

# Sustainability in the Footwear Sector in Portugal Perceived by Consumer Habits

Gustavo A. de Morais<sup>1</sup>[0009-0001-1983-9290] and Ana C. Broega<sup>1</sup>[0000-0001-8400-8402]

<sup>1</sup> Minho University, Textile Engineering Department, Guimarães, Portugal  
cbroega@det.uminho.pt

**Abstract.** Today, the damages brought by the linear production system throughout history are apparent, and at this moment, the harm caused to the biosphere and the depletion of natural resources are perceived, as endangering the well-being and even the survival of humanity. In Portugal, the footwear sector becomes worrying due to the observed expansion of economic values and consequently the use of materials and resources, namely synthetic hides and leather. This research starts with a brief characterization of the footwear sector in Portugal, followed by a contextualization of the importance of the transition from the current production scenario to a Circular Economy. It ends with a study of consumption habits through a survey. It raises reflections on the number of products purchased per user, purchase motivations, forms of disposal, and familiarization with sustainability concepts. The collected information is analyzed under the principles of sustainability and especially the concept of the circular economy, which reveals impressive results and conclusions that can be extremely useful in developing new products and services for sustainability.

**Keywords:** Circular Economy, Footwear, Sustainability

## 1 Introduction

With a linear production system by tradition, in particular footwear and clothing companies need to adopt innovative processes to meet the demand for differentiated products and a transition to a more circular and, therefore, more sustainable system.

It is known that the rhythms of fashion lead to the manufacture of goods on an accelerated scale, which ends up causing the accumulation or premature disposal of products. This subject is accompanied by the wide use of natural resources and waste generation, contributing to the environment's degradation, which becomes even more worrying when the production numbers are analyzed.

According to the Ellen MacArthur Foundation, in 2015, the textile industry was responsible for the emission of 1.2 billion tons of CO<sub>2</sub> into the atmosphere. This production is based on non-renewable resources, including petroleum for the manufacture of synthetic fibers, fertilizers for cotton cultivation, and chemicals for dyeing the fibers. It is worth mentioning the use of water in the entire process, totalizing 93 billion cubic meters annually (Ellen MacArthur Foundation, 2017).

The global footwear market in 2018 was responsible for harm to the environment, accounting for 1.4% of global greenhouse gas emissions, equivalent to 700 million tons of CO<sub>2</sub>-eq (Quantis, 2018). This value is distributed within the production chain, being: extraction of raw material (20%), processing of raw material (14%), production of footwear components (43%), assembly (20%), packaging production (1%), transportation (2%). Within this process, the materials used for the manufacture of footwear are divided into synthetic (57%), leather (25%), and textiles (18%). For synthetics and textiles, the production phase represents the smaller level of impact, while for leather, the extraction and processing phases of the raw material (tanning) represent more than 50% of the climate impact (Quantis, 2018).

In 2018, 22.3 billion pairs of shoes were manufactured worldwide. Among the largest producers are China, India, and Vietnam, which represented 72.3% of the global production volume in 2017, followed by Brazil, Indonesia, Nigeria, Pakistan, Mexico, Thailand, and Italy (Abicalçados, 2019).

Furthermore, according to the Sector Report developed by the Brazilian Footwear Industry Association (Abicalçados) in 2019, the largest footwear producers are also the largest consumers. In China, domestic production is 3.5 times higher than domestic consumption, while in India, domestic production is practically equivalent to consumption. The report also highlights consumption in the United States, with 7.2 pairs of shoes per person, followed by Norway and Hong Kong, with 7.1 pairs per person. The study points out China as the largest exporter among the countries, with 8.3 billion pairs (2017), corresponding to 47.7 billion US dollars, followed by Vienna with 926 million US dollars, Indonesia with 407 million US dollars, and Germany with 281 million US dollars.

