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03 November 2026

Editors Kirsi Niinimäki and Kirsti Cura,
Aalto University

# PLATE
## Product Lifetimes And The Environment

# PROCEEDINGS

5th PLATE Conference
Espoo, Finland

31 May – 2 June
2023

Aalto University
School of Arts, Design
and Architecture

**Aalto University publication series**

ART + DESIGN + ARCHITECTURE 3 / 2023
ISBN 978-952-64-1367-9 (electronic)
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Product Lifetimes
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TU Delft Delft
University of
Technology

FINIX

strategic RESEARCH

new
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# PLATE2023

## The 5th Product Lifetimes and the Environment Conference in Aalto University, Espoo, Finland, 31 May – 2 June, 2023

The 5th international PLATE conference (Product Lifetimes and the Environment) addressed product lifetimes in the context of sustainability. The PLATE conference, which has been running since 2015, has successfully been able to establish a solid network of researchers around its core theme. The topic has come to the forefront of current (political, scientific & societal) debates due to its interconnectedness with a number of recent prominent movements, such as the circular economy, eco-design and collaborative consumption. For the 2023 edition of the conference, we encouraged researchers to propose how to extend, widen or critically re-construct thematic sessions for the PLATE conference, and the paper call was constructed based on these proposals. In this 5th PLATE conference, we had 171 paper presentations and 238 participants from 14 different countries. Beside of paper sessions we organized workshops and REPAIR exhibitions.

### Conference Chair:

Associate Professor Kirsi Niinimäki, Aalto University

### Conference academic committee:

Professor Conny Bakker, TU Delft
Professor Minna Halme, Aalto University
Associate Senior Lecturer Jessika Richter, Lund University
Associate Professor Mikko Jalas, Aalto University
Coordinator Yumiko Henneberry, TU Delft

### Local organizing committee in Aalto University:

Postdoctoral Researcher Kirsti Cura
Postdoctoral Researcher Emmi Pouta
Master student Chloé Hartmann
Fashion/Textile FUTURES research group

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Aalto University, Finland
Delft University of Technology, The Netherlands
Lund University, Sweden
Nottingham Trent University, United Kingdom
Fraunhofer Institute for Reliability and Microintegration (IZM), Germany
University of Limerick, Ireland

Aalto University School of Arts, Design and Architecture
TU Delft Delft University of Technology
FINIX
new cotton project
t-rex

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# Strategy models for upcycling. How to create a systemic change through practice potentialities

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**Keywords**: Upcycling models, Fashion system, Systemic Innovation Design, Sustainability.

**Abstract**: Upcycling has accelerated considerably during the pandemic, where excess inventories for the spring/summer 2020 collection exceeded 140 billion and are increasingly being explored worldwide (Chan, 2020). The practice involves recycling waste materials of various kinds, intending to make products that are not only sustainable but that, through an appropriate design process, acquire added value compared to the source materials. Applying a specific forma mentis - systemic design - the contribution explores new realities explicitly shaped to be part of the re-fashion sector, established companies that have started in their attempts to reconvert even a part of their system, and aims to define a framework starting from waste to levels of integration of the latter in parallel supply chains. In this case, the Systemic Innovation Design approach represents a methodological approach (Barbero & Tamborrini, 2015) and a sustainable design practice to apply knowledge to systemic problems with the aims of co-designing products, systems and business models for sustainable services (Jones, 2014). Cases of this kind were collected and analyzed to capture and return the salient aspects of each upcycling process. A tripartite form was drawn up with three criteria: sustainability, communication and the intrinsic emotions that the brand wants to convey to the consumer in its upcycling model. The research shows that although upcycling does not yet have a precise connotation (Cassidy & Han, 2015), it is a widespread phenomenon continuously being experimented with by both individual consumers and brands. The contribution attempts to offer a critical overview of some of the realities currently on the market and to highlight how, from the same practice, completely different business models can emerge.

## Introduction

The fashion industry is a large-scale economic sector. McKinsey's report estimates that comparing this industry's revenue to the single countries' GDPs, it would be ranked as the seventh-world economic power (McKinsey, 2016). Such a big industry indeed has a great environmental impact. It is, in fact, reported that in 2015 the fashion industry consumed 79 billion cubic meters of water, has emitted 1715 tons of CO2 and 92 million tons of waste of various kinds. It has been estimated that, at this rate of growth, these figures are going to double by 2030 (European report, 2019).

