Leather wastes in the Portuguese footwear industry: new framework according design principles and circular economy

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Abstract

Leather shoes are the main category of footwear products done in Portugal, representing around 75% of all products in this industrial sector. The wastes produce by the footwear industry are very aggressive for the environment and requires new approaches from all stakeholders, including sectorial organizations and politicians. This exploratory research will be done using data from the sectorial organizations APICCAPS and CTCP, data from the National Agency for Environment and also from a field research (cases of Portuguese footwear companies). If the footwear companies will perceive the competitive advantages of being “green”, then they will incorporate the design principles and they will make the sustainability be an essential part of their strategies, including new approaches according the four R’s: Reduce; Reuse; Recycle and Re-thinking or (Re)Design. This is something very important, mainly when the footwear companies are dealing with more conscious consumers and with the new environmental requirements.

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1. Introduction

The Portuguese footwear industry had in the last six years a remarkable performance in several economic and competitive indicators. Leather shoes are the main category of footwear products done in Portugal [1] and Portugal is the 10th World Exporter of Leather Shoes (Table 1). It represents around 75% of all products done in this industrial sector. The wastes produce by the footwear industry are very aggressive for the environment, mainly if it is considered all the value chain (tanning included). The National Plan for the Wastes Management in Portugal (Plano Nacional de Gestão de Resíduos de Portugal) presented by the Portuguese Agency for Environment in 2011 says that 15% of raw material (leather, rubber, polymers, textiles, paper, etc) used in this sector are wastes [2]. Some of these wastes cannot be reused or recycled, but with new approaches and innovative methodologies they can be “worked” in order to create value in their value chain.

For a long time, the main approach at waste’s sustainability was focused in the three “R’s”: Reduce, Reuse; Recycle, in order to minimize damages. At the beginning of this millennium, William McDonough and Michael Braungart proposed a new “R”: Re-thinking or (Re)Designing. This new “R” is based on the behavioural reorganization of the society, focused on Ecodesign and design processes linked with sustainability and with a new conscious consumer [3].

“Circular economy” is a star in all scientific discussion about sustainability and new global economy. As says Walter R. Stahel (pp. 453), “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, and remanufacture what cannot be repaired” [4].

The Portuguese footwear sector does not want to stay behind in these new approaches to sustainability and their global challenges. There is a long road to do, but the Portuguese footwear stakeholders have to start focusing some research efforts in this new way of thinking. This article intents to be a preliminary contribution to the future discussions around “Circular Economy” in traditional and low-tech European’s sectors as they are textile, clothing and footwear.

Table 1. Top 10 Exporters of Leather Footwear (2015).

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>USD Million</th>
<th>World Share</th>
<th>Pairs Millions</th>
<th>World Share</th>
<th>Average Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China</td>
<td>10 922</td>
<td>20.5%</td>
<td>725</td>
<td>33.1%</td>
<td>15.05</td>
</tr>
<tr>
<td>2</td>
<td>Italy</td>
<td>7 695</td>
<td>14.4%</td>
<td>125</td>
<td>5.7%</td>
<td>61.50</td>
</tr>
<tr>
<td>3</td>
<td>Vietnam</td>
<td>5 965</td>
<td>11.2%</td>
<td>293</td>
<td>13.4%</td>
<td>20.37</td>
</tr>
<tr>
<td>4</td>
<td>Hong Kong</td>
<td>2 455</td>
<td>4.6%</td>
<td>90</td>
<td>4.1%</td>
<td>27.34</td>
</tr>
<tr>
<td>5</td>
<td>Germany</td>
<td>2 392</td>
<td>4.5%</td>
<td>69</td>
<td>3.1%</td>
<td>34.74</td>
</tr>
<tr>
<td>6</td>
<td>Indonesia</td>
<td>2 233</td>
<td>4.2%</td>
<td>95</td>
<td>4.3%</td>
<td>23.48</td>
</tr>
<tr>
<td>7</td>
<td>Spain</td>
<td>2 132</td>
<td>4.0%</td>
<td>57</td>
<td>2.6%</td>
<td>37.46</td>
</tr>
<tr>
<td>8</td>
<td>Belgium</td>
<td>1 968</td>
<td>3.7%</td>
<td>71</td>
<td>3.2%</td>
<td>27.86</td>
</tr>
<tr>
<td>9</td>
<td>India</td>
<td>1 923</td>
<td>3.6%</td>
<td>115</td>
<td>5.3%</td>
<td>16.72</td>
</tr>
<tr>
<td>10</td>
<td>Portugal</td>
<td>1 840</td>
<td>3.4%</td>
<td>59</td>
<td>2.7%</td>
<td>31.00</td>
</tr>
</tbody>
</table>

Others important issues linked with fashion industries and sustainability are “fast fashion” and “slow design”. Fast production and also fast consumption leads to the systematic decrease of resources and the consequent increase of wastes. This situation stresses the earth’s capacity to regenerate and recover the damages done by all the human activity. This is why the “slow fashion approach” appears as a new model that can be a revolutionary way to deal with this new reality. It is focused on its link with real human needs, awareness and responsibility. “Slow Fashion” designs, produces and consumes in a way that acknowledges its impacts on society and in the environment [5]. By
using the concept of “slow fashion” in the fashion industry it is possible to re-invigorate a healthy rhythm of production, meaning that the environment and people could healthily co-exist and the earth would have time to regenerate during production cycles [5].

