if re-designed with a reinvented version.

4. Conclusion. The Emergency of Education

Putting these conclusions KWS might be an example of a competitive value-conscious market, whereby the textile reflects timeless trends. The timeless fashion trends don't imply acceptance by everyone but only by those who understand them. What's more, the slow production in small quantities might give designers more room for creativity and innovation. In case of a high price, the item may be not widely sold but may remain considered the most desired. With time the KWS designs might increase in popularity and be recognised by fashion trendsetters.

Given its organic quality and longevity, hopefully, KWS will never be rejected.

In the Namibian context, one has to look at how the geographical and political circumstances create a business vacuum.

However, it is worth pointing out that innovations are not developed in a vacuum. Perhaps this is a time for re-innovation to foster resilience. Considering that the KWS project operates in a vacuum, outside assistance might help to build the growth. Engagement and investigations can refine the design through an educational framework by exploring, visualizing, reflecting, re-creating and communicating (Matevosyan, 2014). Islam (2012) explains that achieving an effective design outcome can be reached through education based on understanding the production process, materials, sustaining business activities, and profit from a commercial application.

Following Rautuier (2021) and the *World Hope Forum*¹ events, conferences, exhibitions, workshops, and even online public demonstrations, spreading the word about building a more ethical and sustainable fashion industry might be a good start. Proposing new measures such as; re-discussing design thinking for a unique design potential and re-establishing new technologies should be encouraged as a solution. Followed by entrepreneurial learning positioned in sustainable production, it should be a novel direction, creating a roadmap for change. Finally, considering benchmarking on a complementary project such as following the hashtag *#WhoMadeMyClothes?*, *#WhatsInMyClothes?*, under GoY on social media for transparency and marketing tools that might bring financial stability.

1 www.worldhopeforum.org.

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NEW/OLD FEATURES

Scenarios: Strategic Tools for a Reflective Fashion

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Abstract

Future has always been an essential dimension to fashion. However, recent practices in trend forecasting seemed to pull the future itself away from fashion, generating a tricky paradox where external issues – given by global challenges – and internal tensions – outlined by relentless market rhythms – clashed feeding fashion's unsustainability.

The pandemic event marked a point from which the next steps towards the future have to be thought of carefully. Thus, fashion firms need to develop new approaches to tackle global challenges, heightening their awareness of change and sharpening their visions thanks to a more reflective attitude towards distant futures.

By analyzing how the fashion industry has been mastering the short-term horizons lately, the contribution aims to investigate the role and the responsibilities of forecasting practices in fashion, especially when it is intended to inform and give consistency to marketing strategies. Broadening the interpretation of forecasting through the lens of future studies, the paper aims to further the discussion on the potential paradigm shift to a fashion forecasting, where scenarios as tools to re-direct and re-tune social and environmental sustainability could offer support in the construction of new systemic strategies while building social narratives.

1. We Went Way Too Far

The pandemic has disrupted society and markets, forcing governance models and industrial systems to face an urgent transformation. Such urgency resonates particularly in the fashion industry, in which several topic moments - ranging from Alessandro Michele (2020)'s digital diaries and his “we went way too far” confession to the open letters from fashion designers all over the world - unveiled a shared awareness about the ills of fashion system, exacerbated by the health emergency and its humanitarian, ecological and economic consequences (Niinimäki et al., 2020). However, while the shock suffered by the fashion system is enormous, the call for a more sustainable fashion appears to be still mainly addressed with an industry and user-focused approach, examining narrow questions regarding how industry may shift practices or how users may engage with fashion differently.

Indeed, several scholars have advocated the need for more sustainable fashion even before current times (Birtwistle & Moore, 2007). Despite its limited reaches, the trend for a fairer fashion was gradually supported by many forms of activism - ranging from the “fashion revolution” (Ditty, 2015) to the *Anti-Fashion Manifesto* (Edelkoort, 2015) -, aimed at raising awareness about the necessary reformulation of fashion's industrial models. The growing interest in what is addressed as “sustainable fashion” implies the need to deal with a broader, systemic issue which cannot be genuinely achieved without a systemic understanding (Tham, 2015) and taking into account recent radical shifts in consumers' expectations towards a more transparent and responsible fashion (Amed et al., 2020).

Therefore, beyond the activist agendas shared by both fashion designers and consumers, addressing the common goal of sustainability means coping with a high degree of complexity. In this sense, longer-term approaches should be preferred in place of short-term and overly deterministic ones in order to heal the interplay between society and markets. In other words, addressing the core issues of fashion's unsustainable production and consumption rather than its symptoms calls for a shift in focus towards the meaning of future in fashion and the activities, the *futuring* that goes with it.

Today, sustainable, responsible and transparent fashion gains strength and depth, becoming more and more pressing as the pandemic harshly shortened the time span for such transformation. Narrow questions to be answered in quick times: fashion – as well as many other human activities – is going through a process of paradigm shift that appears to be extremely hard since it seems to be “stuck in a self-reinforcing cycle of short-term thinking” (Fisher, 2020, p. 10): actually, short-term thinking showed to be the most efficient way to respond to a world shaped by turbulence, uncertainty, novelty and (Ramirez & Wilkinson, 2016). This framework appears to be quite significant for the fashion system, whose constant and natural exposure to contradicting demands led it towards anticipatory and forecasting approaches to manage the most immediate dimensions of future, so that it progressively shrunk into a near-time reality (Frohm & Tucholke, 2020). Recently fashion has undoubtedly been mastering forecasting as one of its core strategies in terms of optimization and risk management (Lantz, 2018).

Today such practices turn to be in a critical spotlight, generating a tricky paradox, in which external issues – given by global challenges – and internal tensions – outlined by relentless market rhythms – clash, pulling future *tout court* away from fashion.

Nevertheless, as long as uncertainty surrounds almost every aspect of life and work, favoring the rise of dynamism and new opportunities, fashion firms need to develop new approaches to tackle this very uncertainty, heightening their awareness of change and sharpening their visions thanks to a more reflective attitude towards distant futures.

This contribution aims to investigate the role and the responsibilities of forecasting practices in fashion, especially when it is intended to inform and give consistency to marketing strategies. By broadening the interpretation of forecasting through the lens of future studies, this paper aims to further the discussion on the potential paradigm shift of future thinking through scenarios as tools to re-imagine, re-direct and re-tune social and environmental sustainability, offering support in the construction of new systemic strategies while building social narratives.

2. Fast Action is not Reaction

Fashion's need to respond to increasingly volatile desires and needs slowly led marketing to engage vigorously in its processes, not without side effects (Edelkoort, 2015) on the whole system - here understood as both an industry and a force of change and creativity.

Managing everchanging desires led to a natural focus in trend forecasting, which quickly became a widespread practice to

achieve an anticipatory and, thus, a more competitive positioning. Such behavior kept fashion designers from focusing on broader horizons, thus disregarding creative narrative building. If from a commercial perspective this meant having strategic cycles too focused on short time frames, from an artistic perspective fashion designers lost their aura and their top-down influence.

Traditionally, fashion trend forecasting was done by fashion designers themselves through a human-based process (DuBreuil & Lu, 2020), where the artistic, cultural and societal viewpoints on current events were the main way to sense or predict future trends and create something original and unique. Creativity was at the core of such processes, but it would soon be looked at as “ ‘opinionated guesswork’ due to designers’ tendencies to rely on their ‘gut feel’ to predict trends” (Frohm & Tucholke, 2020, p. 1). The growing unreliability of inspiration-led practices established another dedicated profession, trend forecasters: in fact, they slowly acted as tastemakers and cultural intermediaries (Lantz, 2018), assisting fashion designers with more structured techniques based on the increasing availability of data inputs about commercial trends and consumers’ behaviors. Here, latest technological evolution exerted massive pressure, offering powerful tools to enhance trend forecasting practices: new technologies facilitated trend information gathering (Silva et al., 2019; Park et al., 2016), impacting even on how trend information would have been generated and used. As the efforts gradually headed towards more accurate predictions, the fashion system seemed to gradually lose interest in longer-term forecasts: keeping up

marketplace – enhanced by digital capitalism – was mandatory to survive and until pre-Covid-19 era the fashion system gained more profitable knowledge from short or micro-trend forecasting. By exerting their highly influential power with both clients and consumers, trend forecasters soon became fashion’s *insurance companies*, leading to the establishment of giant agencies – WGSN, for example – in the field offering an essential support to fashion systems to anticipate trends in a fast-changing world, where fast reaction means survival.

Even though fashion is naturally “forward-thinking” and traditionally depicted as an experimental agent of change, its recent focus was actually much more restricted to a product-side innovation (Ünay & Zehir, 2012). Indeed, trend forecasting practices have been traditionally used to inspire design novelty (Evans, 2004; Cachon & Swinney, 2011; Abecassis-Moeda, 2016) within the development of fashion products. However, the extremely compressed timelines destined to materialize new concepts and visions translate into a collection of items aimed at selling the newest trends themselves. Hence, full circle: trend forecasters track new needs, fashion systems intercept them developing new products and just a few moments after the release trend forecasters track down new needs.

Today trend forecasting is perceived to be an essential service for fashion companies, as it is a useful driver for commercial competition in the fast-paced fashion market. The extreme production-consumption rhythms and the relationship between technology and demand management deepened to the point that the interest is no more “particularly in trend forecasting,

but rather in demand forecasting” (Frohm & Tucholke, 2020, p. 7) often linked to self-fulfilling prophecies (Lantz, 2018). Such shifts have been lately submitted to serious criticism, as the forecasting discipline marked itself with an inherent unsustainability: clothes live more than trends, in a way that in times of climate change the forced obsolescence of fashion products collides against the pillars of sustainability.

This resonates particularly with some studies accurately reported by Frohm and Tucholke (2020), which have already questioned trend forecasting as a limited and self-referential practice, causing several issues on entire ecosystems. Micro-trend forecasting or even demand forecasting assess the domination of marketing and commercial departments in fashion systems: the short-term approach in trend forecasting aims solely at-risk reduction as long as it has been strictly applied in marketing strategies, resulting in the thickening of fashion management myopia. Indeed, the role of trend forecasting is so influential that it can significantly determine the future of fashion (Błaszczuk & Wubs, 2018), but it needs to reconsider the need to focus on value creation more than product creation, focusing on building narratives imbued with singular and original views on society and its future shapes. Even though sustainability has been recognized as a trend itself (Frohm & Tucholke, 2020), it should be treated as a cultural paradigm shift in which trend forecasting engages in promoting ethical and more responsible values. Thus, trend forecasting as a discipline will probably need to shift to something else, starting from acknowledging its responsibility in the cycle of creation-destruction of trends and its relation to sustainability.

3. Transitioning through Scenario Thinking

Today the future in fashion appears to be split in two: on one side, fashion designers and their imagination remain the most powerful source to tell stories and build narratives through self-expression, even though they would not find place in the current fast-paced market; on the other side trend forecasting is not sufficiently consistent to draw longer-term strategies nor narratives, but it excels in responding reactively to fashion's fast-changing market.

It is worth underlining that trend forecasting is not the exclusive dimension talking about the future within fashion: as stated before, the future itself is an essential dimension in the whole fashion process. The dreaming pulse about what will happen in society has always been and still remains the core inspiration to fashion designers: by expressing their statements, fashion designers would talk about societal ups and downs, ills and treasures, allowing people to seize the future through their products and creations.