Before 2020 the industry's total revenue was between 1,7 and 2,5 trillion dollars. (McKinsey, 2020). The Covid 19 pandemic forced the world to stop and rethink how to approach goods production. This new scenario can be described with the term New Normal, meaning a situation where routines are disrupted, and the extraordinary becomes ordinary (Sacchi, 2020).

This global change indeed touched the fashion industry. It has been estimated that the "excess inventory from spring/summer 2020 collections were more than double the average", with a total value between €140 billion to €160 billion (Chan, 2020). This deadstock provided the opportunity to experiment with sustainable ways of doing business.

In recent years entrepreneurs are reflecting on the "excessive speed that has not translated into positive change or evolution" (Sacchi, 2020); it follows that the new requirement for goods is high durability. In the fashion field, words such as seasonless, timeless and carry-over appear (Sacchi, 2020). New studies have also shown that buyers are gradually more aware of their actions and choices. They can now be defined as active subjects, overturning the most important economic theories of the last century (Sacchi, 2020).

In addition to the challenges brought by the pandemic, the industry is now facing the consequences of geopolitical instability and inflation. Therefore, the general expectations are pessimistic despite the recovery in 2021 and part of 2022. Two-thirds of the executives are considering nearshoring to mitigate the effects of inflation and the possibility of disruptions in the supply chain. In addition, 75% of executives want to reduce their inventory, and 16% think implementing sustainability represents a significant market opportunity (McKinsey, 2022).

All the previous premises suggest that it could be the right time to work on alternative ways of conceiving businesses. A profitable direction could be a business model based on tackling the massive amount of waste the industry produces, slowing manufacturing processes, considering the consumers' newfound critical voice and resisting geopolitical fluctuations. The upcycling technique, "to treat an item that has already been used in such a way that you make something of greater quality or value than the original" (Oxford Advanced Learner's Dictionary), could be an effective way to satisfy all the previous requirements.

This contribution intends to provide general guidelines for creating a sustainable upcycling strategy in the fashion field. After a detailed analysis of the fashion scenario and the post-pandemic tendencies, the research focuses on finding a theoretical foundation for sustainable upcycling businesses by defining three main criteria: sustainability, communication and emotions. Lastly, in addition to the guidelines, the paper outlines a general system as a base for constructing a sustainable upcycling model.

## Methodology

Upcycling has had considerable experience in the fashion industry, so it was necessary to analyse what has already been done in this field. Firstly, it was essential to define a suitable method for collecting data, outlining companies' systems and identifying their strengths and weaknesses.

### *Definition of parameters*

Considering the scenario, it is necessary to pay attention to the sustainability of companies and the proper development of communication. However, we also wanted to analyse the human dimension during this work. Indeed, emotions constitute an immutable constant that evolves but does not disappear throughout people's lives.

**Sustainability** is not only about the environment. Designing a production system "means meeting our needs without compromising the ability of future generations to meet their own needs" (UN Brundtland Commission, 1987); therefore, social rights and economic development are crucial aspects to consider.

**Communication** encompasses what a brand decides to tell about itself. Through the tone of voice, a company uses for its storytelling and the choice of verbal or iconic language, it is possible to generate specific imagery and successfully engage the right target audience.
Finally, **emotions** are the most underestimated criterion yet the most crucial element in creating consumer affection.

### *How parameters work*

Parameters are meant to work together symbiotically with the right balance. Each element must exist apart from the other but must be present and structural. In our analysis, Sustainability, Communication, and Emotions are equally important (Figure 1).

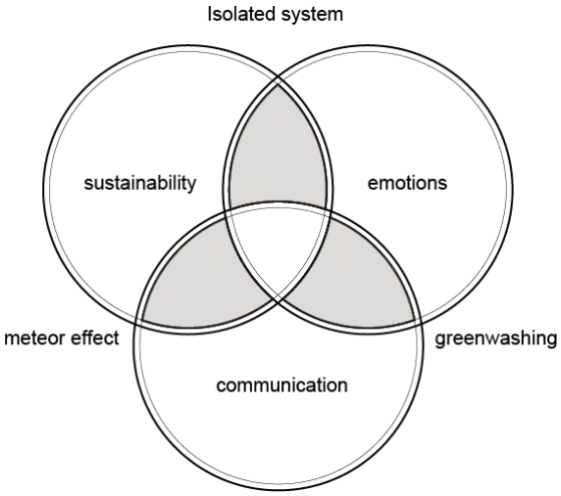



**Figure 1. Functioning of parameters and intersections.**

When sustainability is not involved, businesses tend to incur “behaviour or activities that make people believe that a company is doing more to

protect the environment than it is" (Cambridge Advanced Learner's Dictionary & Thesaurus, n.d.). This phenomenon is known as Greenwashing: the user is hooked by a well-crafted communication strategy based on sustainability. However, as soon as the fraud arises, his affection will undoubtedly become outraged.