2. Methodology

This research is part of a broader project in the sustainability and competitiveness of the Portuguese footwear industry according new trends in the “Circular Economy” and in the called “Creative Industries”. This is an exploratory research, using data from the sectorial organizations (APICCAPS – Portuguese Footwear, Components and Leather Goods Manufacturers’ Association, and CTCP – Portuguese Footwear’s Technological Center), data from the National Agency for Environment and also it will be done a field research (cases of Portuguese footwear companies: tanning industry and footwear producers). The first steps are already done and in April 2017 the 2C2T Textile Research Center from Minho University will have young researchers doing a work plan to find some answers to these questions.

The research methodology can be quantitative or qualitative: the qualitative analysis is presented as the most recommended when the researcher wants to study a small sample of entities and the study is focused on a theme, subject or sector [6]. It is also recommended when the investigation aims obtaining detailed and in-depth information on situations, events, people, organizations, interactions and behaviors observed by the investigator during the field research [7]. When the industrial sector consists mainly of SMEs, as they are the “fashion industries” and the Portuguese footwear industry, the qualitative approach is recommended to reduce the distance between the administrator or owner and the investigator [8]. The tanning company Roldes from Guimarães produces leather wastes and works with several Portuguese footwear producers. This company will be an important partner is this exploratory research (Figure 1).

![Image](image_url)

Fig. 1. Leather wastes in Laminating Machine

3. Results and discussion

The total inventory of the footwear wastes produced in Portugal is yet uncomplete. Each footwear and tanning company has to deal with their leather wastes and send them to appropriate places (the companies that works with
leather wastes – collect, transport and deposition in landfills - have environmental competences and license to work with these kind of wastes), but they have to find the best solution according several items. This is a necessary starting point to the future discussion about sustainability and “the shift to green” [9]. Designing and reengineering new processes and products according the circular economy and the triple bottom line sustainability model [10] is a critical issue that needs to be assured. The Total Design activity model begins with the market requirements and demands [11] and it ends with the products’ selling. A more conscious consumer to the “green issues”, demands a definition of products and processes according these principles. The phases “specification, concept design, detail design and manufacture” have to have the sustainability concepts integrated. Manufacturing shoes according to the Design for Environment principles [12] requires the direct involvement of the product design and development process in each footwear company and this approach will be done, starting from the main raw material: mainly Wet Blue Leathers (Figure 2). Later, it is expected to be implemented in the preparation of the shoes’ collections and in the footwear production line.

Fig. 2. Wet Blue leathers

Ecodesign is an important approach to the sustainability and two of the main perspectives of Ecodesign are Upcycling and Downcycling [13]. Downcycling corresponds to a process of recovering a material for reuse as a new material but of lower value, compromising the integrity of the original material in the recycling process. As an example, the leather wastes of Figure 1 will be exported and submitted to a downcycling process in China (they will be raw material to technical gloves). Upcycling corresponds to a process of reuse of wastes that are converted into new products or materials with added value, whether this value has an environmental or economic dimension. The downcycling is a less environmentally friendly form of recycling than the alternatives for reduction and reuse, due to energy consumption from non-renewable sources used in recycling processes.

The deposition of leather wastes in landfills or the wastes incineration will continue to exist in the footwear industry. Smashed and granulated leather wastes (Figure 3 a,b) will be always an ecological problem, but if in this research project new solutions according design principles and circular economy can be find, the environmental impact can be highly reduced.
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Fig. 3. (a) Leather Wastes (powder); (b) Block powder

An internal report of CTCP coordinated by Maria José Ferreira argues that each pair of leather shoes produces around 100/200 grams of leather wastes. Portugal is an important European producer of this kind of shoes, as they are Italy or Romania, and has to deal with their environmental impacts.

4. Conclusions

The Portuguese footwear industry produces several wastes and they are sent to landfill or to incineration without being weighed and analyzed other "green" options. This reality needs to be faced and assumed by all the stakeholders (industry and consumers mainly) and by the national authorities. If the footwear companies will perceive the competitive advantages of being "green", then they should incorporate the design principles and they should make the sustainability to be an essential part of their strategies. If the politicians (national and local) understand the advantages of the circular economy, then they will promote it in their everyday actions and in their politics plans. Portugal produces and exports over 50 million pairs of leather shoes. If each pair is responsible for 100-200 grams of leather wastes, this is an environmental problem but it is also a great opportunity for searching new solutions, involving design in several dimensions and approaches. The universities and sectorial organizations of the Portuguese fashion industry are prepared for these new challenges and to satisfy the requirements of a more conscious consumer - a green fashion consumer.

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