Culture and Transition Design in the Fashion System

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Abstract.
This research investigates the possibilities of design as a strategic framework for harnessing the transformative potential of the sociocultural dimension in types of innovation that enable a sustainable transformation of the fashion industry. Creative Economics has identified various impacts of culture on a diversity of innovation levels, but this causal relationship, by assuming culture as a "soft" component of innovation, undervalues its capacity for agency, which has been a claim in cultural sociology and fashion studies.
To fill this research gap, this article adopts Design for Sustainability (DfS), a recent perspective that integrates strategic design into systemic innovations. This framework is better suited to connect a transformative conception of culture as it understands systemic innovation in terms of structuration processes catalyzed by design.
The DfS framework is used as a lens for reviewing the literature around the connections between design and cultural-based innovation towards sustainability. 32 references are analysed under a transdisciplinary heuristic tool that allows integrating culture, design and systems innovation in fashion, and the selection criteria of the references analyzed.
The results map a multiplicity of approaches that privilege the cultural dimension of fashion system such as craftsmanship, fashion design activism or social fashion design, and allow us to explain why these cultural practices, instead of marginal, should be considered as potentially transformative.
These results suggest that cultural economics should include the transitional perspective of design to increase the value of culture in innovation and, on the other hand, that a cultural turn of innovation, as proposed here, would improve the analytical capacity of the DfS approach.

1 Introduction

The production and consumption model of the fashion industry has severe environmental and social impacts. Each phase along its value chain generates a variety of environmental damage: high levels of water pollution, production of synthetic

fibers and a global transportation network based on oil, low levels of recycling, high waste generation in the form of landfills and burning of clothes (Fashion Revolution, 2019; Peters, Li, & Lenzen, 2021; Šajn, 2019; Scheffer, 2012). Additionally, the offshoring dynamics and efficiency of suppliers has led to a sweatshop model based on the exploitation of labor markets with very low levels of qualification (Kumar, 2020), while has provoked a deep crisis in traditional industrial clusters as European regions.

Innovation appears as the way to make economic growth compatible with environmental goals (Voß, 2010). In this sense, most of the sustainability endeavors in textile and clothing industry are focused on technical aspects and consumer's awareness as production of new ecologic materials, sustainable value chains or circular economy.

Although this industry is recognized as the quintessence of low innovation (Scott, 2006; Taplin, 2006), some clusters have managed a knowledge-intensive specialization such as the German textile industry, but, others territories traditionally oriented by the design and fashion industry -such as southern Europe- look for a different specialization more oriented to the symbolic dimension of fashion.

The Creative Economy and design studies have made great strides in this direction, while a variety of European projects[1] have addressed this larger question by connecting and experimenting synergies between creative and cultural sectors and the T&C industry.

However, the consideration of culture as a "symbolic", "soft" or "hidden" dimension of innovation (Asheim & Hansen, 2009; Green, Miles, & Rutter, 2007; Stoneman, 2010) makes it a contextual or external variable of transformation, which is in contradiction with cultural sociology that places culture at the center of the structuring and agency, (Hays, 1994; Spillman, 1996), two processes that energize the social institutionalization and reflexivity that underpin sustainable transitions (Geels, 2004).

In this research, fashion is proposed as a revealing case that evidences the need for a new approach to innovation. There is a set of sustainable fashion practices, such as social designers, social activists, organized communities of artisans or entrepreneurs, which constitutes the "cultures of sustainable fashion" (Thomas, 2020), that explore how to transform the social values that underpin the unsustainable socio-productive model of fast fashion. This practices exceed economic-centered and sectorial

[1] WEAR Sustain https://wearsustain.eu/dashboards/home
WORTH: https://www.worthproject.eu/worth-project/
Createx: http://createxproject.eu/
TCBL: https://tcbl.eu/
CreativeWear: https://creativewear.interreg-med.eu/

approaches on culture and innovation, and demand a systemic and human centered perspective.

Therefore, this research adopts the Design for Sustainability (DfS) (Ceschin & Gaziulusoy, 2020, pp. 124–141; İ. Gaziulusoy & Erdoğan Öztekin, 2019), an emerging approach that maps different strategic levels where design operates as a catalyst of radical sustainable innovations, not only at the product level, but - and more relevant - at the socio-technical system level, in which case it is defined as Design for Sustainability Transitions (DfST).