When Communication is missing, a business cannot reach out to the masses despite noble intentions. Therefore it is destined to create an isolated system and be confined to a small niche.

When Emotions are excluded, Communication and Sustainability must engage more with the consumer, and the business will be able to stand out among its competitors.

*Case studies' analysis*

These parameters constitute the structure for the case studies analysis, which explores brands' systems, focusing on every element involved in reaching success in the upcycled fashion industry.

Every case study is introduced by a text providing basic information (who founded the brand, when and where, the category of items it sells, and the mission). Then, a radar scheme reports the influence of each parameter (Figure 2). It uses three axes, one for each variable: it is assigned a score of 0 to 5 to each value, assuming 0 as "not at all" and five as "completely": thus, assigning an objective rate based on deep analysis; it generates a triangle, through whose shape it is possible to summarize the trend of the brand.

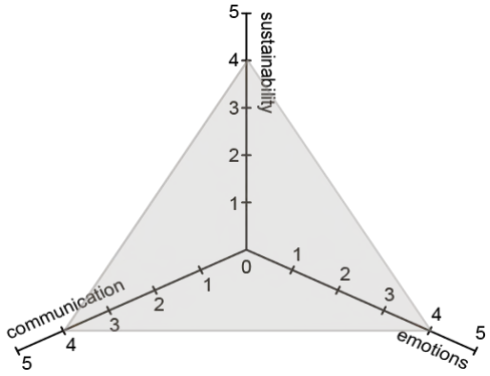



**Figure 2. Radar scheme (with an hypothesis of the triangle generated after the evaluation).**

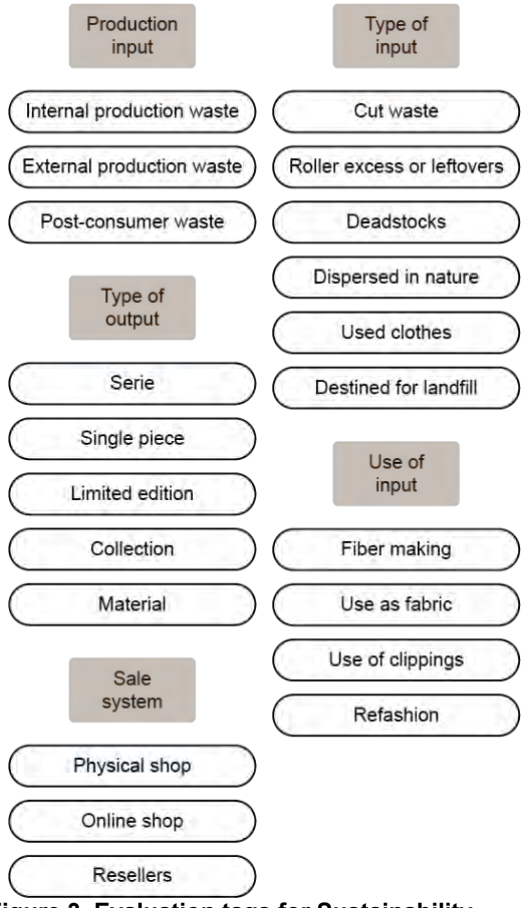



**Figure 3. Evaluation tags for Sustainability.**

The sustainability part uses tags to define the inputs adopted and the outputs produced (Figure 3). The central part is the visual reproduction of the business' system (from sourcing raw material to selling the final product and, where possible, to post-consumption or disposal).




**Figure 4. Evaluation tags for Communication.**

The Communication part reclaims tone of voice parameters studied by Valentina Falcinelli in "Testi che parlano" (Falcinelli, 2018), and again, thanks to simple tags, it defines both visual and verbal languages adopted (Figure 4).