Such dimension is extremely close to speculative thinking, which today gains popularity as the pandemic event marked a point from which the next steps towards the future have to be thought of carefully. Speculative thinking is usually found in fiction and draws upon the need to explore realities of different natures: if trend forecaster needs to reflect on their responsibility about the un-sustainability of their practices (Frohm & Tucholke, 2020), such responsibility must align with current global challenges, advocating sustainability *tout court* as a core driver of change. However, as long as fashion undergoes the commodification perspective, it is perceived as inherently

incompatible with sustainability. This resonates with what design theorist Tony Fry (2009) calls “de-futuring”: coming from capitalistic environments, both design and fashion engaged in the articulated machinery of production-consumption cycles, producing the un-sustainability of this world, thus depriving it of future. Conversely, assuming “sustain-ability” (Fry, 2009) as a paradigm shift, would mean acquiring new skills to support people, social life, cultures, imaginaries and the environment, thus achieving the *futuring* effect, the creation of the future for a recovering world. Fry (2009) also points out that future cannot be understood as a reality independent of our existence: future cannot be known, but futures can be built, approached through the actions made in the present. This has been quite clear for trend forecasters, who lately ended up in exerting influence to sell the trend itself as a way to gain control over the future. However, they failed in promoting sustainability, engulfed by the market-driven machinery (Tham, 2010).

There are some approaches coming from future studies that could help fashion in “re-directing” (Fry, 2009) futures, that means challenging established ways of thinking, working and making combined with the production of both new designed objects and new design practices (Vaccari & Vanni, 2020). Thus, the practice of futuring can be understood as a way for fashion designers and forecasters together to explore alternative scenarios for the future.

Scenarios are key tools to this contribution, as they seem to be the balance and connecting point between creativity-inspired future approaches and market-driven future approaches.

A framing is needed here: scenarios – scrolling through the several definitions from future studies literature – can be outlined as stories constructed around how specific drivers of change will move in certain directions (Bradfield et al., 2005), resulting in a number of narratives usually divergent from each other. Here divergency offers a meaningful foundation since divergent techniques pertaining to strategic foresight practices – such as scenarios – do not aim to result in predictions: in contrast with trend forecasting aims, the ultimate purpose of scenarios “is not to be right, but to be ready” (Phillips, 2019, p. 22) to tackle those futures. In this sense, scenarios challenge the constraints imposed by present structures, mental models and behavioral patterns, adopting an exploratory and anticipatory attitude (Godet, 2000). As a result, the greater the variety of inputs converging into the process, the better the narrations’ adherence to the whole system: such operations will require the deep engagement of as many actors as possible to achieve successful results. This kind of practice facilitates genuinely holistic thinking about possible futures, combined with reflexivity, flexibility and democratic engagement with the values (in)forming those futures.

Literature offers few examples through which it is possible to read a growing interest in such tools: *Fashion Futures 2030* was an inspiring project led by London College of Fashion in collaboration with the Centre for Sustainable Fashion in 2019. The aim of the project was depicting what the world and its fashion might look like in the next ten years: by adopting two critical trends – care for sustainability issues and technological advancement – the project adopted the orthogonal matrix

method to explore four different scenarios resulting from the intersection of the selected trends. The four narratives (Figures 1, 2, 3, 4) talk about the relationship between fashion, nature and human action in not-so-distant futures, opening space for further discussions and reflections about alternative paths of action and development for fashion.

It is clear how such narratives could benefit from the original human-based forecasting, generating values, hopes and fears into visions about the future. This resonates with the perspective considering scenarios as strategic conversations (Van der Heijden, 2011), which are the expression of a collective vision not just on the “content of the future,” but, practically, on its foundational values, aspirations, and expectations, enabling participants to negotiate their interests. In fact, the *Fashion Futures 2030* experience was firstly presented as a co-design workshop at Copenhagen Fashion Summit (2019), proving how scenarios could be effective tools, whose adoption in fashion could foster a “re-directed” imaginative design, product development, long-term strategy building and personal development in understanding and raising awareness on the climate emergency and social injustice, brought to life in recognisable and understandable ways by storytelling media.

4. Participated Values to Get Unstuck

As long as scenarios seem to play a central role in upcoming practices of narrative building in fashion, they gain equal emphasis from a management-strategic perspective too.

The need for long-term-oriented forecasting instead of a product-oriented one intercepts a remarkable metamorphosis, in which trend forecasting enriches with scenario approaches.

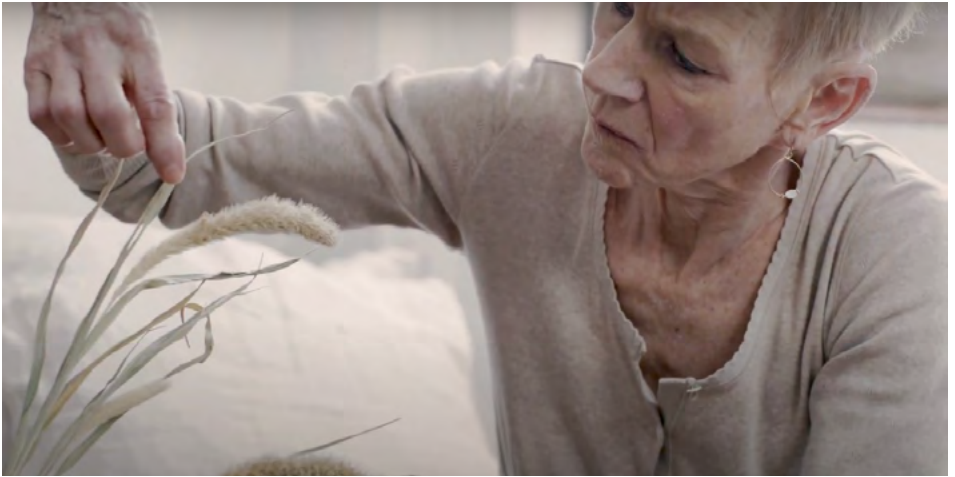


Figure 1. *Fashion Futures 2030 Scenario 1 – Living with Less.* In the first scenario clothing is treasured and kept for a long time, as well as passed down within family and friend groups. London College of Fashion, 2019.



Figure 2. *Fashion Futures 2030 Scenario 2 – A story from Hyper Hype.* In *Hyper Hype* fashion is fast, frivolous and cheap. New styles are released every day via digital runway shows and adverts by multi-brand conglomerates. London College of Fashion, 2019.



Figure 3. *Fashion Futures 2030 Scenario 3 – A story from Safety Race.* This narrative talks about a fashion driven by identity politics, heavily flavored by ethnic traditions to overcome environmental collapse. London College of Fashion, 2019.



Figure 4. *Fashion Futures 2030 Scenario 4 – A story from Chaos Embrace.* In this last scenario everyday fashion is centered around well-crafted, utilitarian garments that are kept and worn for long periods of time. London College of Fashion, 2019.

As Van der Heijden (2011) notes, “the ultimate purpose of scenarios is to create a more adaptable organization, which first recognizes change and uncertainty, and secondly uses it creatively to its advantage”. To do so, scenarios need to be informed by both statistical data and different perspectives coming from all over the system, so that it could be possible to build several points of views and, thus, develop a holistic interpretation of such data and mathematical trends. For this reason, scenarios are increasingly believed to be the tools par-excellence of future techniques since they naturally encourage collective participation (Andreescu et al., 2013). In fact, since scenarios are tools which stem from a grounded necessity of collaboration – among decision-makers, designers, stakeholders, shareholders, and experts from various fields (Schwartz, 2012) –, they are at the same time able to promote the conditions to encourage that same collaboration by triggering heterogeneous discussions about alternative paths of development (Godet, 2000; Andreescu et al., 2013).

Thanks to designers channeling creativity towards a human-centered perspective made of negotiated values, fashion stakeholders could express their own creativity, applying tacit and explicit knowledge not only in product strategies but also in the development of larger-scale programs. Thus, the fashion industry – along with its rich and plural ecosystem – is offered a new viable path to innovation by encouraging the participation in strategy formulation by all the players in the supply chain, from manufacturers to designers, from suppliers to logistic providers and, last but not least, to consumers. This framework recalls Tham’s (2015) hypotheses about trend

forecasting next shift, placing it in a tighter collaboration among trend forecasters and fashion designers in order to promote attitudinal changes where fashion and sustainability converge into the generation of new competitive knowledge: as a consequence, scenario thinking is a process about learning, negotiation, and sharing of new values producing new meanings.

In these terms, scenario thinking implies a proactive approach, which stands out as an antidote to reactive approaches. According to Kahane's (2012) theory about "transformative scenario planning," actors could engage even with greater levels of complexity thanks to its foundational processes. Specifically, the scholar distinguishes between adaptive attitudes, which ask actors to force a transformation over a given situation, and transformative attitudes, where actors transform a situation by mainly transforming themselves: working together "cooperatively and creatively to get unstuck and to move forward" (Kahane, 2012, p. 18), participants might be able to take action individually in their sector, but only if they collectively align towards a shared direction of change.

[...] by proxy. It must start in the individual. Yet, we cannot be holistic on our own. We must imagine together [...] in a place for risky and playful exploration, [...] where] an agile dance between micro and macro perspectives, and operational and strategic design take place. Scenarios then rank in fashion forecasting as strategic tools that can synergize products, systems, and even narrative paradigms. (Tham's, 2015)

5. Towards a Fashion Forecasting

Today fashion appears in need to imbue its industrial paradigms with more consistent visions about what will come after the pandemic in terms of social narratives and lifestyles to achieve a fast action rather than a quick market-driven reaction to address emergency and sustainability issues. Such “future-thinking” would benefit from an interpretation of fashion future as a way forward to shape and envision a better world, stemming from an ethical dimension that slowly translates into a moral obligation for fashion itself. Thus, fashion thinking could entwine with *futuring* practices in order to embrace all the layers of reality to overcome the global challenges of the XXI century.

Scenarios for fashion thinking seem to respond to the need of a new mythopoesis, which offers an alternative to dominant narratives deriving from current commercial framework. By assuming the “what if” posture, fashion could return in the realm of metaphors, launching an epistemological leap into a new mission for fashion. Scenarios satisfy the need to explore possible futures and develop critical views about its various shapes. Future-making practices in fashion would stem from a constructive turbulence, where scenario narratives do not run out in simple nor linear projections, but they draw articulated fictions and frictions to inspire and provoke fabulous narratives about human *happenings* and *becomings*.

Scenarios articulate as multifaceted tools able to connect and reconcile trend forecasting practices informed by mathematical models and data science with the much more imaginative

and creative practices typical of traditional techniques aimed at pre-sensing societal needs and desires. Potentially, big data tools could outline some fashion forecasts, reveal patterns, trends, and predictions in consumer preferences by leveraging the breadth and huge data available today even from alternative sources like social media. Such information will give powerful insights, starting from which a human interpretation is mandatory for them to make sense. Here, the quantitative dimension of scenarios meets its qualitative counterpart, relying on human-based forecasting practices to envision such data and the trend-scenarios outlined with a filter of interpretation – that could be compliant or consolidating, provoking, or warning. Thus, would lead to the building of new narratives, in which fashion designers could position their product strategy and upcoming creations, while consumers would engage in a coherent present, wearing products imbued with values and meaning.