As part of the social system, cultural transitions are understood as incremental and long-term processes, but design becomes a promising framework for energizing radical transformations in institutionalized norms and values. Through the case of fashion practices, this research asks:

How can Design for Sustainable Transitions contribute to an understanding of the role of culture in the transformation of the fashion system?

This question is addressed on sustainable fashion practices reported in the academic literature. The DfS allows to sieve the multitude of fashion practices into those that intersect culture, design and sustainability oriented to systemic transformation of fashion that results in 32 academic references, selected through a heuristic tool (I. Gaziulusoy & Boyle, 2012) which allows a transdisciplinary comprehension of this complex study object.

The filter of DfS allows to stablish which fashion practices point to socio-technical transitions, identifying different applications of design, for instance, product-services systems for sustainable fashion, participatory fashion design, social and community design, fashion design as political action, among others, that

2 The cultural dimension of Design for Sustainability

The theoretical approach combines a sociological conception of culture and the DfS approach.

2.1 The concept of culture in the processes of structuring and agency

Culture in sociology is understood as a comprehensive dimension of social change. This “cultural turn” of sociology (Wolff, 1999) are based on two conceptual shifts: first, it brings cultural studies from the humanities closer to the typical categories of sociology such as the processes of structuration and agency (Hays, 1994; Spillman, 1996) and, second, it discard the objectivism and neutrality of sociological categories, putting in the first place the "*discursive nature of social relations and institutions*" (Wolff,

1999, p. 23), and include the dimension of power and politics of signification (Storey, 2005) in the study of social change.

The structuring definition of culture is clearly developed in Pierre Bourdieu's sociology, in which the concepts of habitus and field remove from culture, as well as from sociology in general, the traditional theoretical dispute between domination and individualism (Bourdieu, 1983).

On the other hand, however, the new status of culture as a comprehensive category, does not erase the role of subjectivity and representation, nor does it relegate its proximity to post-structural definitions of power and narratives in the processes of institutionalization and social action (Wolff, 1999).

The relevance of the "cultural turn" is that, while it erodes the idea of culture as a "tool kit" from which the "action strategies" of individuals derive, it brings culture closer to the study of other much broader dimensions such as economics, education or industrial sociology (Wolff, 1999).

2.2 Design for Sustainability (DfS)

The Design for Sustainability -DfS- (Ceschin & Gaziulusoy, 2020) provides both conceptual and strategic elements: on the one hand, it corresponds to a map of the different levels of sustainable innovation and, on the other, to the strategic factors that condition the emergence of radical innovations in the system.

2.2.1 Innovation levels:

According to the emerging approach, strategic design introduces sustainable improvements at a variety of innovation levels, from material and product design to social system design. The first type is more technology-centered and is performed for isolated agents, while the systemic level is more collective and human-centered.

The novelty of this approach is the recognition of the capacity of design to produce radical innovations at the system level, something traditionally associated with incremental and long-term processes (Gaziulusoy & Brezet, 2015).

In concrete, the DfS (Ceschin & Gaziulusoy, 2020, p. 145) draws five strategic innovation levels:

- **Material/component**: improvements in the material characteristics of products oriented to reduce its environmental impact.
- **Product design:** changes in the product considering its complete lifecycle.
- **Product Service Systems (PSS):** Design oriented to services generation that substitutes product by integrating multi-actors, services and value chains.

- **Spatio-social innovations:** Production of social innovations that improve sustainability demands at different levels: community, district or big urban areas.
- **Socio-technical systems:** Design process of radical innovations in the high level system transitions.

Illustration 1 schematizes the innovation levels in which design intervene to produce sustainability.