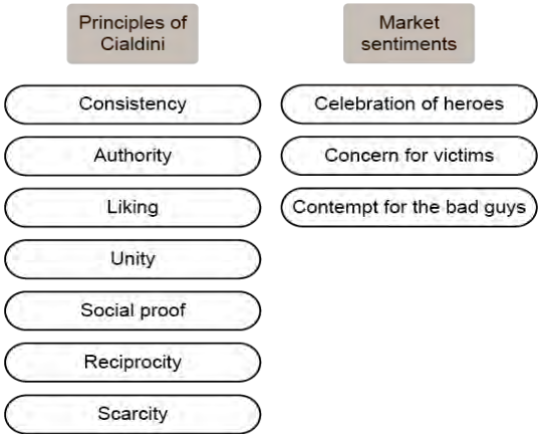



**Figure 5. Evaluation tags for Emotions.**

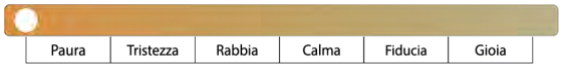



**Figure 6. Emotions' evaluator from Plutchick's Wheel of Emotions.**

Finally, emotions are described by the Market Sentiments, the Principles of Persuasion by Roberto Cialdini (Cialdini,2007) (Figure 5) and an evaluator inspired by Plutchick's Wheel of Emotions (Plutchick, 1991) (Figure 6). In this case, businesses must be studied on two levels: the first analyzes the feelings the brand is trying to recall, and the second one tries to understand what final users receive.

The review of each brand must consider the target too. For that, it has been used a division based on generations (Figure 7).

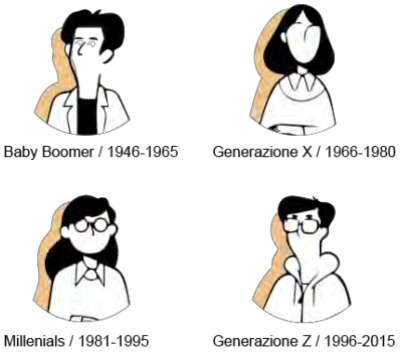



**Figure 7. Division based on generations.**

Many recent sociological studies have shown that distinctive features developed in relation to the historical period in which one grew up that unite groups of people belonging to the same generation. It cannot precisely describe the target of the brand; anyhow, it allows us to identify the age range of the final users and their vision of the world (Istat, 2016

## Findings

As a result of deep research in upcycled fashion, 34 businesses have been selected and analyzed. Most of the cases adopt the upcycling model as the primary production system (Figure 8), which can differ by the type of inputs (Figure 11) and outputs (Figure 9) and the type of production (Figure 10).
All the cases are actual functioning companies from all over the world (Figure 14).