An evolution of trend forecasting is thus achieved, as it embraces a broader dimension of future by drawing information from different sources, engaging with new actors and raising awareness on the dangers of an unsustainable world.

The contribution has been showing how forecasting practices have been seen under a different light depending on the *object* which was meant to be forecasted: from the classic *trend* forecasting to the *micro-trend* forecasting, down to the *demand* forecasting. This step is fundamental because it makes evident how vision in fashion – and the space for it to unfold properly – shrunk dramatically, in a way that it would have been almost impossible to face moments of emergency or

prepare for multi-layered global challenges. Thus, it would be worth promoting a *fashion forecasting*, which consists in an active practice of reimagining dressing and clothing as a tool of radical expression, resistance, and future building.

Even though fashion forecasting as an approach is receiving increasing attention in the field of fashion design under different designations, a more structured development of such approaches is still lacking in literature. However, some workshops – similar to the one previously reported – seem to embrace this theoretical and operational path to collaboratively construct an imaginative garment that confronts the issues shaking the world right now. Despite the limited literature, fashion forecasting could provide a great contribution in re-directing and re-tuning social and cultural interpretative models, in which sustainability – as a social, economic and environmental goal – drives a shift in the future forms of fashion thinking and making, dressing and stating.

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Strategies for Sustainability and Circularity: a New Value Chain for the Fashion Industry

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Abstract

The paper aims to analyse the evolution of the fashion system, particularly with regard to the sportswear (activewear) supply chain, linked to environmental sustainability, outlining some improvements, corporate strategies and alternative production models with consequences on the value chains, products and communication messages.

Sustainability is a complex issue that over the years has been enriched with new contents and key factors: from the environmental policy to the new configurations of manufacturing processes, until responsible purchasing and consumption behaviours.

The new social and cultural models, the rising of awareness and consciousness towards these issues, require companies to make coherent, effective and sustainable choices, mostly in the textile-clothing industry, one of the sectors with the greatest environmental impact. From the selection of low-impact resources, the analysis and development of product life cycle (life cycle assessment) and even the communication contents, the practices of environmental sustainability involve the whole value chain.

The paper, in the second part, focuses on these themes on the supply chain trend of the sport and outdoor clothing, one of the most involved in the change process, also considering the “natural” consumers interest in environmental problems, increasingly aware to supply system strategy that encourages a way of responsible consumer behaviors, from product design to marketing. The work is enriched by the case study of an Italian company, a leader in the global footwear and mountain clothing field.

1. Eco-Design and Sustainability Strategy in the Outdoor Apparel Industry

1.1. Sustainable Productive Phenomenon in Fashion System

There are many experiences in *fashion system* that propose new inclusive economic paradigms, partnership between socio-economic actors belonging to new value chains (Manzini & Vezzoli, 2003), which integrate the tangible and intangible component of the products (Vezzoli et al., 2014); systemic and circular production processes that follow the principles of industrial symbiosis, in which the production waste are resources for new processes (Bistagnino, 2011; Barbero, 2018); ethically and socially responsible productions evaluating the principles of equity in the availability of resources, the rules of democracy, human rights, respect for cultural identities.

Before the *Anti Fashion Manifesto* by Lidewij Edelkoort, which has highlighted the critical issues of fast fashion production, assessing social and environmental impact and effects on behavior, the environmental issues were addressed by companies marginally, through strategies lead mainly by the end of pipe approach.

Growing the perception that identifies the fashion industry as one of the main polluting sectors and the one with the greatest environmental and social impact, the company's choices and the production and communication strategies have been oriented to a redefinition of value chains and an assessment of the effects on market trends.

The recent report by Barclays denounces the impact of the business model of the fashion system, considering it “un-

sustainable” today and soon; according to Bcg and Global Fashion Agenda (2017) it is estimated that the sector will reach 3.3 trillion dollars by 2030, with an annual growth of 5%. To this increase will correspond a negative impact on the environment and according to the Ellen MacArthur Foundation, the fashion industry will consume 25% of the world’s carbon budget by 2050 (Casadei, 2020).

The fashion system industry is associated with terms such as quality, excellence, tradition, and innovation, but also with hyper-consumption, pollution, exploitation “... mistreating animals, applying unequal working and payment conditions to their employees and creating eco-style collections based on the heavy pollution industry” (Moretto et al., 2018).

Thus, the gap between slow fashion and fast fashion is increasingly wide, on the one hand, a model that enhances excellence, territorial networks, quality production, the workers communities and, on the other a model that introduces the acceleration of production, with several micro-seasons reaching up to 52 collections per year, increases textile production and distributes poor quality of products, confusing the consumer and leads to impulse buying choices.

H&M has implemented a sustainable program, *Conscious Action*, in which eco-material is used and promoted, the sustainable manufacturing manner in countries with a high sustainable consciousness is adopted, green distribution approaches with less emissions and energy use are used, and green retailing and educating consumers are promoted (Shen, 2014) (Figg. 1, 2).



Figure 1. H&M Conscious collection, *Long live fashion*, 2016.



Figure 2. H&M, *Recycling System 'Loop'*, Loop uses a technique that disassembles and assembles old garments into new ones, 2020.

Therefore, the consumer is pushed to hyper-consumption of poor quality garments with accelerated obsolescence and is unable, in most cases, to distinguish the real effectiveness of company actions in favor of the environment and the social impact of the productive process (Crivellaro et al., 2012).

The change in the economic and production paradigm, with a view of environmental sustainability, requires a synergic set of actions, implemented at different scales, and based on the creation of interconnections and relationships through a systemic approach¹ concerning the supply of raw materials, production processes, the company's commitment to the protection of workers, and no less important, packaging and logistics management (Bistagnino, 2017).

In the outdoor and activewear segment, the adoption of sustainable strategies throughout the entire life of the product, the coherence between philosophy, values and actions is closely correlated with the lifestyles of the target audience. The athleisure, sportswear or activewear phenomenon, from which brands such as *Outdoor Voice*, *Lulemoon*, *Aday*, *Girlfriend Collective*, *Patagonia* were born is supported by consumer interest in environmental and socio-ethical issues and by an increasingly widespread trend towards healthy, active and dynamic lifestyles.

1 The systemic design approach proposes, starting from the optimization and exchange of raw materials and industrial by-products of the industrial symbiosis approach, an approach based on the concept of an open industrial system (Lanzavecchia et al., 2012). As an alternative to the linear model, the circular economy aims, through systemic design, to reduce the waste of resources and transform the outputs into inputs, i.e. resources for another production cycle. Reducing waste, reviving waste, and extending the life cycle of the garment are essential features of the project in a waste-free policy.

These companies not only operate according to the logic of systemic design and design for sustainability but also convey socially responsible and ethical values responding to the growing demand generated by *eco-conscious consumers*. The commitment to these issues is perceived by these consumers as more authentic, effective, and credible.

They are informed, aware of production impacts, attentive to the life cycle of the product, and demanding on the performance of the garments.

The adoption of sustainable models, value chains and promotion strategies are clearly expressed by companies operating in the outdoor apparel segment, who are able to adopt sustainable processes and technologies, to research on hi-performances of materials, to transfer to the consumers intrinsic values linked to environment respect.

1.2. Signals of a Value Chain Reconfiguration: Actions, Products, and Storytelling

Ethical and sustainable fashion no longer defines a trend, codified by aesthetic canons and storytelling, but by the value chain reconfiguration of the fashion industry. The interest in building value chains, models, and sustainable promotion strategies has led brands to make their production processes explicit, with the aim of informing and transferring good practices for sustainable production, purchasing, and recycling.

This can be seen in the numerous digital activism initiatives carried out by brands supporting online movements, like *#WhoMadeMyClothes*, created after the Rana Plaza disaster in Bangladesh in 2013, that has mobilized 500 collaborations worldwide, involving more than 300 NGOs and cultural and

educational organizations, it has been followed in 60 countries, with more than 1800 events and over 44,000 social media posts in the last year (Fig. 3).

In the sportswear sector, many companies are working to reduce waste, recycling plastic material from the seas, or using organic material for eco-friendly fabric production.



Figure 3. Fashion Revolution, Who made my clothes? Campaign, 2018.

Ecoalf, a pioneer of the *Upcycling the Oceans* project, involves local fishermen and sailors from over 32 ports and transforms plastic waste into fabrics for high-quality products and promotes environmental responsibility campaigns, thanks to the #becausethereisnoplanetb movement, raising climate change issues awareness and replying to initiatives in other seas (Fig. 4).

The seas and oceans protection are a commitment of leading sportswear companies such as Adidas, which actively collaborates with the *Parley for the Oceans* association for the production of Primeblue yarn, used in the Adidas x Parley line.



Figure 4. Ecoalf, *Because there is no planet B* Collection, 2020.

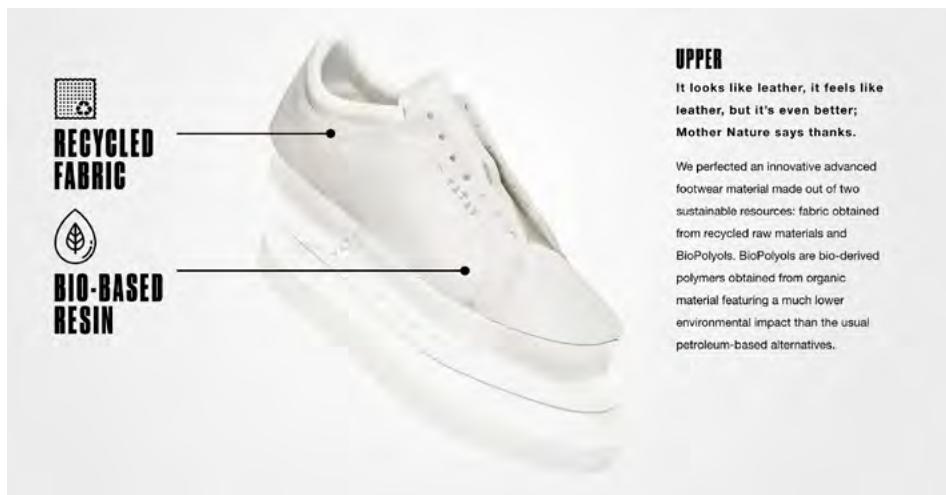


Figure 5. Yatay, *No more plastic collection*. 100% sustainable shoes from recycled fiber and bio-based resins with a biodegradable PU sole.

To make consumers aware of plastic pollution, brands such as Yatay,² on the other hand, are engaged in research into innovative bio-based materials such as wood, corn, rubber, and bio-polymers, for the production of 100% eco-sustainable sneakers. A solution for the integral replacement of plastic components, from soles to uppers, to reduce the pollution of microplastics released into the environment (Fig. 5).

Organic Basic, informs clearly consumers on environmental impact reduction of the production cycle, using the annual Impact Report, which assesses water, emissions, energy, chemicals, and waste used in new product development and in organic and recycled materials.

² Yatay, the Italian company engaged in the production of vegan shoes since 2008, supports the non-profit foundation No More Plastic with numerous initiatives, to generate public awareness about plastic pollution, advocate the need for alternatives to single-use plastic products and foster innovative solutions to invent the future of consumption.

Communicating the impact of its production chain is one of the branding strategies supported by numerous brands in the segment, which through environmental activism initiatives educate consumers, who are increasingly involved and attentive to their purchasing behavior.