According to APICCAPS (Portuguese Association of Footwear, Components, Leather Goods and Substitute Manufacturers), by the end of 2017, the country (Portugal) had a total number of 1526 companies in operation, exporting in the same year about 83,257,409 pairs of shoes, and showing a growth of 2.9% over the previous year. This sector counts with the sale of more than 95% of its production to 152 countries in five continents. In 2018, the country exported around two billion Euros in shoes, representing around 3.4% of total national products exported. With these growing values of consumption and resources becoming more and more scarce, it becomes urgent to awaken to more conscious and responsible consumption.

The Circular Economy was born to oppose the current Linear System of production, then structured by extraction, production, and disposal. This Circular Economy has been developed over the last few years, having its bases in Regenerative Design, Cradle to Cradle, Industrial Ecology, Biomimetics, and Blue Economy. Its objectives are waste and pollution elimination from the beginning, maintenance of products and materials in use, and regeneration of natural systems. This new concept considers the existence of two cycles, the Biological, where natural raw materials are used to return to the environment through composting and anaerobic digestion, for example, and the Technical Cycle, where products and components are recovered or restored through reuse, repair, remanufacture or recycling (Ellen MacArthur Foundation).

According to the Footwear Technology Centre of Portugal, footwear companies will benefit if they choose to move away from the current linear production model

and propose alternatives based on the circular model. It bets on ecodesign, an element that can guarantee the durability of the products, timeless styles, customization, reduction of chemical substances, absence of toxic products, comfort, lightness, minimization of materials, and repair, reuse, and recycling. The selection of materials is an essential factor, and it is suitable to use recycled, recyclable, biologically based, natural or renewable, ultra-light, durable, with a low environmental footprint or resulting from local production. All these processes must be covered in an ecological production, which suggests scanning, as the end of the prints on paper, for example, the production waste reduction, and use of renewable energy, among others. In this context, waste is seen as a great opportunity for raw materials and can allow different sectors' interconnection. Leather can be produced with biological origin materials, thermoplastic materials can be recycled and give rise to high-quality products, and post-consumption shoes can be recycled and transformed into new or raw materials for furniture and construction (CTCP, 2020).

Active in the transition process of this new economy, the Cradle to Cradle Institute of Product Innovation presents one of the most relevant certifications in recognition of products designed for the Circular Economy, guiding designers and manufacturers through a process of continuous improvement in the management of materials and resources. The certification is divided into five categories:

- 1- Material property, which seeks to ensure that products are manufactured with the safest possible chemical compounds for humans and the environment, through a process of inventory, evaluation, and optimization of the chemicals of the material;
- 2- Product circularity, which eliminates the concept of garbage and allows products to remain in continuous cycles of use;
- 3- Renewable energy and climate, which values the use of clean energy, promoting the reduction or vanishing of the climate changes caused by the greenhouse effect;
- 4- Water management, for the recognition of such resources, protection of springs and watersheds, and safe availability to people and other living beings; and finally
- 5- Social justice, which honors the environment and all those involved in the production process and product cycle, whether employees or the local community.

The certification can be granted on five levels: Basic, Bronze, Silver, Gold, and Platinum, to simulate continuous improvements. After a first analysis, the certification is renewed every two years, confirming if the improvement plans have been achieved and if leverage to another level is possible (Circular Idea, 2019). The circular economy of Planet Earth is only 9.1% (Circular Economy, 2018), i.e., numerous and rapid transformations are necessary for the search for environmental balance.

## 2 Methodology

As a tool for understanding the attitudes of the current footwear consumer, a survey was applied. Structured in three parts: questions of characterization of the sample, exploration of footwear consumption habits, and environmental concern of the surveyed sample. These were elaborated in digital format and applied online, and it was released by the University of Minho's contact database and the researchers' contact database. The digital format was available online for a month to answer. It is a convenience sample but directed to Portuguese citizens from the most diverse fields and occupations. The survey presented about 40 questions and required about 7 minutes to be answered.