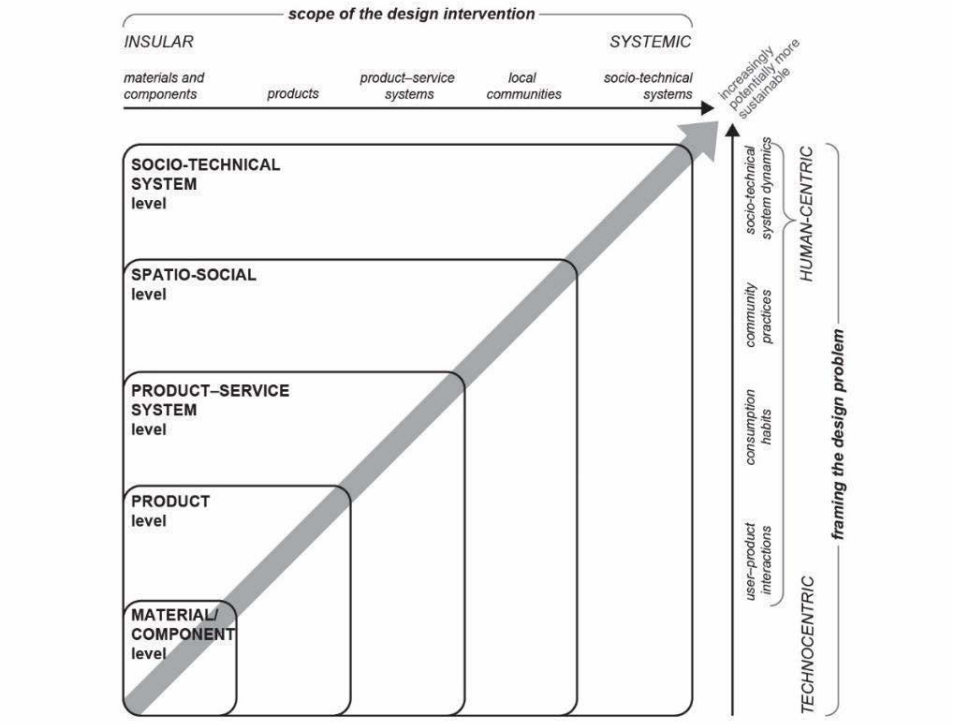

Illustration 1. The Design for Sustainability Framework. (Ceschin & Gaziulusoy, 2020 pp. 144).

2.2.2 Design for Sustainable Transitions (DfST)

In the higher level, design is rendered at the socio-technical level and it is called Design for Sustainability Transitions (DfST) (Ceschin & Gaziulusoy, 2016, 2020; A. I. Gaziulusoy & Brezet, 2015; Joore & Brezet, 2015; Tischner, 2008; Vezzoli et al., 2018). And is defined as the set of design practices applied in a multiplicity of technological or social domains, in which design provides environmentally (Vezzoli et al., 2018) and socially (Tischner, 2008) sustainable solutions, either with a focus on sustainable development (Vezzoli et al., 2018) or degrowth (A. I. Gaziulusoy & Houtbeckers, 2018)

Socio-technical transitions, in fact, can be defined as reflexive processes that require co-design of cyclical and iterative phases of experimentation (Grin, Rotmans, & Schot, 2010).

On the other hand, the beginnings of the DfST are related to the need to design "cultural change" (Ceschin & Gaziulusoy, 2020, p. 125), which is very telling in terms of the suitability of the DfST for the analysis of cultural innovation processes.

2.3 Theoretical proposal: Culture and the DfS

Although the literature has advanced in an articulation between strategic design and the systemic innovation approach, it would be conceptually and methodologically appropriate to include the concept of culture, in order to know to what extent those culturally based initiatives that question dominant production and consumption models can be defined as socio-technical transitions.

In other words, whether the field of culture, in the form of cultural practices that involves different forms of agency as social participation, social activism from artistic activities, community organizations or alternative lifestyles and values, deserves a status of validity (scientific, political, social) as a field of experimentation of transitions.

In this sense, the theoretical proposal of this research takes into account the sociological turn taken by the concept of culture, as mentioned in section 2.1, i.e., as an active dimension within the social processes of structuration.

Given that system innovation is a societal embedded process (Kanger, Geels, Sovacool, & Schot, 2019), i.e., that the dynamics of stability and transition are subordinated to changes in social and cultural schemas, as well as to material and technological aspects, then the integration of culture into the analysis of fast fashion from a socio-technical perspective seems to be promising at the conceptual and methodological level.