The communication models are also oriented to convey the ethical and sustainable commitment through social responsibility actions and campaigns, aiming at equality, inclusion, traceability of resources and processes, the safety of environments including people.

Girlfriends Collective, specialized in ecological and high-quality fabrics from recycled materials, promotes rights and safe conditions for all workers, through initiatives that ensure legality, safe conditions, gender equality, fair wages, combating child labor. The company is also committed to supporting the #blacklivesmatter movement and organizations that are at the forefront of human rights advocacy.

Features such as the choice of organic materials, traceability of resources and production, and fair trade are the center of communication of brands such as Veja, specialized in the footwear sector. Among the production phases of footwear, the sole is the one with the greatest impact on CO2 emissions. Therefore, the Italian shoe brand ACBC completely rethinks the components of the Zipshoe™ shoe, making the sole and upper modular and interchangeable, in a system of 100 different combinations, reducing both the impact of production and transport. In addition, in a circular vision, the brand takes care of the collection of post-consumer shoes, allocating them to charity organizations for the production of anti-shock flooring for playgrounds in areas of need.

Clearly ahead of its competitors, Patagonia³ has based its corporate philosophy on values such as credibility, transparency and authenticity, constantly communicating its commitment to the environment protection. The brand's commitment to cross-cutting issues related to protecting the planet has built its competitive success, making it a pioneer in the sector. Its mission is to “build the best product, cause no unnecessary harm, use business to inspire and implement solutions to the environmental crisis”.

The company produces high-quality garments, resulting in careful construction and narration of the production sustainable process. All the garments in the Patagonia collections use only eco-oriented materials such as organic cotton, recycled polyester, nylon from post-industrial waste fibers, wool from sustainably managed farms, hemp, and TENCEL, an innovative fiber obtained from the pulp of eucalyptus trees. Patagonia also puts particular attention to microfibers release into the environment, caused by its products, and is committed to reducing pollution and plastic waste during storage and sales, with eco-oriented packaging.

The ethical approach and social responsibility are the driving force behind the company's competitive success, attentive to raising awareness among its customers, promoting the repair and recycling policy summarized in the slogan “buy only what you need, reuse, recycle or re-imagine your old garments, we will take them back or repair them”.

3 Patagonia is committed to donating 1% of sales revenues to environmental associations or organizations of activists for the health of the planet, for a total of 41.5 million dollars from 1985 to today. It has also created a digital platform called Patagonia Action Works that deals with providing funding to environmental protection organizations.

DON'T BUY THIS JACKET



It's Black Friday, the day in the year retail turns from red to black and starts to make real money. But Black Friday, and the culture of consumption it reflects, puts the economy of natural systems that support all life firmly in the red. We're now using the resources of one-and-a-half planets on our one and only planet.

Because Patagonia wants to be in business for a good long time – and leave a world inhabitable for our kids – we want to do the opposite of every other business today. We ask you to buy less and to reflect before you spend a dime on the jacket or anything else.

Environmental bankruptcy, as with corporate bankruptcy, can happen very slowly, then all at a sudden. This is what we face unless we slow down, then reverse the damage. We're running short on fresh water, topsoil, fisheries, wetlands – all our planet's natural systems and resources that support business, and life, including our own.

The environmental cost of everything we make is astonishing. Consider the R2 jacket shown, one of our best sellers. To make it required 135 liters of

COMMON THREADS INITIATIVE

REDUCE

WE make useful gear that lasts a long time
YOU don't buy what you don't need

REPAIR

WE help you repair your Patagonia gear
YOU pledge to fix what's broken

REUSE

WE help find a home for Patagonia gear you no longer need
YOU sell or pass it on*

RECYCLE

WE will take back your Patagonia gear that is worn out
YOU pledge to keep your stuff out of the landfill and incinerator



REIMAGINE

TOGETHER we reimagine a world where we take only what nature can replace

water, enough to meet the daily needs (three glasses a day) of 45 people. Its journey from its origin as 60% recycled polyester to our Reno warehouse generated nearly 20 pounds of carbon dioxide, 24 times the weight of the finished product. This jacket left behind, on its way to Reno, two-thirds its weight in waste.

And this is a 60% recycled polyester jacket, knit and sewn to a high standard, it is exceptionally durable, so you won't have to replace it as often. And when it comes to the end of its useful life we'll take it back to recycle into a product of equal value. But, as is true of all the things we can make and you can fix, this jacket comes with an environmental cost higher than its price.

There is much to be done and plenty for us all to do. Don't buy what you don't need. Think twice before you buy anything. Go to patagonia.com/CommonThreads or scan the QR code below. Take the Common Threads Initiative pledge, and join us in the fifth "R": to reimagine a world where we take only what nature can replace.

patagonia
patagonia.com



TAKE THE PLEDGE

*If you sell your used Patagonia product on eBay, and take the Common Threads Initiative pledge, we will co-pay your product's shipping for no additional charge.

Figure 6. Patagonia, *Don't buy this jacket* Campaign, 2011.

With these messages, the company continually renews customers' confidence in the brand, with campaigns such as "Don't buy this jacket" or the Worn Wear touring initiative in 2015, which repairs worn garments, extending the average life to 2.2 years and reducing carbon footprint, waste, and water by 73% (ThredUp, 2018) (Fig. 6).

The case studies reported have been selected for their approach to the project, oriented to interpret the sustainable vision of the company and to transfer it, coherently, in strategies, identity values, processes and products. From this brands overview emerges that the adoption of new communication and branding models are able to attract emerging segments of the market, still "thin" in size, but no longer niches, essential because they are young, socially active, affluent, acting as pioneer / first mover/trendsetters and seem able to inspire and guide the purchasing and consumption trends of the mass market (Wang & Shen, 2017).

In the fashion industry, the construction of a valid branding strategy, transferred to the entire communication system in a coherent manner, takes on value thanks to initiatives that convey messages configuring and

incorporating cultural elements because it is these that drive both consumption and communication and trigger the process of mutual emulation, the dynamics of 'fashion'. [...] the instrumental nature of the product dissolves in the communication of its symbolic action, assuming mainly an identity value. (Conti, 2012, p. 14-15)

2. Market Analysis, Values, and Trends in the Outdoor Industry: La Sportiva Case

2.2. Company's Overview

The single-case study selected is an Italian company, La Sportiva, a mid-sized firm which operates in the world outdoor market because it is particularly suitable for highlighting a holistic approach to sustainability, which is assumed as a core principle of corporate strategy. The case analysis allows to show how a company may adopt a real and holistic approach to sustainability, against / as opposed to the “greenwashing”, a behavior that could be defined “poor environmental performance and positive communication about environmental performance” (Delmas & Burbano, 2011).

La Sportiva was founded in Tesero, a village at the foot of the Dolomites in 1928; in the 1950s, the boom of winter holidays and the consequent increase in demand for mountains equipment prompted the company to manufacture the first ski boots. In the mid-Eighties, due to strong competition and the advent of plastic boots, the company specialized in the production of climbing shoes. In 1981 La Sportiva launched *Mariacher*, a climbing shoe that was a breakthrough innovation as well as a design revolution. Few years after, the company was the first to introduce a “ballerina”, that in a short time became a must-be for climbers worldwide.

Since then, product design and innovation capabilities have contributed to transform the company. Over the years, La Sportiva has grown up to become one of the leading players in the global industry of climbing shoes and mountain boots.



Figure 7. La Sportiva, Didier Raboutou climbing in Verdon with La Sportiva *ballerine*, 1984.

Thanks to its technological reputation, it is not only an iconic brand for the world climbing community, but also for outdoor footwear and clothing market (Fig. 7).

For over 90 years, the company had never moved its headquarters and it still produces mainly in its factory at Ziano di Fiemme, operating in the fascinating environment of Dolomites, a UNESCO world heritage site.

Company's footwear is positioned at the high-end of the market in mounting running, trekking and ski mountaineering segments. Each product is designed, developed and tested in close collaboration between R&D departments and a team of athletes (climbers, mountaineers, mountain runners, and skialpers) who act both product tester and brand ambassadors. Recently, the company diversified, entering into the apparel market with a wide selection of technical clothes for mountain running and climbing. Nowadays, it is a total look company (footwear and apparel) focused on "those who love to experience mountains at any latitude and altitude, from the professional to the enthusiast. The goal is [...] to be all for someone, not something for everyone" (La Sportiva, website). The turnover was 96 million euros in 2018, showing a double-digit average annual growth (16,6%) since 2012, and is over 80% from abroad.

Beyond its organizational capabilities, from product design and innovation technology to marketing communication, La Sportiva has been a forerunner in the sustainability policy.

2.3. An Integrate Strategic Approach to Sustainability

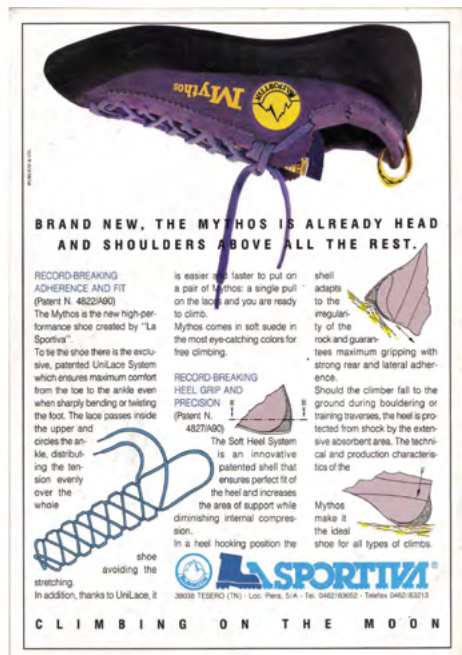
La Sportiva's strategic approach to sustainability may be analyzed by applying a circular economy framework.

Circular economy is an economy restorative and regenerative by design.⁴ As pointed out by Walter Stahel (2016, p. 435), a circular economy «would turn goods that are at the end of their service life into resources for others, closing loops in industrial ecosystems and minimizing waste. It would change economic logic because it replaces production with sufficiency: reuse what you can, recycle what cannot be reused, repair what is broken, remanufacture what cannot be repaired». The concept of circular economy is linked to other analogous approaches, as the cradle-to-cradle design model (Braungart & McDonough, 2002), the biomimicry paradigm by Janine Benyus (1997), the natural capitalism by Hawken, Lovins & Lovins (1999), and the industrial ecology (Lifset & Graedel, 2002). Finally, industrial ecology (Lifset & Graedel, 2002), by focusing on product design and manufacturing processes, views firms as agents for environmental improvement because they possess the technological expertise that is critical to the successful execution of environmentally informed design of products and processes. Moreover, it considers non-human ‘natural’ ecosystems as models for industrial activity as well as it “places human technological activity in the context of the larger ecosystems that support it, examining the sources of resources used in society and the sinks that may act to absorb or detoxify wastes” (Lifset & Graedel, 2002, p. 4).

4 Circular economy is based on three main principles: design out waste and pollution; keep products and materials in use; regenerate natural systems.

“The concept recognizes the importance of the economy needing to work effectively at all scales – for large and small businesses, for organizations and individuals, globally and locally. Transitioning to a circular economy does not only amount to adjustments aimed at reducing the negative impacts of the linear economy. Rather, it represents a systemic shift that builds long-term resilience, generates business and economic opportunities, and provides environmental and societal benefits” (Ellen MacArthur Foundation, 2017).