## 3 Presentation and discussion of results

### 3.1 Sample Characterization

The results represent a sample of 167 individuals, distributed 56.3% female and 43.7% male, aged between 19 and 55 years, and an average of 30.4 years old in the female population and 34.7 years old in the male population. In terms of education, most have undergraduate or graduate degrees, 87.1% of women and 68.4% of men. Most of them are employees (52.6% of the men and 48.2% of the women) and students (18.8% of men and 10.5% of women). A significant part of the sample has professional actuation in the field of design and architecture (42,1% male and 40,0% female), in fashion (30,6% female), and in engineering (31,6% male).

### 3.2 Consumer Habits and Environmental Concerns

It was identified that more than half of the sample (62.4% female and 57.9% male) considers footwear an essential element in the composition of personal style, that 44.7% of the female public buys about 3 to 4 pairs of shoes per year, while 57.9% of men buy 1 to 2 pairs per year.

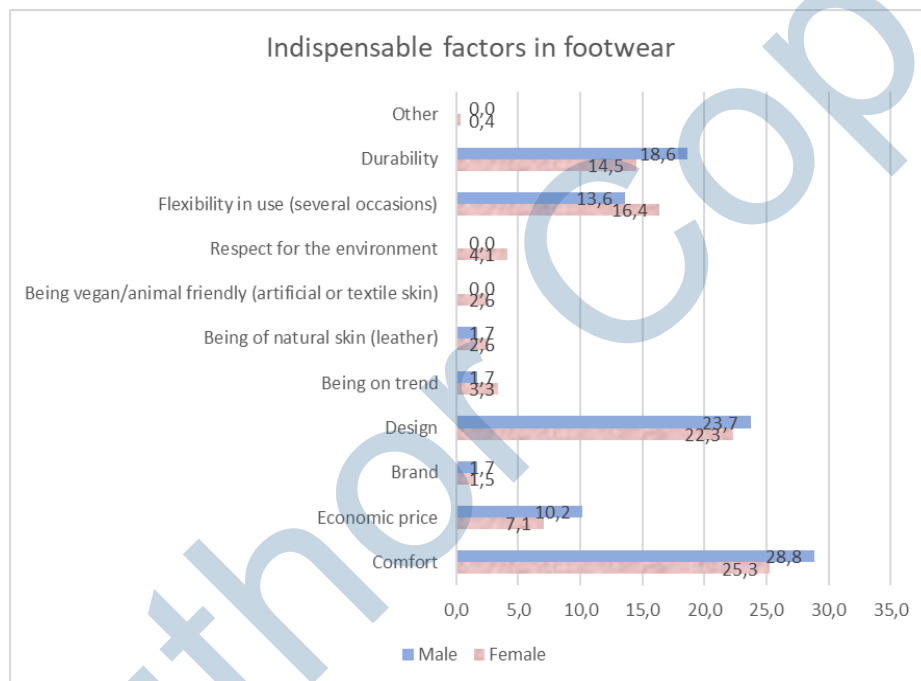
Regarding the shoes stored in the closet, on average, 40% of women have more than 16 pairs, and 31.6% of men have 7 to 9 pairs of shoes. The research pointed out that 38.8% of the female public almost "always plans to purchase footwear", but in turn 3.5% let themselves be carried away by "impulse". In turn 36.8% of the male sample "plans their shoe purchases", and 15.8% only buy when they "have to replace a worn out pair" of shoes.

Most of the respondents have a preference for purchasing in physical spaces, such as shopping malls.

Figure 1 presents the results related to the requirements considered indispensable in footwear. Both publics elected "comfort" as the most important element, followed by "design" and "durability" mainly for men. It is noted that flexibility in use is also a valued parameter for women, taking into account the use on several occasions.