In order to synthesize an analytical tool based on this theoretical proposal, three analytical levels are proposed, as summarized in Table 1.

First, to ask what kind of meanings and normative structures are addressed in a particular cultural practice, what part of the dominant sociotechnical regime is articulated, and what elements allow a cultural practice to stop being considered marginal and become a valid space of system transformation.

Secondly, to know what levels of systemic approach are proposed in a specific cultural practice, i.e., whether the transforming proposal is more insular or holistic.

And thirdly, how a human-centered approach is approached, whether it is done from a *very* technological perspective of innovation or whether technologies are understood to be the product of a social construction process.

Table 1. Analytical tool for the design of a Strategic Niche Management of cultural practices. Source: Author.

Dimension of analysis	Type of fashion practice
Type of rules, meanings	• Main experimented concepts, normative structures or meanings.
System approach	• Relative distance from isolated or holistic approach of innovation
Human centered	• Prevalence of a semiotic or social construction of technologies over functionality of technologies
References	• (Bibliographic references)

These dimensions help establish the relative distances between a systemic and a human-centered approach to innovation and provide the grid references for mapping cultural practices on the DfS map.

3 A transdisciplinary Methodology and Analysis

When a researcher begins to search the literature on fashion, culture and design sustainability, he or she faces the problem of the multiplicity of fields of knowledge, actors and type of publications that generates a large number of references. Therefore, it is necessary to establish a search and selection logic that simplifies and integrates the object of study across disciplines and provides sufficient methodological soundness.

The transdisciplinary approach (Gaziulusoy, 2015; Gaziulusoy & Boyle, 2012; Huutoniemi & Tapio, 2014; Pohl, 2014) make it possible to integrate a framework of analysis that cuts across the disciplines involved and delimit and systematize the selection of bibliographic sources.

This methodological turn is concretized in a heuristic tool, as described in Gaziulusoy & Boyle, aiming to help transdisciplinary researchers *"in systematic structuring and prioritization of literature review/reporting process*" (2012, p. 140). The heuritstic tool makes disciplines talk each other and provides the boolean operators for search on databases and the selection criteria.

The transdisciplinary approach is ideal for the research topic because it focuses on solving socially relevant problems; it establishes methodological collaboration between disciplines; it involves knowledge from non-scientific perspectives and is *"normative, i.e. [it] aim[s] to transform the problem domain"* (I. Gaziulusoy & Boyle, 2012, p. 139). On the other hand, the heuristic tool helps individual researchers because it reduces the research infrastructure that requires in-depth analysis in specialized disciplines (I. Gaziulusoy & Boyle, 2012, pp. 139–140).

According to Gaziulusoy & Boyl (2012), it works in two dimensions: first, a four-level pyramid that simplifies the variety of disciplines into four levels: empirical, pragmatic,

normative and value-based, each of which corresponds to basic disciplines (sciences); applied disciplines; planning or policy; and philosophy or ethics. All these disciplines produce knowledge relevant to the research.

However, in order to select the references among this myriad of publications, the second dimension is necessary, which comprises three types of knowledge: knowledge of systems, of objectives and of transformation. They refer, respectively, to the current state of knowledge, the desired state and the strategies to achieve the latter.

As can be expected, the volume of publications on design, sustainability and culture in the textile and apparel industry is large. The first step of the research was a search under the terms sustainability, design and culture in the mentioned industry which drastically limited the amount of publications in the fields of social sciences, economics, management, industrial studies, design studies, among others, however, it resulted still complicated and unmanageable.

A second major methodological step was to use the second heuristic dimension to find out which of the publications situate knowledge production in terms of transformation, resulting in a primary search field, which refines the terms transition, instead of innovation, culture and change, instead culture; redesign, instead of design; and fashion system, instead of the textile and apparel industry (Figure 2). This new field introduces into the search the current crisis of sustainability and the transformative and systemic dimensions.