The company was one of the first in the outdoor and footwear industry to publish a sustainability report, to adopt sustainable development goals of United Nation's Agenda 2030, to introduce good practices in the production process, to emphasize ecological features of the products into communication campaigns (Fig. 8).



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United Nations Agenda 2030 for Sustainable Development		La Sportiva statements
12 RESPONSIBLE CONSUMPTION AND PRODUCTION		La Sportiva is committed to identifying circular economy solutions for recycling and reusing materials in production. The company creates products characterized by durability, sensitizes consumers and encourages reuse by offering a repair service to extend the life of the product.
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE		Innovation is a characterizing aspect of the industrial development of the company, which constantly introduces new products partly patented on the market. The efficiency orientation of the production process is another important asset, as shown by the conception of the new plant.
3 GOOD HEALTH AND WELL-BEING		The quality of the work environment, corporate welfare, training, health and safety at work are important issues for La Sportiva, committed to the prevention and protection of health and to improving safety in the workplace.
13 CLIMATE ACTION		The quality of the air, the reduction of emissions and the management of environmental impacts along the entire production chain are aspects that La Sportiva takes special care of. The virtuous project of re-using processing waste allows the reduction of emissions in the production chain. Emission control is also achieved through the management of home-work commuting and parking.
7 AFFORDABLE AND CLEAN ENERGY		La Sportiva is committed to increasing energy supply from renewable sources and improving energy performance. The main projects include the district heating plant built for the new production site with the collaboration of the Magnifica Comunità di Fiemme.
8 DECENT WORK AND ECONOMIC GROWTH		La Sportiva creates employment opportunities at local level, contributing to the economic growth of the Val di Fiemme, both through recruitment and through the selection of suppliers.
17 PARTNERSHIP FOR THE GOALS		La Sportiva creates employment opportunities at the local level, contributing to the economic growth of the Val di Fiemme, both through recruitment and through the selection of suppliers.

Figure 9. La Sportiva, *Sustainability Report*, December 2019.



Figure 10. La Sportiva, production plant in Ziano di Fiemme, 2018.

In 2003, La Sportiva was the first company in the outdoor footwear industry to achieve a certification UNI ISO 14001-9001, by demonstrating not only the compliance with the requirements of a quality management system, but also the respect of the environment. For some time now, La Sportiva has been using the hashtag #foryourmountain in social media and institutional communication, emphasizing the strong commitment towards sustainability, trying to engage stakeholder into environmental issues, aiming at rebuilding the relationship between human and ecosystem. Inside the Sustainability Report 2019, the meaning of the hashtag is explained as follows: “Our passion is the mountain: respecting the environment in which we operate is at the base of our activity, it is what we want to transfer to the users through our product” (La Sportiva S.p.A., 2019, p. 12).

Sustainability is for La Sportiva a fundamental driving force at the base of innovation that pushes it to look for solutions with low environmental impact and that extends the life cycle of products. The company localization and the target market contributed to develop both a social and environmental responsibility. Being far from industrial districts, with its factory literally at the foot of the mountains, and above all having among both customers and employees a lot of mountain lovers have given to the company a natural attitude to build a “green” strategy that covers the whole value chain, from product design to raw material procurement, from supplier selection to production process, from marketing to after-sales services. An eco-friendly philosophy inspires the process of new product development as well as the brand communication strategy.

The search for innovative technology, new techniques and materials is driven by sustainability principles, in order to devote ever more attention to environmental impact and find viable solutions to reduce material waste and CO2 emissions.

3. Conclusions

In-depth analysis of a company that has been among the first in Italy to explore innovative models and practices design-oriented to environmental sustainability. Its headquarters is in the foothills of the Dolomites makes it possible to observe in vivo the evolutionary process of entire ecological strategies: from the constant dialogue with the local community to eco-design practices, from the research and development process inspired to reduce environmental impact, from the selection of raw materials inspired by the circular economy to the application of the waste management tools, from the procedure of ethical and environmental assessment of suppliers until the launch of communication campaigns focused on green marketing, supporting responsible consumption behavior.

Is it possible to identify four pillars of a corporate strategy based on a holistic approach to sustainability:

- Developing new product by designing a circular value chain;
- Applying environmental management system;
- Engaging the local community.

The company invests a large share of its profits in R&D, in search for efficient solutions and for eco-compatible or recycled raw materials that combine quality and durability, with low environmental impact at the same time.

The company has introduced innovative techniques to manage environmental impact, through a risk assessment system that prevent them and react effectively if damage occurs. Moreover, La Sportiva struggles to use renewable or low impact energy sources. The heating is provided by a biomass plant.

“La Sportiva creates mountain shoes in the mountains (and respecting the mountains). The bond with the territory is not only a moral obligation but it is a real and added value opportunity” (La Sportiva S.p.A., 2019, p.28).

Social responsibility has led the family to maintain the production plant of boots and shoes in Trentino, making great effort to remain competitive despite localization at 1.000 meters above sea level, in the heart of Dolomites. La Sportiva supports many initiatives for the development and well-being of the community. Despite having achieved an international standing, La Sportiva maintains deep and embedded roots in the territory: the local economy fall-outs are among the prime aims of its work, challenging the logistical and space difficulties that such a choice may determine.

Credits

The paper is written by the authors sharing the theoretical approach and the articulation of the contents. “Abstract” and “Conclusion” are edited by F. Izzo, R. Veneziano, M. Carlomagno; “Sustainable Productive Phenomenon in Fashion System” paragraph is edited by R. Veneziano; “Signals of a Value Chain Reconfiguration: Actions, Products and Storytelling” paragraph is edited by M. Carlomagno; “Company’s Overview” and “An Integrate Strategic Approach to Sustainability” paragraphs are edited by F. Izzo.

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Fashion-Oriented Bio Textiles

The New Speculative Aesthetics of Biocouture

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Abstract

The paper investigates some recent manufacturing processes of biohacking and synthetic biology applied to the fashion textile sector, comparing their laboratory practices, intentions and appearances.

By linking heterogeneous knowledge in a transdisciplinary vision, the paper analyses their potential, combining case studies, processes, and arising aesthetics. In this scenario, the laboratory practices are configured as open study processes, oriented toward a new way of conceiving fashion manufacture, perfectly integrated with the planet's ecosystems.

Among the most interesting aspects, new forms of awareness, intimately linked to the nature to which humankind belongs, emerge, pushing the designer to the role of a catalyst of a sustainable and multispecies vision.

Through an analysis of case studies, the contribution finally reflects the rise of an aesthetic-sensorial paradigm: the formless. All biomaterials and dyes deriving from living organisms seem to relate to this aesthetic category since they lead to a different conception of shape, color, and substance.

In contrast to a classical aesthetic perfection, biomaterials and bio textiles often reveal textures that are dotted, shaded, imperfect, anti-hierarchical, opaque, unpredictable, and for this reason, they shake the viewer, destabilizing him.

The contribution aims to promote an investigation into fashion-oriented bio practices connecting transdisciplinary knowledges to fascinating aesthetics for the consolidation of new fashion imagery.

1. Rethinking Textile Fashion Sustainability

The planetary crisis concerning the survival of many living species due to the industrialization of human activities, which is pervasively affecting the balance of nature, does not leave the fashion industry indifferent. On the contrary, it is deeply involved, both because of the profound co-responsibilities it represents and concerning the potential role it could play in restoring these imbalances.

In accompanying the lives of human beings, clothing is probably among the most widespread consumer goods that people buy around the world, but the frequency of purchase has changed radically over the centuries. In relation to what was previously consumed by each individual over a lifetime, a study by McKinsey & Company shows that the number of garments produced annually has doubled since 2000 and exceeded 100 billion by 2014 (Remy, Speelman & Swartz, 2017). A statistic that, if reported on the numerical value of the population, shows how many garments, sometimes in excess, each individual owns.

The textile industry's impact on the environment is devastating and is determined by three main types of pollution: air pollution, solid waste, and water pollution. Concerning air pollution, the clothing industry accounts for 10% of the world's CO₂ emissions through the release of harmful substances such as nitrogen oxides, sulfur dioxide deriving from the energy production phases, volatile organic compounds (VOCs) produced during coating, drying, coloring, aniline vapors, hydrogen sulfide, chlorine dioxide produced during coloring and decolorization.

On the other hand, about the quantity of solid waste, the global textile industry throws about 90 million garments into landfills every year where, in addition to the actual clothes – unsold or discarded – all the processing residues also end up, such as fragments, fabric scraps and production waste.

Finally, water pollution invests almost all stages of production – such as washing the fabric, bleaching, coloring, and washing the finished product – in the continuous release of highly harmful substances to the environment such as formaldehyde, chlorine, and heavy metals which, absorbed by watercourses in high concentrations, are responsible for about 20% of global water pollution. Another problem emerges from the release into the environment of waters not decontaminated and rich in microplastics that, in the case of synthetic fibers, they continue to be released in subsequent washes.

In the light of these brief premises, it is clear that a different approach to the production, consumption, and disposal of textile products is urgently needed. It is a behavior required not only by natural ecosystems that are now rebelling but also by consumers themselves, who are increasingly sensitive to these issues. In addressing these critical issues, the role of fashion designers and manufacturers is becoming crucial. In reversing these trends, a variety of virtuous practices are emerging, including upcycling of materials, biocouture, and biodesign for sustainable fabrics and dyes.

Through these new practices, the fashion processes, tools, and production materials are beginning to be rethought according to a different ethic and aesthetic, more akin to nature and its regenerative modes.

The biodesign trends associated with biocouture, in particular, lead to forms of awareness intimately connected with the living ecosystem to which humankind belongs together other forms of life, pushing the fashion designer to the role of catalyst for a renovated sustainable vision.

Different corals, different people, different populations are involved, together and for each other. Either prosperity will be cultivated as a multispecies responsibility, without the arrogance of the celestial gods and their emissaries, or the biodiverse Earth will slip into something extremely sticky, like any overloaded complex adaptive system that no longer has the strength to take one insult after another. [...] We are all lichens. (Haraway, 2016, pp. 86-87)

2. Biohacking and Growing Textiles

Starting from 2000, the growing access to the web and technological information, the transdisciplinary overlap, the exponential convergence of scientific knowledge, the spread of independent DIY Biology and biohacking practices are just some of the causes that increasingly intersect project, technology, and nature. In the most advanced textile design laboratories, the production paradigm is evolving towards a new horizon of living manufacturing. It is a research scenario on the borderline between biology and technology, where fashion envisions and experiments new interactions with the concept of living organism and its genesis processes, according to a hybrid and intercrossed design perspective.

Among the pioneering experiences in this direction, in 1997, Martin Margiela was one of the first designers to collaborate

with a Dutch microbiologist to cultivate parasitic organisms on clothes from previous collections - from 1989, when he founded his atelier, until 1997. Exhibited at the Boijmans Van Beuningen Museum in Rotterdam, the collection saw 18 dresses in white, cream, and grey color grades in wooden cases and plastic film, presented in their decadent and transitory beauty (La Maison Martin Margiela, 1997).

They result from a combined action between man and nature, aimed at a total dissolution of the garments. From a conceptual point of view, the mutations that living agents were able to trigger in the external environment - such as germination, sedimentation and colorings - characterized the clothes in unexpected ways and were intended as evidence of the passing of time and life.