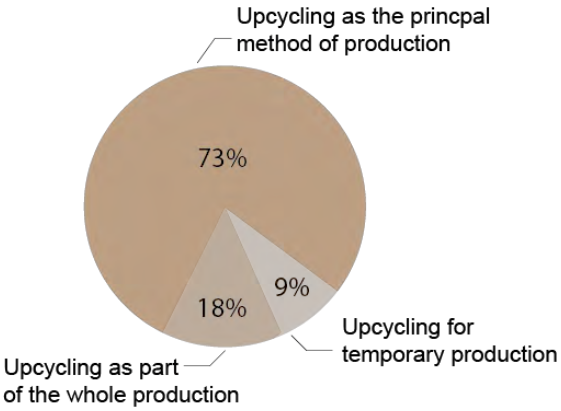



**Figure 8. Upcycling as the main core business versus upcycling for exceptions (referred to the 34 cases).**

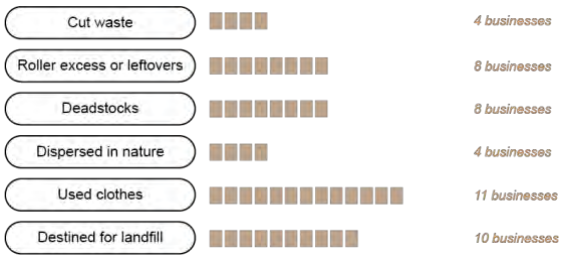



**Figure 9. Inputs the 34 businesses adopt.**

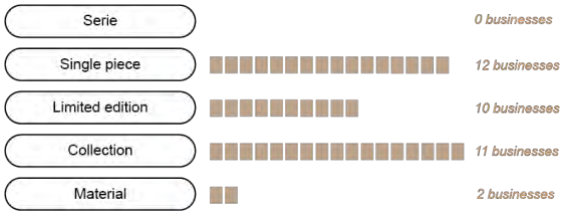



**Figure 10. Outputs the 34 businesses produce.**

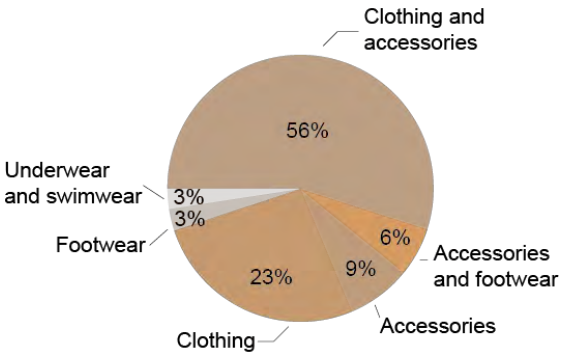



**Figure 11. Type of production of the 34 cases analyzed.**

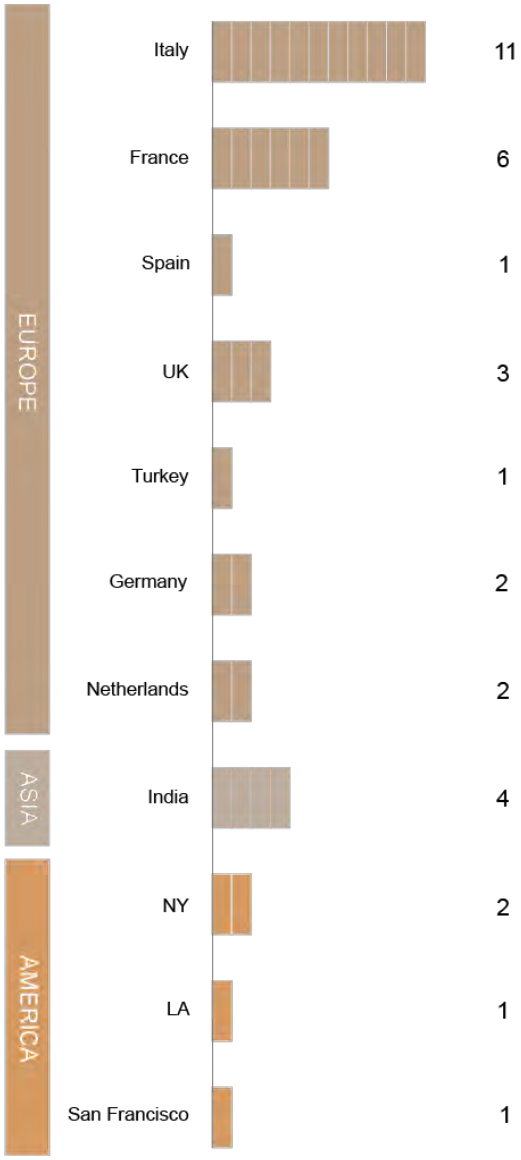



**Figure 12. Cases analyzed (referred to the 34 cases).**

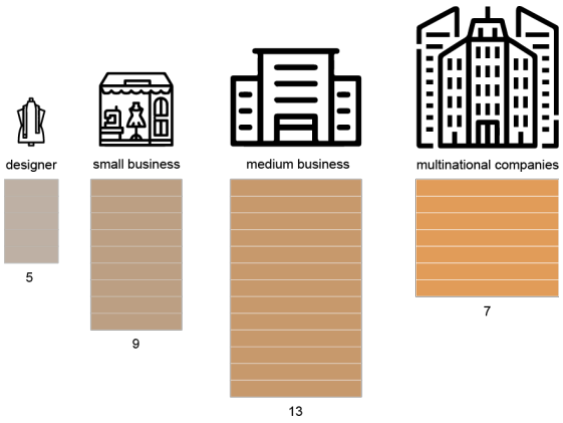



**Figure 13. Cases analyzed by dimension (referred to the 34 cases).**

The analysis shows that only a small percentage is balanced (or semi-balanced) according to the tripartite scheme. In particular, this percentage is composed of medium-small companies (Figure 15) with a clear target and strongly independent from the fashion market trends. All the other brands considered, on the contrary, manifest a strong imbalance towards one of the parameters (Figure 16).