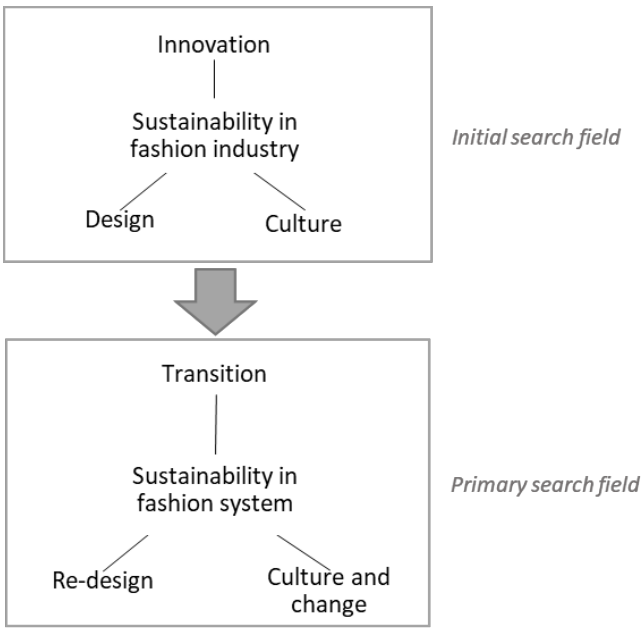

Illustration 2. Transdisciplinary approach for the search and prioritization of references.

This primary field of research provides the boolean search commands that were applied in the major social science and innovation databases such Scopus, Web of Science, Google Scholar, ProQuest, JSTOR and Google. This systematic search was complemented by a "snowballing" strategy that made it possible to add references that had not been considered. The search results were refined by discarding and adding references not included in the operators, resulting in a list of 32 references.

4 Results

The results show that the fashion practices studied can be classified according to the different levels of innovation of the DfS framework, i.e., references to sustainable fashion product-service systems, participatory fashion design, community-based initiatives; redesign of fashion value chains and systemic fashion markets can be identified. The analysis tool made it possible to achieve these results.

4.1 Analysis process

The analysis process consists of the evaluation of an individual source with the analysis tool (Table 1.). A particular source is considered to carry one or more fashion practices, implicitly or explicitly.

A second analytical step is the positioning on the DfS map. The analysis tool provides the coordinates that make it possible to locate specific fashion practices on the conceptual map.

Once located, it was possible to establish clusters of sources that allow classifications and the emergence of analytical categories.

These categories were finally detailed in a structured explanation, which constitutes the results of the research.

Two examples of the application of the analysis tool are presented here, illustrating, in the first case, how the systemic approach is addressed in the specific practice of fashion activism and participatory design. It assumes fashion as an explicitly political practice. It also makes clear the human-centered strategy based eon emotional design and the type of consumer meanings and value creation it aims to transform.

Table 2. First example of the analysis process.

Dimension of analysis	**Fashion activism and participatory design**
Type of rules, meanings	• Consumer awareness, value creation of clothes by emotions and personal production
System approach	• Design activists refers to “who challenge the current practices with design thinking to improve the environment and society”. • “non-aligned social broker and catalyst; a facilitator; an author; a creator; a co-author; and a happener”.

	• Fashion Activism is in the same way a political activity and participatory approach to empower the consumer to be independent from the fashion industry.
Human centered	• Emotional person-product attachment, half-way design approach, "do it yourself", personal engagement, re-design.
References	• (A. Hirscher & Niinimäki, 2015)

A second example illustrates a fashion practice that is systemic but market-centered rather than human-centered. Its perspective is systemic because it understands change not only as a market or economic issue, but requires the involvement of institutional, social, scientific and cultural changes.

Table 3. Second example of the analysis process

Dimension of analysis	**Fashion activism and participatory design**
Type of rules, meanings	• Change in mindsets of industrials, institutions and research actors.
System approach	• Market Systems Dynamics approach • Role of institutionalization processes as a condition of sustainable change
Human centered	• Minimal reference to cultural change
References	• (Dolbec & Fischer, 2015; Ghaffari, Jafari, & Sandikci, 2019; A. Hirscher & Niinimäki, 2015; Ozdamar Ertekin, Atik, & Murray, 2020)

After this analytical exercise it was possible to map the fashion practices according to the DfS model.

4.2 Fashion Practices in the Design for Sustainability Framework

4.2.1 Level 1 and 2. Materials and products:

Systems design covers a very broad scope of innovation, at the material level it includes the introduction of fibers and fabrics, sustainable product design such as cradle-to-cradle and product life cycle assessment. It also includes value chain redesign in the fashion industry and environmental standards.