More than a decade later, in 2012, the exhibition *Bio Design. Nature, Science, Creativity*, organized by MoMA in New York was one of the first international exhibitions curated with the intention of collecting and cataloguing such experiences to explore “an emerging and often radical approach to design that draws on biological tenets and even incorporates the use of living materials into structures, objects, and tools” (Myers, 2012, pp.168-171). By involving organisms at every scale, such as plants, bacteria, algae, fungi, the designer radically transforms the use of the object into a different kind of intellectual experience, taking on the role of mediator of collaborative research.

Among the research, we find many experiments on microbial cellulose, which consists of a new type of skin made by bacteria, whose image is as intriguing as it is repulsive.



Figure 1. *La Maison Martin Margiela*, Rotterdam 1997.



Figure 2. Suzanne Lee, *BioCouture* in microbial cellulose, 2010.



Figure 3. Carol Collet, *BioLace*, London 2013.

It is a biological substance of very ancient origin but has only recently been rediscovered by contemporary design. Through a special treatment of cultivation, drying, and finishing, Suzanne Lee has made it her trademark, then directing her research to the foundation of an agency called *BioFabricate*, focused more generally on the new frontiers of bio-industries.

We can build our world differently. Advances in biotechnology enable us to move away from factory farming, intensive agriculture, and fossil resources to produce the raw materials for a more sustainable material world. Sectors such as fashion, sport, wellness, mobility, interiors, construction are all embracing materials and ingredients derived from microbes. *Biofabricate's* vision is 'Our material world. Built with biology'. (Lee, 2020)

Among the most critical bio textiles researches, in this perspective, we remember Sonja Bäumel's fabrics, Oron Catts & Ionat Zurr's artificial leathers, Naja Ryde Ankarfeldt's microbial skins machines, Carole Collet's laces, up to the most recent fungi leather by Officina Corpuscoli, Bold Treath's synthetic spider silk, and the cow stomachs leathers by Studio Billie van Katwijk.

The constant increase of these design experiences reveals how synthetic biology (Ginsberg et al., 2014) and biohacking can represent research impulses of extraordinary interest for the fashion sectors. The modality of transmitting this knowledge and the sharing of scientific protocols and procedures is accelerating the speed at which these innovations occur. Hacking a previously closed and regulated system,

deconstructing it and rebuilding its rules, these designers work as biohackers (Delfanti, 2013), breaking down wetware and forms of life, working with plants, small organisms and organic waste. Everything is shared online within the community and reconnected to what already exists, activating a virtuous circuit of open innovation that democratizes the relationship between designers, citizens and science.

Although adhering to international protocols prohibiting experimentation with organisms or substances that are dangerous to humans or ecosystems, the handling of living substances, however, highlights a whole series of ethical and philosophical issues. It is “life” that is the main object of the laboratory, and in this sense, organisms such as cells, bacteria, algae and plants become the material around which artists, designers and researchers are faced. “When art and science meet, unique connections arise. Scientists focus on factual knowledge production, whereas artists give meaning to this knowledge by connecting it to ethics, philosophy and aesthetics” (Evers, 2014, p. 3).

In the field of biocouture, for example, the reproductive character of cultivation processes is not pure standardized repetition but a continuous co-creation work that generates, thanks to the uniqueness of the natural element, always new and singular outputs. The use of microorganisms and natural substances, mixed with other organic materials, produce fabrics compliant with very high levels of biodegradability and compostability and according to parameters in line with the current principles of circular fashion.

From the analysis of these practices, it is interesting to observe how the designer looks at nature and its symbolic component in a dissimilar way from the pure scientist. Diversity consists mainly in a re-elaboration of meanings, processes and aesthetics from an artistic and sensitive point of view. Nature is interpreted in its double humanistic-scientific quality, and it is investigated as a process tool to redesign more sustainable production systems. The potential deriving from these researches is enormous, both for the ability to bring designers closer to the great themes of scientific research and for the possibility of building new fields of action in a shared way.

Expressing a sensitive design vision related to the deep relationship that exists between all living organisms, including human being, Ettore Sottsass give us this dreamlike image:

One day, I brought home a mysterious object, a kind of half- dead, dry worm, and forgot all about it. Then a wonderful insect came out of the dry worm, all green and wet with a stinking liquid, and I gradually realized that it was a grasshopper. I also realized that I was witnessing the inscrutable enigma of all life on the planet. Life is not born in perfume but into stinking liquids. (Sottsass, 2010, p.42)

3. Fashion-Oriented Bacterial Dyes

The ability of specific bacteria to generate pigments capable of dyeing fabrics is worth investigating, considering the urgent problems of environmental pollution caused by the textile industry. It could highlight how these productive biological systems could offer an attractive sustainable alternative.



From the analysis of bacterial dyes tested by independent researchers and designers – such as *ColorFix*, *Living Colour Collective*, *FaberFuture*, *Pila*, *BioShades* – it is possible to observe how these microorganisms, cultivated in a few days on agar plates or through different synthetic biology processes, can give back a wide variety of colour perceptions. For the vividness of the tones, among the most interesting bacteria, we can consider *Serratia Marcensces*, *Janthinobacterium Lividum*, *Vogesella Indigofera*: microorganisms that can be used both for dyeing natural fibers such as silk, wool and cotton, and some synthetic fibers, such as nylon, for example (Yildirim et al., 2020). These bio dyeing processes are all inside a certain biosafety level (BSL 1) and with a quite simple practicing, always using the right level of attention and cleaning, they can be explored in different ways. Their explorations, indeed, generate colors and textures, as unexpected as they are fascinating, as well as being extremely advantageous, from an economic point of view, compared to the already well-known dyes derived from plants (Graz et al., 2015). By a controlled manipulation that governs the tissue quality, the type of microorganism, the incubation the temperatures, surface and duration of cultivation, it is possible to obtain different color gradients, generating a singular aesthetic, the result of an interaction that is each time unique and living-based. Among the most interesting researches, we can examine some that differ in technology but lead to similar results, in terms of aesthetics, colors and intent.

Founded in 2016 in Norwich, *Colorifix* uses a synthetic biology technique that involves the sequencing of DNA, determining a specific natural color from an animal, plant or microbe.

The color is transferred into an engineered microorganism, which is later fermented by a fermentation process fed by sugar molasses, and multiplied in such a quantity that it can be used efficiently on large surfaces. According to the company's founders, with this technique, it is possible to obtain dyeing at 37 °C on both natural and synthetic fibers and a considerable reduction in water consumption (10 times less than the commonly used water). Confirming the high degree of innovation, among the various partners who have invested in the brand, we find the Swedish H&M group.

Based in Paris, the *Pili* company, on the other hand, adopts sophisticated biotechnology combined with the use of ancient fermentation processes, using enzymatic waterfalls to transform raw materials into textile dyes. The basic idea is to integrate enzymes into bacteria that are subsequently grown in bioreactors where sugar acts as the primary energy source.



Figure 5. Ginkgo Bioworks Laboratories, London 2020.

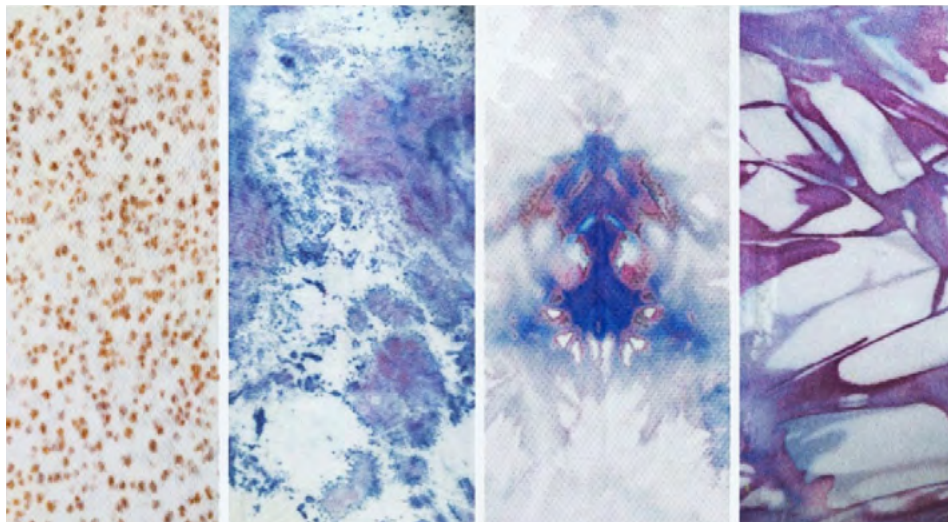


Figure 6. *Pili Company*, bacteria dyeing, Paris 2018.

This process does not require fossil fuels and does not produce dangerous by-products, making these biofactories highly efficient and non-polluting. Among the *Pili* brand's main exhibitions, we can nominate *Broken Nature* at Triennale Milano Museum, curated by Paola Antonelli (Antonelli & Tannir, 2019), and the *La Fabrique du Vivant* at The Centre Pompidou in Paris, curated by Marie-Ange Brayer and Olivier Zeitoun, both held in 2019.

Following a biohacking procedure, another research project in bacterial textile dyeing is *BioShaded*, driven by Cecilia Raspanti from the *Textile FabLab* of the *Waag Society* in Amsterdam. The project explores with an open and shared approach how textiles can be dyed in a less polluting way, working with pigments produced by living bacteria. Funded by the European Community, the project is based on a series

of workshops aimed at increasing the knowledge of designers and creatives in general, through the networking of a fully accessible documentation for the activation of such practices. Among the bacteria used in collaborative experimentations, there are the *Janthino Bacterium Lividum* (violacein), the *Serratia Marcenses* (prodigiosin) and the *Vogesella Indigofera* (indigodine), all always belong to the biosafety level 1, the safer one. In connection with this Dutch network, in 2019 the design collective *Living Colour* succeeded in obtaining a collaboration with the *Puma* brand, with which it will soon launch the first collection of sportswear dyed with bacteria.

Intersecting nature, biotechnology, and society to build a sustainable future, the *Faber Futures* agency in London can be considered one of the most advanced centers working in this realm. Combining biohacking techniques with synthetic biology, thanks to a global network of laboratories and scientists, *Faber Futures* exploits the biofabrication possibilities of organisms such as bacteria, fungi and algae to develop new materials, processes and applications in a wide spectrum of industrial sectors. Amongst these, textile design plays a central role. For example, the *Assemblage 001*, driven by Natsai Audrey Chieza, represents the world's first garment to incorporate bacterial dyes as the foundation of its construction. The project develops a special bacterial dyeing process that is highly customisable and versatile even for the creation of complex tailoring products (Natsai & Ginsberg, 2018).

Although these bio dyeing techniques are only at the beginning, it is important to understand how, their management

and further optimization can open in the future possibilities to explore new chromatic shades, applications and textures. In this sense, these practices can embody the forerunner studies of the sustainable dyes, perfectly oriented to a bio-based textile industry so much requested now from the circular fashion.