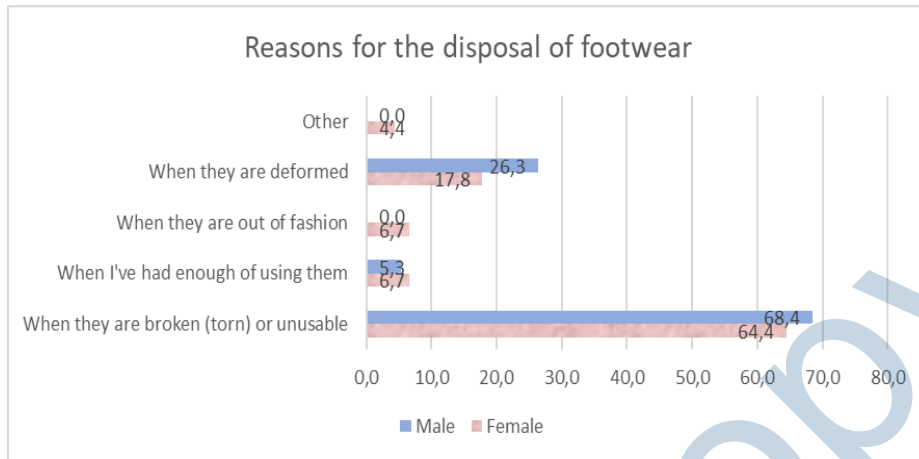
When it comes to the footwear typology, the Sneaker appears first for both females (24.9%) and males (29.5%), followed by booties for women (15.6%) and sporty shoes for men (27.3%).

In terms of durability, most of the sample say that their footwear has a useful life of more than five years (51.8% of women and 42.1% of men). As for the minimum duration of the footwear, the sample pointed to more than one year (52.9% women, 57.9% men), with interesting answers in contrast, as footwear with a useful life of less than one month have 7.1% of women and 5.3% of men. The parts identified as those that are most rapidly damaged were the toecap and the soles.



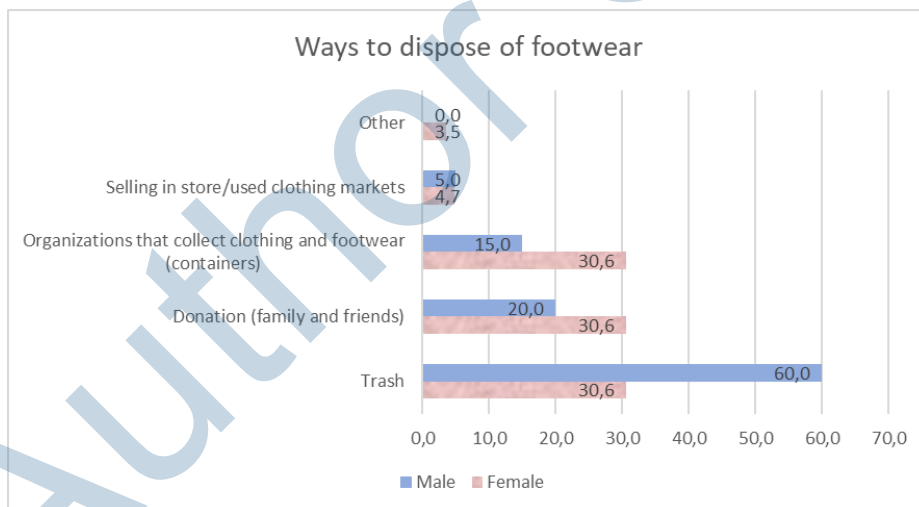
**Fig. 1.** Answer the question: "What are the indispensable factors in your footwear?"

Figures 2 and 3 show the values related to the disposal processes of footwear. The main reason why respondents discard footwear is when it is damaged and deformed. Men throw disposed shoes in the trash (60%), while women not only throw them in the trash (30.6%), but also contemplate donating them to family and friends (30.6%), or even dispose it in clothing bin collectors (30.6%).