Co-design practices are applied in the introduction of new sustainable fashion products (Hur, Beverley, & Cassidy, 2013). Branding is included in this subgroup as a design strategy by which to generate sustainable values in fashion consumers (Kozlowski, Searcy, & Bardecki, 2016; Moorhouse & Moorhouse, 2018). Life Cycle Assessment is also addressed in order to identify and design strategies to reduce impacts in the specific value chain stages of fashion industry (Kozlowski, Bardecki, & Searcy, 2012).

4.2.2 Level 3. Product Service-system (PSS):

A network of practices based on the PSS design can compose a sustainable fashion value chain, as Azzi, Vezzoli & Conti proposes, designing a scenario which includes do-it-yourself clothes, community clothing clubs, shared wardrobes, as ongoing existing fashion practices (Azzi, Vezzoli, & Conti, 2020).

Other practices can be located as design services modality, with some conceptual and methodological distances from a very PSS vision. For instance, the designing of sustainable tools for institutions and industry, beyond standards and green innovations perspective (Kozlowski, Bardecki, & Searcy, 2019).

On the other hand, there are some practices based on co-design of services closer to a participatory approach of consumers (Hur et al., 2013).

4.2.3 Level 4. Spatio-social:

When co-design goes beyond individual consumers, towards the involvement of communities in a participatory approach, and is articulated as a fashionable political proposal, these practices can be considered as a spatio-social version of design.

Table 4. Classification of consulted references according to Design for sustainability innovation levels.

DfS levels	Typology of culture-based design for sustainability in fashion system	References
Material/component	Sustainable T&C design	Torres & Gardetti, 2013
Product	Life Cycle Assessment	Kozlowski, Bardecki, & Searcy, 2012
	Branding and business models design	Kozlowski, Searcy, & Bardecki, 2016
	Sustainable Branding	Moorhouse & Moorhouse, 2018
	Systemic markets	Ozdamar Ertekin, Atik, & Murray, 2020
	Tools for Sustainable Fashion Design	Kozlowski, Bardecki, & Searcy, 2019
	Product-Service System for sustainable fashion	Azzi, Vezzoli, & Conti, 2020
Product-Service System	Co-design	Hur, Beverley, & Cassidy, 2013
	Co-design craft	Hur & Beverley, 2013
	Service design	Mazzarella, Mitchell, & Escobar-Tello, 2017
	Branding and social innovation	Bertola et al., 2020
Spatio-Social	Participatory design	McHattie, Champion, & Broadley, 2018
		A.-L. Hirscher & Fuad-Luke, 2013
	Ethical Economy: social production and new values creation	A.-L. Hirscher, Mazzarella, & Fuad-Luke, 2019
		Hirscher, Niinimäki, & Joyner Armstrong, 2018
	Fashion activism	Hirscher, 2013
		Busch, 2008
		A. Hirscher & Niinimäki, 2015
		The Fashion Practice Collective, 2014
	Social movements and industry transformation	Thomas, 2020
Socio-Technical System	Design strategies from a consumer perspective	Niinimäki & Hassi, 2011
	Ethics in sustainable fashion system	Niinimäki, 2015
	Fashion sustainability as institutional processes	Gupta, Gwozdz, & Gentry, 2019
	Sustainability and responsability	Boström & Micheletti, 2016
	Post-growth and fashion	Taylor, 2019
	Cultural-based design	Bertola et al., 2016
	"Slow Fashion"	Fletcher, 2014
	Craftmanship and transition	Vuletich, 2015

Source: Author.

Social innovations in this level consists in creating new values about our social and individual relationship with the production and consumption of clothing based on different fields of application, actors at play and objectives of change. For example, the role of service design to promote artisan communities who generate "meaningful routes" (Mazzarella, Mitchell, & Escobar-Tello, 2017) towards more sustainable values; similarly, participatory design is applied as a mechanism to connect textile traditions in regional innovation processes (McHattie, Champion, & Broadley, 2018).