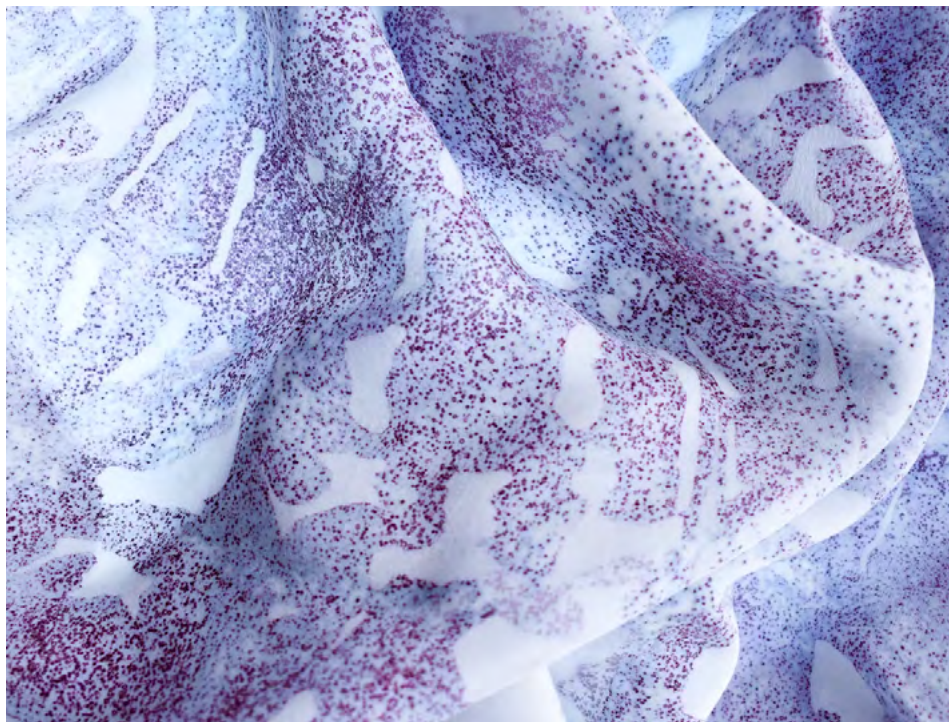


Figure 7. Natsai Audrey Chieza, bacteria dyeing from *Faber Futures*, 2017.

4. Conclusions: the Emerging of Formless as a New Aesthetic Fashion Paradigm

In the light of the research described so far, both in the field of bio textiles and bacterial dyes, an unusual and fascinating aesthetic dimension emerges, which can be assimilated to the concept of the organic and the formless.

I sometimes thought of the formless. There are things, spots, masses, contours, volumes, that somehow have only a de facto existence: they are only perceived by us, but not known; we cannot reduce them to a single law, deduce their all from the analysis of one of their parts, reconstruct them with logical operations. [...] To say that they are formless things means not that they have no forms at all, but that their forms find nothing in us that allows us to replace them with an act of safe definition or recognition. (Valéry, 1936/1960, p. 1194)

Paul Valéry's reflections on the concept of formless are rooted in the definition-manifesto that Bataille firstly wrote in the programmatic entry contained in the appendix *Dictionnaire Critique* of the second issue of the magazine *Documents* of 1929. The formless is a universe that cannot be reduced to a precise form, "like a spit, a spider, a worm" (Bataille, 1929/1974, p.165). It is a subversive and anti-academic deconstruction of the prevailing classical aesthetic, indicating an attitude, a driving perspective from which to observe and understand the world. Away from a canonical image of industrial perfection, this world is analyzed by Bataille through key words somehow annexed to the living, such as black birds, mouth, aesthete, unhappiness, materialism, slaughterhouse, metamorphosis, eye, dust, space (Alemani, 2002).

The notion of formless was later, over the decades, investigated by art theorists as Denis Hollier, Rosalind Krauss, Georges Didi-Huberman, Yves Bois, and transformed into a critical and interpretative instrument of the contemporary artistic practices.



Figure 8. Natsai Audrey Chieza, *Project Coelicolor: Assemblage 001*. Faber Futures, London 2017.

The formless is today a point of view from which an attack by contemporary critics on a vision of modern art based on the idealism of both subject and work: purged by the irruption of the carnal, temporality, materiality, the concept of disorder and waste as well as the idea of fragment; based on a supremacy of the eye that excludes all the other senses and denies the tactility of matter. (Krauss & Bois, 2003, p.6)

Almost all fashion products made from the use of organisms such as bacteria, algae and fungi can be related to this category, since they lead us to a different conception of form, aesthetics and matter. In the light of these considerations, the contribution attempts to summarize this thesis through the explication of three speculative adherences to formless:

- *Imperfection*: At the antipodes respect to an ideal of classical geometry – whose canons are to be found in the Renaissance principles of harmony, symmetry, compositional equilibrium – the aesthetics of growing textiles and bio dyeing are punctuated, shaded, imperfect, anti-hierarchical, opaque, indefinite, unpredictable. In this sense, those new artifacts shake the spectator, destabilize him, stimulating his curiosity and thought.
- *Decadence*: Microbial leathers as well as bacterial dyes exist in the present, and then dissolve, disintegrating over long time, reflections of a changing and transitory contemporaneity. In the construction of these tissues and pigments, the living matter is explored as a process, through a scientific study of its dynamics and spectacularized mech-

anisms, by explicitly shifting reflection back to a level of transience, understood as a prerequisite of life.

- *Raw Matter*: Distant from a serial and asepticity imaginary, the materiality that emerges from such practices follows the logic of the living, according to a collaborative approach of co-creation with the organisms employed. In all its structure, the matter expresses itself naked without being covered up. It thus becomes a tangible manifesto of a design intention oriented towards a fusion with other forms of life.

In these multiple perspectives, still open to further investigations, organic textures and indefinite patterns are the mirror of a contemporary design that penetrates beyond the technological perfect surface of things to denounce, sometimes in a brutal way, the undisputed urgency of saving the planet, to save ourselves.

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PROJECTS & DOCUMENTS

Interview to Mauro Vismara (MAEKO)

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Born from the ability to observe and look to the future, MAEKO was born in 1998 from Mauro Vismara's need to look beyond the times and in full expansion of new handmade fibers to return to a naturalness that at the time was already being forgotten.

The well-being of individuals is an integral part of Mauro Vismara's holistic vision, who stops working on people's bodies in order to provide them with the best possible textile substrates for their comfort and health. This professional transformation, even though it seems distant, is supported by the same philosophy and ethics, of safeguarding the environment and its territory, and the deep desire to preserve people and their millenary culture.

MAEKO promotes bio-based yarns for the textile and fashion sectors, but also interiors and architecture, where it shows the various dimensions of manufacturers and carries out experiments that highlight their main assets. MAEKO presents itself today as a vertical industry capable of executing and, above all, controlling and certifying the entire production cycle. The following logic of sustained ethics is integrated with the environment, starting from the choice of fibers to spinning, dyeing and weaving. The company is at the technological and social forefront, presenting products of high technical quality and social responsibility.

Q: How was the MAEKO idea born and for what needs?

A: Our business was born in 1998 when I understood the characteristics and possibilities given by hemp, dedicating myself to its cultivation with the aim of extracting fibers to create yarns and fabrics. When we started we were pioneers and visionaries and we had already noticed an interest in the fashion sector, which needed to grow in a more sustainable way, to raise awareness.

Q: How is MAEKO organized?

A: In small steps, MAEKO has transformed itself into a verticalized company with the entire textile production line. We made investments in agriculture to be able to control the quality of the fibers and cultivation. That's what we needed on our territory, with a spinning, weaving and dyeing process, for hemp, nettle and other fibers.



At the moment we are dedicating ourselves both to the intermediate phase, from the field to the transformation into fiber, and to the continuous research to use all the waste to work in a circular economy. Our search for raw materials is directed and prefers to use fibers that are closer and closer to us to decrease the production of CO₂.

In 2019 we acquired the historic worsted spinning company Filarte which has become an integral part of MAEKO, incorporating the entire Filarte team and all its know-how.

Q: Taking into account the current challenges imposed by the emergence of Covid-19, how does MAEKO think it can help companies in their responses and what are the new chances for fashion?

A: The pandemic emergency did not create major problems, on the contrary we have noticed a greater awareness of respect for the environment.

MAEKO's business develops on the experience gained over the years, giving each customer the opportunity to create their own product. We create an exclusive relationship with the clients, being able to let them choose about: the composition, the weave of the fabric and the desired color.

The constant goal is to enhance the natural characteristics of the fibers, ennobling them through the use of alternative finishing treatments, to increase the tactile characteristics without distorting their naturalness.

Q: What does the transparency of companies mean today as a key-factor for the final user's consciousness?

A: Without a doubt, the certifications we follow are an important step for the transparency and awareness of our customers. They may buy a product that complies with all the sustainability rules, knowing that environmental protection is strongly certified. MAEKO in collaboration with Colorsystem, has developed a special space dedicated to the Dyeing phases; a space that is useful and mandatory for us to spread widely the use of GOTS (Global Organic Textile Standard) certified dyes. This activity aims to maintain strict control of the entire production chain and to observe the directives dictated by the REACH Regulation (Registration, Evaluation, Authorization and Restriction of Chemicals is a European Union).

Q: Territorial production and its sustainability are among the greatest challenges for companies at the moment. Companies produce in national territories, use non-renewable local resources such as energy, water and raw material to export the product exclusively abroad; leaving locally waste and polluted common resources, with externalities to the community. What is the current role of companies in the social, cultural and identity valorization of their territorial geography?

A: Today, through dynamic and constant growth, MAEKO produces high quality natural fabrics with a controlled supply chain, participating in the development of a sustainable economy that is friendly to nature and respectful of the environment and the individuals. MAEKO produces many of the fibers it uses and in the most sustainable and organic possible way. It works in a circular process, reusing production waste

and leftovers and most of its agricultural production, constantly looking for ways to reduce the environmental impact on the local territory and community.

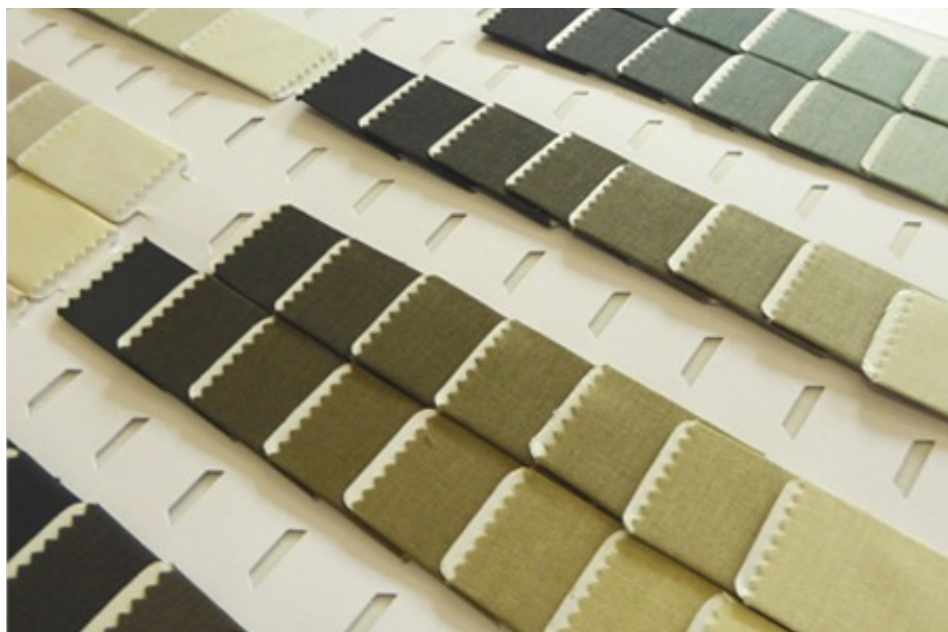
The yarns of hemp, nettle, soy, crabyon, bamboo, linen, organic cotton, yak and certified wool, are, some of them, processed by expert technicians in a historic weaving mill in the province of Turin; the other ones are certified production chains by GOTS. Italian craftsmanship is part of our culture, identity and our manual skills and the way we live. MAEKO wants to pass on ancient knowledge as a legacy and in custody to future generations, without sacrificing innovation. Sustainable local development is absolutely in our interest, even if, unfortunately, we realize that some types of fibers are difficult, if not impossible, to cultivate or raise. MAEKO's business develops on the experience gained over the years, giving each customer the opportunity to create their own product in a more sustainable way.