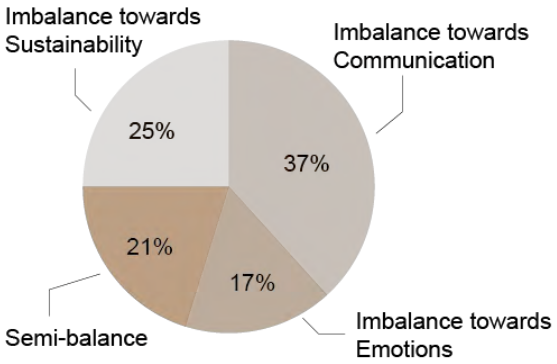



**Figure 14. Analysis of businesses' results.**

Thus, a categorization based on the weight of a specific parameter guides the identification of four groups.

*Imbalance towards Sustainability*

Cases included are niche businesses with highly-specialized productions, with a defined type of inputs and outputs. Moreover, they refer to a defined target, apparently not contemplating enlargements because of undeveloped communication strategies (Table 1).

| % of the category | Properties and characteristics |
|---|---|
| 28,6 | Very high level of sustainability<br>Absence of balance on the triangle<br>Niche businesses |
| 64,3 | High level of sustainability<br>Imbalance on the triangle<br>Niche businesses: strong specialization of the production |
| 7,1 | Medium level of sustainability<br>2 parameters balanced on the triangle<br>Niche businesses: poor communication |

**Table 1. Imbalance towards Sustainability's data.**

*Imbalance towards Communication*

Cases included involve some of the most famous brands in the fashion industry: whether it is a coincidence or not, it is always about limited editions or temporary collaborations. Furthermore, data confirm that these actions mainly aim at trends and market needs (Table 2).

| % of the category | Properties and characteristics |
|---|---|
| 50,0 | Very high level of communication<br>Significant absence of balance on the triangle<br>Limited edition / temporary collection |
| 50,0 | High level of communication<br>Imbalance of the triangle<br>Limited edition |

**Table 2. Imbalance towards Communication's data.**

*Imbalance towards Emotions*

Cases included are little-known niche business realities. This group involves brands with a very defined production, mainly based on the uniqueness of the items. It is mostly about one-piece outputs attributable to luxury or high fashion (Table 3).

| % of the category | Properties and characteristics |
|---|---|
| 33,3 | High level of emotions<br>Significant absence of balance on the triangle<br>Niche businesses: strong specialization of the production |
| 33,4 | High level of emotions<br>Imbalance on the triangle<br>Niche businesses: on piece |
| 33,3 | Medium level of emotions<br>Imbalance on the triangle<br>Niche businesses: little or unknown brands |

**Table 3. Imbalance towards Emotions' data.**

### *Semi-balance*

Cases include primarily designers' actions, who work in their atelier with strong motivations leading to courageous choices in fashion panorama. Also, there is particular care at every step of the system. Each reality has strong specialized production, is constantly improvable, and is transparent in every stage of creation. (Table 4).

| % of the category | Properties and characteristics |
|---|---|
| 30,0 | Balance on the triangle<br>Very defined target<br>Growing businesses |
| 70,0 | Unsignificant imbalance<br>Very defined target<br>Businesses with great chances to grow and improve. |

**Table 4. Semi-balance's data.**

## Guidelines

Despite the existence of a small percentage of successful businesses, not many realities are worthy of becoming a model for aspiring to. Unfortunately, upcycled fashion businesses remain niches known exclusively by some conscious consumers.

A significant problem nowadays is that sustainable business models must consider circularity in their systems. Focusing on inputs and outputs is not enough. Creating raw materials (inputs) and disposing of final objects (outputs) are both very expensive and impactful. Upcycling allows them to downsize their impact, relocate their role inside a production system and, more importantly, convert them into connection points. These stages generate empowering relations among different systems instead of just being the initial and the final phases of a potentially unsustainable process.