Participatory design is proposed as a tool for sustainable alternative economies in fashion industry (A.-L. Hirscher & Fuad-Luke, 2013). On the other hand, design can link in different ways the consumer within the productive process of clothing as social re-appropriation of production to generate an "ethical economy" (A.-L. Hirscher, Mazzarella, & Fuad-Luke, 2019; A.-L. Hirscher, Niinimäki, & Joyner Armstrong, 2018) and, design is also projected as a reflexive and political practice through the concept of fashion activism (Busch, 2008; A. Hirscher, 2013; A. Hirscher & Niinimäki, 2015; The Fashion Practice Collective, 2014).

From a perspective that connects design at the product level with structural changes in the industry system, the work of Niinimäki & Hassi (2011) raises the capacity of design to incorporate consumers' growing demands for sustainability into product innovations. In the same vein, the work of Bertola et al. (2016) proposes that, given

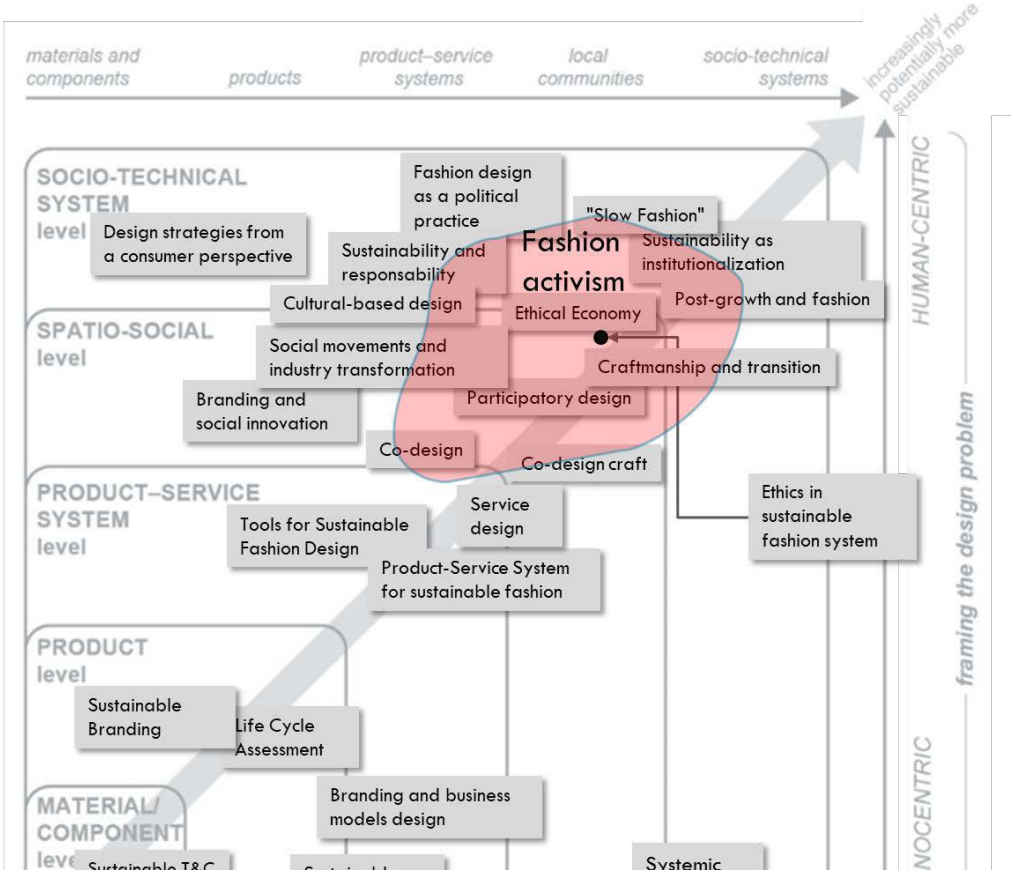

Illustration 3. Fashion practices in the Design for Sustainbility map. Source: Author based on Ceschin & Gaziulusoy, 2020.

the profound change in the concept of innovation represented by the privileging of meaning over functionality, the design of narratives of authenticity plays a fundamental role in the innovation process, especially in culture-intensive industries such as the fashion industry.