**Fig. 2.** Answer the question: "Usually why do you discard your shoes?"

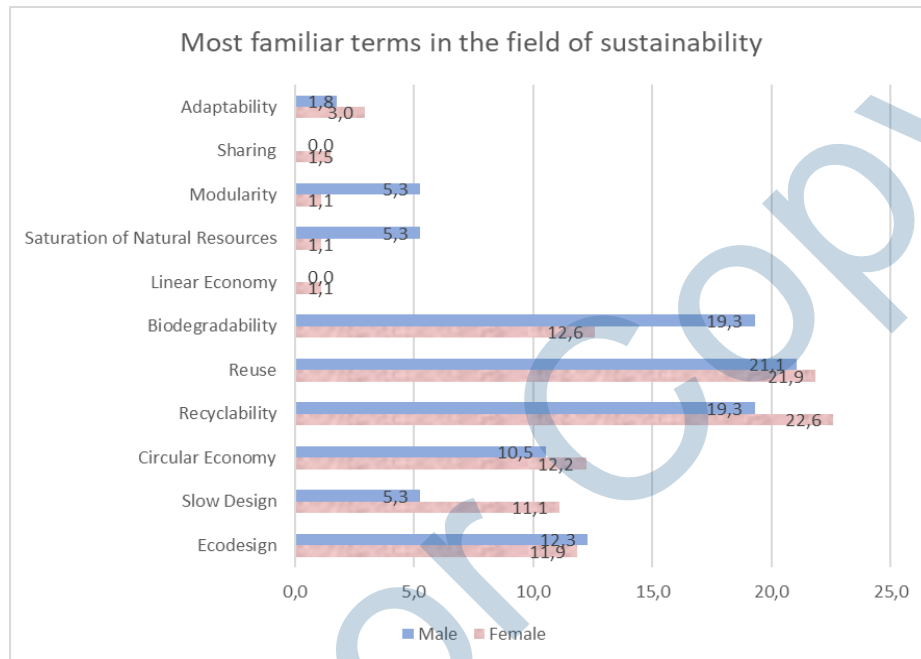
A question about the use of second-hand shoes was presented, and the answer was divided into: 73.7% of the male sample did not accept such a condition, however, 54.1% of women accept to use of second-hand shoes.



**Fig. 3.** Answer the question: "How do you dispose of the shoes you no longer want?"

When questioned about the materials considered more sustainable in the manufacture of shoes, textiles took the first position, followed by leather. Regarding the question: "Do you know Footwear Brands with ecological or sustainable models?" 60% of the women said to know some footwear brand with these characteristics, while most men (57.9%) claim not to know ecological or sustainable brands.

To know the familiarity of the respondents with terms or concepts of sustainability, it was asked: "What are the terms which you are most familiar in the scope of sustainability? Among the most recognized answers are: "recycling", "reuse" and "biodegradability" (Fig. 4).