Q: What will be the future in the vision of MAEKO?

A: Our goal is to create an even more dynamic and diversified structure which is the exact opposite of large industries, where it is very difficult to make changes in production, if not impossible. This dyeing department, for example, is aimed at focusing attention on the services most requested by the companies themselves, such as the Lab Dip, an indispensable tool for studying samples, or dyes for more limited productions, starting from a few meters. The research for new forms of conscious production that respect personal experience and the materials offered by the territory, is MAEKO's mission for the construction of a better future.

The transparency of production, the respect for the environment and people has always been what distinguishes us from most international textile productions. We want to continue to improve our work to safeguard the territory and our techniques and traditions, ensuring that, in the midst of increasingly pressing globalization, our identity is not lost and can continue to guide future generations.

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V

BIOGRAPHIES

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Industrial Designer specialized in the textile area. Master in History of Urban Art. Full-time Professor and Researcher at Facultad del Hábitat, Universidad Autónoma de San Luis Potosí, and a member of the research group Design & complex thinking, where he develops design research oriented towards Evolution of thoughts, theories and concepts of Design.

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Before she studied Design and Communication at University of Campania Luigi Vanvitelli - Department of Architecture and Industrial Design (DADI) and successively she finished her studies with a Master's degree in Design for Innovation at Department of Civil Engineering Design Construction and Environment (DICDEA) in March 2018.

She is interested in the investigation of innovative approaches to the conceptualization of new vision of design, especially on food design, cosmetic product and communication.

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Her research interests are related to the world of Small and Medium Enterprises concerning the development of new products and technologies applied to design and production.

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PhD student in Design at University of Florence, DIDA (Department of Architecture), Design Campus section. Her research combines design approaches, future studies and digital media to foster deeper civic engagement and inclusion. In addition to her studies, she supports Professors at DIDA in managing educational and training activities, communicating with students and tutors.

Outside of the academic environment, she is a designer enjoying philosophy and politics readings from all over the world, with a strong attention to their related languages, be they carved in stone or posted on social media.

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Gina Nadal Fernandez

Gina Nadal Fernandez is a final year PhD student in the Design Department at Manchester School of Art, Manchester Metropolitan University. Her doctoral research is by practice, and investigates how emotional experience can be designed into digital jacquard woven textiles during a co-design process by using digital coding.

She takes a multidisciplinary approach that embraces design theory, textiles, digital coding, consumer behaviour and mass customisation in her weaving practice using a TC-1 loom and natural yarns.

Gina has presented her research at the PhD by Design workshop at the Design Research Society Conference 2018, at the Global Fashion Conference 2018 and 2020. She is also a member of the Textile Society and Design Research Society. She holds a master's degree in Fashion Graphics from Manchester School of Art, Manchester Metropolitan University that looked at the relationship between digital jacquard textile practice and emotional value using digital coding.

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Debora Giorgi

PhD, Architect, she is a Design Researcher at the Dipartimento di Architettura DIDA of the University of Florence. Since 1991 she works on Sustainable Local Development and the social implications of the project starting from the Cultural Heritage. For over 20 years she worked in projects in Ethiopia, Algeria, Tunisia, Morocco, Yemen, Jordan, Haiti, with the most important national and international donors – as WHC - UNESCO, UNCCD, European Commission. Since 2011 she has been collaborating with the DIDA UNIFI especially in projects around Maghreb countries and in the social field promoting Social Design projects and workshops using co-design methodologies. She is professor of Service Design at DIDA UNIFI, professor of Design for Cultural Heritage in the License Course in DesignS at Ecole Euro-Méditerranéenne d'Architecture Design et Urbanisme de l'Université Euro-Méditerranéenne de Fès EMADU – UEMF in Morocco and visiting professor in some universities in Mediterranean countries.

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Beata Hamalwa

Beata Hamalwa founded Fashion Design Diploma at College of the Arts, Windhoek, Namibia, and Fashion Design Certificate at City Varsity, Cape Town, South Africa, and co-founded the Heroes Primary School - all became imperative in employment creation. Her versatile educational background from Poland, Namibia and South Africa in arts and fashion design has provided a valuable foundation for her career in several art training programmes.

She holds a Master of Technology in Design. Her Master's thesis, titled 'Beadwork and its impact on contemporary fashion in South Africa,' investigates the cultural wealth contribution to decolonizing fashion. She believes that modern arts and trends do not imply the demise of indigenous culture. Her latest endeavour is to investigate the possibility of sustainability in the current fashion industry in Namibia, which led me to PhD research at the Cape Peninsula University of Technology.

As an artist, Hamalwa has showcased at premier fashion events in Namibia, Portugal, Germany, France, Poland, the United Kingdom, South Africa, Botswana, and Reunion Island.

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Full Professor of Strategic Management of Innovation at the University of Campania Luigi Vanvitelli, where he teaches also Strategic Analysis. He has been Dean of Department of Economics from 2017 to 2020. He is member of the Entrepreneurship and Innovation Ph. D. teaching board. He has been visiting professor of Innovation Management at the University of Naples Federico II. His research interests include innovation strategy, international strategy of SMEs, innovation in creative industry, cultural entrepreneurship. He is author of a large number of scholarly publications on these topics. He is member of Valuation Committee of University L'Orientale. He has been head of Valuation Committee of the Stazione Zoologica Anton Dohrn, a public research organization in the fields of marine biology and ecology, from 2010 to 2016. He served as a consultant to Ministry of Innovation, collaborating at programs about regional innovation systems, academic spin-off and venture capital, and member of the Steering Committee of Council of Ministers for the program High-Tech for Southern Italy.

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Degree in Textile Engineering at University Center of FEI (1987), Master in Mechanical Engineering at State University of Campinas (2001), Ph.D in Mechanical Engineering at State University of Campinas (2006) and Postdoctorate in Design at University of Lisbon (2016).

She started her academic career in 1995, was the coordinator of the undergraduation course in Textile Engineering at University Center of FEI (2001 to 2006), was the coordinator of the undergraduation course in Textile and Fashion at University of Sao Paulo (2010 to 2012), was the coordinator of the Master's Degree in Textile and Fashion at University of Sao Paulo (2012 to 2016).

She has been a professor at the School of Arts, Sciences and Humanities since 2006 and has been an associate professor at the University of São Paulo since 2011. She researches in the areas of textile materials, knitting technology and textile design.

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PhD student in the Textile Engineering course at the University of Minho (Portugal), master (2013) and graduated (2009) by the Textile and Fashion course at the University of São Paulo.

Since 2012 acts as a researcher at the Technical Textiles and Protection Products Laboratory of the Institute for Technological Research, where has been working especially on the following topics: vegetable textile fibers, natural dyes, comfort, characterization and performance evaluation of technical textiles.

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Undergraduate (2009) in Bachelor of Textiles and Fashion from the University of São Paulo, Master (2013) and PhD (2017) in Mechanical Engineering from the State University of Campinas (Unicamp). Conducted a period of Internship of Doctorate Sandwich Abroad (SWE) - Science without Borders Program (2015-2016) at Fachgebiet Datenverarbeitung in der Konstruktion (Dik), Technical University of Darmstadt, Germany.

She has experience in Mechanical Engineering with an emphasis on Mechanical Design and in Textiles and Fashion with an emphasis on product design methodology, sustainable product development, Brazilian natural fibers, knitting technology and Industry 4.0. She is currently Assistant Professor II at Nossa Senhora do Patrocinio University and Coordinator of the Fashion Design Course.

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Chiara Scarpitti

Chiara Scarpitti, designer and PhD, is Researcher at the Department of Architecture and Industrial Design of the University of Campania "Luigi Vanvitelli". Since 2006 she has been working in the field of design and jewellery at an international level, obtaining numerous awards and exhibiting her works in museums and galleries including Triennale Design Museum in Milan, MAD Museum of Art and Design in New York and HOW Design Center in Shanghai.

Member of the Board of Directors of AGC - Association for Contemporary Jewellery, she taught jewellery design at IED Moda in Milan and at the Academy of Fine Arts in Naples.

In 2018 she has published the monograph "Multipli Singolari. Contemporary jewellery beyond digital" with ListLab, Barcellona, in double edition (ita/eng), and in 2020 "Oggetti pensiero. Storie di design, organismi e nature plurali" with Lettera Ventidue, Siracusa. Her theoretical research is characterized by a speculative hybridization between digital technologies and manufacturing excellence linked to contemporary design and fashion.

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Degree in chemistry from the University of Mogi das Cruzes (2004), Master in Industrial Processes from the Technological Research Institute of the State of São Paulo (2013) and Chemical Production Engineer from Faculdades Oswaldo Cruz (2017). He is currently responsible for the Technical Textiles and Protective Products Laboratory and for the Shoes and Protective Products Laboratory of the Technological Research Institute of the State of São Paulo.

He mainly works on the following topics: technical fabrics, characterization tests and performance evaluation of textiles and PPE's, weathering and microencapsulation applied to textiles.

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Renato Stasi

Renato Stasi has been involved in the creation of clothing and accessories collections for the fashion segment for almost thirty years, as a designer and responsible for the development of the collection, he has worked for several companies including the LVMH Group, Redwall, Hettabretz. He is an adjunct professor at the DIDA - UNIFI Department of Architecture, in the CDL in Industrial Design and CDLM Fashion System Design. Lecturer at IED, where he is the coordinator of two three-year courses. He has carried out supplementary teaching activities at the Politecnico di Milano for several years. He has held seminars and workshops in various universities. Stasi is Coordinator of the Steering Committee of the Master's Degree Course in Fashion System Design of the University of Florence - School of Architecture - DIDA.

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Margherita Tufarelli

Designer, PhD in Design. Currently a research fellow at DIDA (Department of Architecture) of the University of Florence (Italy), Design Campus section. The PhD thesis, with the title "future heritage and heritage futures. An exploration on meanings of the digitized Cultural Heritage" aimed at investigating the role that the digital archives of Cultural Heritage can have in the contamination between the culture of the past and contemporary creativity. Her research interests concern the heritage/creativity sphere within the digital evolution; thus, the application, impact and opportunities that lie in the relationship between digital technologies and cultural heritage. She is currently working on a research project titled "Living archive. Disseminating and reusing the Fashion cultural heritage" founded by Regione Toscana.

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Since 2008 she coordinates (with P. Ranzo e M.A. Sbordonè) the Design for Peace Lab activities. The creative lab was established following the draft agreement signed by the Province of Naples - Councilorship to Peace and International Cooperation - and the Department with the purpose of sharing experiences and best practices in the field of international cooperation and the management of humanitarian emergencies.

She teaches from 2013 to now Social Design and Design for Cosmetic - Design for Innovation Degree Course at University of Campania 'Luigi Vanvitelli'.

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