4.2.4 Level 5. Socio-technical systems:
Another field of research conceives sustainability as a matter of profound redesign of the fashion system, which is a holistic process that includes not only production or consumption, but understands it to be, in a sociological sense, an institution in whose construction different social, political and economic processes converge. In this sense, Fletcher's Slow Fashion concept is a representative of a transitional perspective of the DfS.

Other fashion practices drives institutionalization processes in a polysemy of dimensions, as, for example, in introducing new market dynamics through processes of convergence (Market System Dynamics - MSD) (Ozdamar Ertekin et al., 2020). But institutionalization is also when all actors are involved in the transformation, where governmental bodies and social agents contribute to the process, e.g. the effort of sustainability of production and consumption (Boström & Micheletti, 2016), or that changes in more sustainable lifestyles, are the collective fruit of the actors who make up the fashion system (Gupta, Gwozdz, & Gentry, 2019). However, for these last cited sources, the systemic perspective is applied in the domain of materials, products, markets or consumers more technologic than human centered.

5 Conclusions

From the results obtained, and addressing the research question of how the DfS can contribute to the understanding of the role of culture in the innovation of the fashion system, it is possible to establish that the proposed framework articulates culture in the innovation of the proposed object of study in a better way than the creative economy. According to the latter, culture and the arts have a linear causal relationship with sectoral innovation in the fashion industry, while the DfS addresses new dynamics in the concept of innovation, according to which it is more systemic and oriented by the construction of social meanings than by technologies and functionality.

But the concept of culture in this framework requires a better attention. It is necessary to adopt a sociological concept of culture that is linked to the capacity for agency, which requires vindicating the sociological relationship between structure and agency, which, additionally, beyond opposing categories, are complementary to each other (Hays, 1994; Spillman, 1996).

The resulting theoretical proposal, based on a combination between DfS and a sociological concept of culture, which is synthesized in the proposed analytical tool,

helped to assess the transition perspective of fashion practices in terms of both systemic approach and human-centered transformation.

The results of the analysis provide a classification of these practices in the DfS map of innovation levels. From this exercise derives a new consideration of fashion practices as valid processes of system transformation. Specifically claiming radical fashion, craft activism, hacking design, social processes of clothing production, shared wardrobes, artisanal communities, upcycling, textile traditions or clothing repair and DIY as transformative rather than marginal proposals.

It recognizes the creation of ethical values, the recovery of the relationship between tools, materials and the body as a resignification of our connection with clothing, as alternative values that those fashion practices put into circulation where culture and the arts are constituted as fields of experimentation in which these processes are aligned as proposals for sustainable transition.

6 Discussion

This research results propose an academic and strategical dialogue at two levels:

First a dialogue with socio-technical systems approach:

Fashion system has not been studied from a socio-technical approach: despite its known impacts on sustainability, the definition of the regime and the multiplicity of experimental initiatives is needed. On the one hand, in addition to waste production, low levels of recycling, and social impacts, Fast fashion regime is oil dependent for synthetic fibres production and global transportation networks. On the other hand, there are a myriad of fashion initiatives aiming to regime transformation that can be characterized as innovation niches.

Culture has not been sufficiently integrated in the socio-technical approach: Although it has been initially approached as an understanding of the dynamics of appropriation by users (Geels, 2004), a better articulation of cultural sociology is needed where culture is a structured system of representations that, at the same time, structure social practices.

Culture seems to continue as an independent variable in the transition studies: Power and resistance dynamics are central in the constructivist perspective of culture, but these dimensions of social change, studied in the form of narratives (Hermwille, 2016) or discourse (Rosenbloom, Berton, & Meadowcroft, 2016), in the socio-technical approach, are linked more to the political than to the cultural sphere. Power is itself treated as a political dimension of sustainable transitions (Avelino, 2021).

And, secondly, a dialogue with design studies:

The need to implement a specific design method for cultural-based socio-technical experimentation arises. This includes the implementation of skill sets and attitudes for cultural practitioners, organizations and institutions as designers of sustainable transitions.

Finally, these results call for considering culture *as* a central dimension of sustainability, beyond an intrinsic or instrumental aspect (Soini & Dessein, 2016. Italics in original). This is especially relevant in the circumstances of the current environmental emergency, where the necessary changes are considered more cultural than technological.

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