**Fig. 4.** Answer the question: "What terms are most familiar to you in the field of sustainability?"

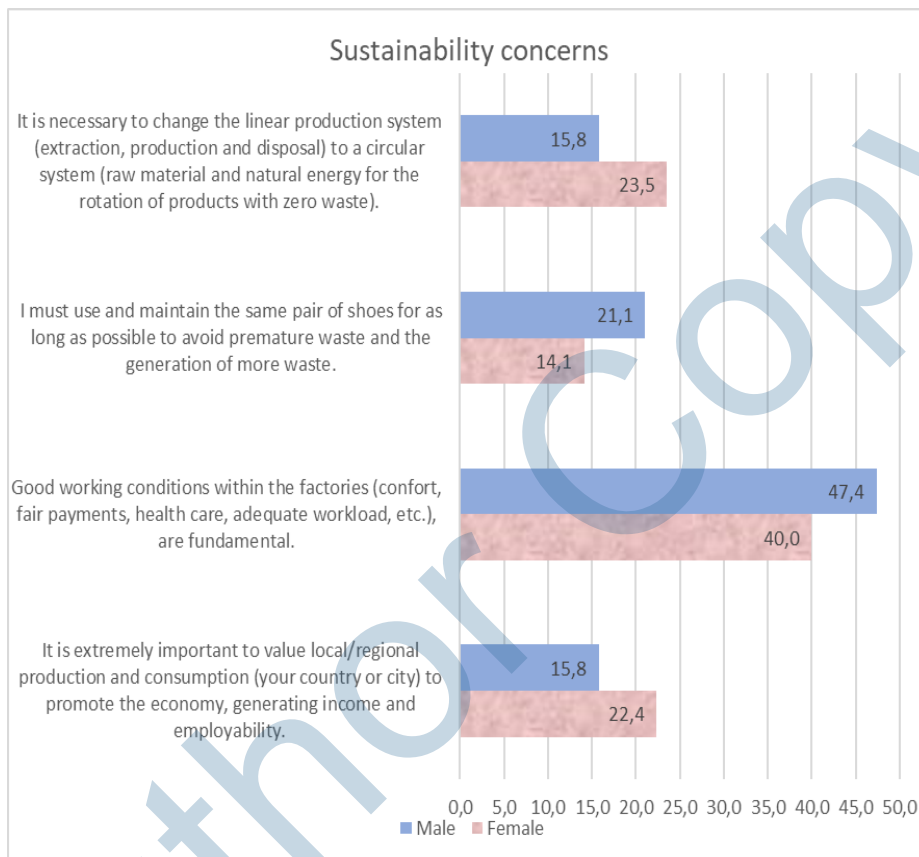
To allow a reflection on the respondents' perception of sustainable perspectives, statements were proposed to assess the agreement from 1 to 5, from total disagreement (1) to total agreement (5), passing through neutral value (neither agree nor disagree) with 3.

Thus in the statement of the phrase: "the footwear industry does not bring as much harm to the environment as the clothing industry", 34.1% of women agree (value 2), and 31.6% of men have no opinion (value 3).

As for the question "I need to know the origin of my product: where it is manufactured, how it is made, which raw material is used.", once again 36.5% of women agree with this need (value 2), and 31.6% of men answered neither agree nor disagree (value 3).

Figure 5 presents the results regarding the environmental, social, and economic factors of sustainability. The main concern is the factories' "excellent working conditions" for 47.4% of men and 40.0% of women. However, 23.3% of women already show some concerns about changing the linear production system to a circular system and valuing local production and consumption to promote the local economy and

employability (22.4%). Men for their part are more focused on maintaining their footwear for longer (21.1%), extending its Life Cycle, avoiding its premature disposal, and the generation of more waste.



**Fig. 5.** Answer the question: "Which of the statements below best fits your concerns?"

## 4 Conclusions

Considering that Linear Economics is a process in transition, it is necessary to analyze sustainable perspectives since they are the ones that allow the direction toward a new circular model. This applies to any industry and especially the footwear sector, and this is reflected in the conclusions of this paper.

Footwear is considered an essential element in the composition of the personal style, both by women and men. The purchase of footwear in physical space is still privileged, perhaps due to the need for trying the product, since the "comfort" (adequacy of the feet) is still one of the most valued factors in this product, so the online purchase is not yet the preferred.



In general, besides valuing footwear design, women have a more fabulous taste for fashion issues, and maybe for that reason, despite planning their footwear purchases, they often let themselves be carried away by impulse purchases. They buy on average 2 to 4 pairs of shoes per year, and they accumulate more than 16 pairs of shoes in their closets. On the other hand, men accumulate fewer pairs (7 to 9), which can be explained by considering durability an essential factor, buying only when they are unusable.