### *Structural guidelines*

Starting from the criteria covered previously, the research will now focus on defining general guidelines (Table 5) that a sustainable fashion brand that chooses the upcycling technique should follow.

| Guidelines | Description |
|---|---|
| Enhance the history | In order to create real affection with the product, its communication should be created around the waste's history. |
| Phigital district | A sustainable brand should be part of a more complex system, where one business' outputs can become anothers' inputs. These connections should be implemented through digital means. |
| Local supply chain | To maximize sustainability, the supply chain and the production should be limited to a small area. |
| Shared knowhow | A sustainable brand should provide platforms to share knowledge. This way businesses, and ordinary people as well, can be empowered and generate positive impact. |
| High quality's raw material | A sustainable brand should use only high quality's material, so that garments can have a long life cycle |
| Designed end-of-life | To create a circular system, a sustainable brand should design the last part of their products' life, reintroducing them to their system or making sure they are going to enter in others. |

**Table 5. Description of guidelines.**

*System's guidelines*

After defining the guidelines, it is possible to draw a generic system with the fundamental components for a sustainable upcycling brand and its relations. This could represent a base point for more complex business models (Figure 15).

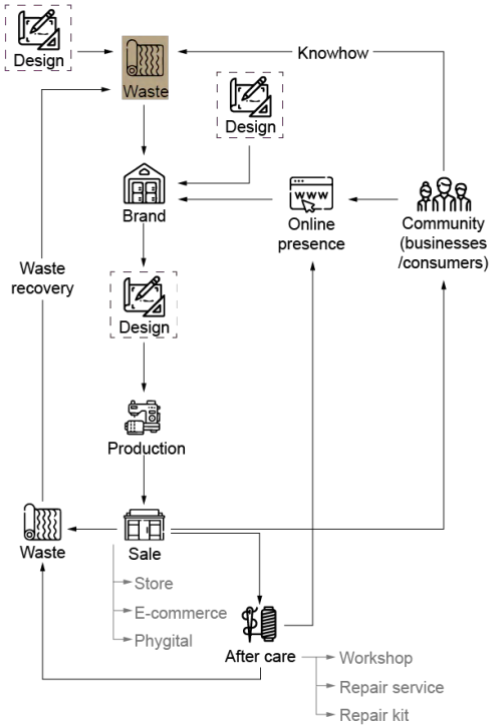



**Figure 15. Processes of general system.**

The process originates from the section "waste," a general definition of the system's inputs. These inputs can be various; the only requirement is that they must not be of new production. The brand then collects the waste. The "design process" needs special mention. It is possible to see that it is positioned in more than one place because, depending on the brand's business model, this process can occur at different times.

The next step is production, followed by sale, which can be managed physically, digitally or, more effectively, in both ways. Finally, the brand needs an online presence to interact with the community and share and collect know-how.

The final part of the system covers the post-consumer phase. According to the previous guidelines, the products' end-of-life must be designed, and a sustainable brand should predict at least two ways to do so. The first is allowing the consumer to repair or modify the garment to postpone disposal. The second one is designing the path the waste will follow, ensuring it will be reintroduced as an input in a productive system.

## Conclusions

As specified at the beginning of the research, the paper aims to provide strategies and best practices to businesses that aim to be sustainable. The three parameters represent a dual resource for designers, giving them both a structural direction and a toolkit to draw from for innovation.

According to the scenario outlined, times are favourable for introducing new sustainable production models, and upcycling is an optimal solution. Adopting the practice as the primary production strategy would allow businesses to think from a systemic perspective and to find opportunities in what now is seen as a waste. To achieve higher levels of sustainability, companies should no longer perceive themselves as separate entities from the surrounding environment, but they should aim to connect their systems to existing ones. Implementing the right connections is crucial.

This research's findings report that this mindset is already present in many businesses but is too often confined to the input phase. There are, in fact, multiple examples of the different ways a business can source leftover fabrics, but not many models suggest how to tackle the post-production and post-consumer waste generated by their systems. This unexplored area could be a breeding ground for innovation for designers looking for effective and unprecedented solutions to "close the circle".

*Research's limits and future goals*

This research takes a systemic design perspective; its aim is not to provide detailed production techniques but to analyse and suggest flow management strategies and provide insights to innovate the fashion industry.

The three parameters result from an analysis that places humans at the centre before any other element; however, it is, of course, just one

of the many possible ways to provide an innovative and sustainable point of view.

Furthermore, the cataloguing based on these parameters uses evaluation tools supported by literature or, in some cases, based on qualitative criteria. The goal is to refine the method to implement the analysis's objectivity, involving the analyser's subjective aspect as little as possible.

Finally, although, at the moment, this research is only theoretical, the next step would be to apply the system and guidelines and test them empirically.

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