Concerning footwear disposal, the figures are worrying because they show that more than 50% of men and 30.6% of women still dump them in the garbage. A good portion of the female public (30.6%), also usually leave their shoes in collectors (of used clothing), where organizations later collect it. It is worth remembering that the shoes deposited in the garbage end up in landfills or incinerated, bringing severe damage to the environment. Such attitudes occur because there are still no consistent policies regarding the correct disposal of clothing and footwear. In a new circular model, a possible solution to this problem would be to hold companies responsible for receiving their end-of-life products and recycling them for new products.

It appears that the majority of women surveyed know some brand of footwear with sustainable and ecological models, unlike men who are not yet awake to the cause. Such a scenario can be explained, considering the familiarization of the female public with fashion and an absolute lack of communication of brands to their values in terms of sustainability.

The terms Recycling, Reuse, and Biodegradability, about the concept of sustainability, are the most familiar to the respondents. Thus, in the context of the transition from an economic model, concepts may already have been perceived, such as Biodegradability recognition, which is an indispensable Circular Economy factor.

Regarding "concerns about the harm caused to the environment by the clothing industry and the footwear sector" and "I need to know the origin of the product: where it is manufactured, how it is made, what raw material is used," the subject seems to raise awareness among the female public, however, in terms of footwear consumption, men are the ones who buy the least.

We believe that because the female public has a more significant buying habit, and is thus directly linked to fashion, they have greater knowledge and positioning about such matters. Once again, we believe in the potential of fashion as a communication tool. Following this line of thought, there is perhaps an explanation for 54.1% of women accepting the use of second-hand shoes, and 73.7% of men not accepting these second-hand products.

In the search for the perception of sustainability concerns, both women and men have shown greater attention to fair working conditions, an essential factor of ethical fashion. It is believed that such a result arises from the fact that most of the inquirers are employees and can quickly put themselves in the position of employees of the footwear industry.

This study ends up recognizing the current footwear consumer, thus providing a vision of how it is necessary to pay greater attention to the values of circularity and its application in the face of current environmental demands.

## References

1. Ellen MacArthur Foundation (2017) A New Textiles Economy: Redesigning Fashion's Future. <https://ellenmacarthurfoundation.org/a-new-textiles-economy>
2. Quantis (2018) Measuring Fashion: Insights from the Environmental Impact of the Global Apparel and Footwear Industries. p 18
3. Abicalçados (2019) Footwear Industry Report Brazil 2019. p 7-14
4. APICCAPS. Footwear in numbers. Portugal, p 3-13. <https://www.apiccaps.pt/>
5. Ellen MacArthur Foundation (2019) Circular Economy. <https://www.ellenmacarthurfoundation.org/pt/economia-circular/conceito>
6. Centro Tecnológico do Calçado de Portugal (2020) How the Footwear Cluster Can Embrace Sustainability and the Circular Economy. [https://www.ctcp.pt/noticias/como-pode-o-cluster-do-calcado-abracar-a-sustentabilidade-e-a-economia-circular/4509.html?lang=1&newsletter=yes&utm\\_source=sendinblue&utm\\_campaign=CTCP\\_Noticias\\_Como\\_pode\\_o\\_Cluster\\_do\\_Calado\\_abraar\\_a\\_Sustentabilidade\\_e\\_a\\_Economia\\_Circular&utm\\_medium=email](https://www.ctcp.pt/noticias/como-pode-o-cluster-do-calcado-abracar-a-sustentabilidade-e-a-economia-circular/4509.html?lang=1&newsletter=yes&utm_source=sendinblue&utm_campaign=CTCP_Noticias_Como_pode_o_Cluster_do_Calado_abraar_a_Sustentabilidade_e_a_Economia_Circular&utm_medium=email)
7. Circular Idea (2019) Cradle to Cradle Certification will win version 4.0 - Know the main changes. <https://www.ideiacircular.com/certificacao-cradle-to-cradle-versao-4-0/>
8. Circular Economy (2018) The Circularity Gap Report: Our World is only 9% circular <https://www.circle-economy.com/news/the-circularity-gap-report-our-world-is-only-9-circular>