Design as a Driver for Behavioural Change: Oceans and Plastics, Approaches for a Shift Towards Sustainability

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Abstract. Design as a field of study and research emerged in the 1960’s, a relatively recent area of academic study, however its multidisciplinary characteristics demonstrate that it has become a field of major importance in various types of research problems on other areas of study.

We are living a pandemic scenario unveiled by Covid-19 that made governments and societies change their ways of living, working, and interacting. On a Planet in which humanity’s overconsumption and overproduction endangered the biological regeneration of the natural habitats, these changes demonstrate the possibility to transform behavioural habits and mindsets towards a more environmentally driven attitude.

In this study, we researched the negative impact of plastic litter in the Oceans, a fast-growing menace that needs urgent action. Based in a comprehensive literature review, we were able to better understand the span of the problem and decided to center our approach on fast moving consumer goods, having narrowed the aim of our research to one of the most common plastic packaging items found in marine litter that results from a negative behavioural habit: plastic grocery bags.

Subsequently we have selected a set of food retail companies in Portugal as case studies, to access if they use new and innovative design solutions, in which careful material flow decisions, environmental concerns, acceptable consumption habits and aesthetics have been taken in consideration.

Findings reveal sustainability concerns when analyzing the commitment and action plans adopted by these companies on the improvement of their environmental impacts, with the reduction in the use of raw materials or the eco-design of their self-brand products, in which Design is a strategic element. Future work intends to follow up those actions to identify if they led the user/consumer to adopt a more sustainable and sentient behaviour.

Keywords: Design · Behavioural change · Sustainability · Oceans and plastics · Packaging · Circular economy
1 Introduction

As a science, Design emerged in the early 1920’s, where there was a need to make it less of a subjective art and more of a systematic process that used a rational and objective method like all other science areas. This need re-emerged in the 1960’s, where the Conference on Design Methods held in London is generally regarded as the event which marked the launch of design methodology as a subject or field of enquiry [2]. Nowadays, Design is perceived as a field of study and research, a discipline where we study the principles, practices, and procedures of design within its own rigorous culture and not as an objective and rational science [2]. It is then important to respect and acknowledge the creativity and non-linear innovation inherent in the design process [3]. Design is by essence transdisciplinary, a value-driven activity where designers can create change and propose values in the society [3, 4].

According to Simon [5], all sciences seek to change “existing situations into preferred ones”, whilst Papanek [1] states that Design is inherent to all human activity. Both statements suggest that all practices, whether professional or personal, are centrally concerned with design as a process, through which they can create new and better solutions for their problems.

It is therefore our belief, that because of its fundamental nature, Design, as a problem-solving activity, requires socially and morally responsible designers, so that it can truly be a cross-disciplinary tool for the creation of innovative solutions that can act as drivers for the common good.

1.1 Design and Behavioural Change

In The Sciences of the Artificial, Simon states that “the world we live in today is much more a man-made, or artificial, world than it is a natural world” [5]. This statement is consistent with the way humans relate with each other through their possessions and through the way they make, use and trade objects for both their symbolic value and functionality [6]. As Hood describes it, “belongings convey aspirations that owners wish to display to others” [6]. The author also emphasizes that almost all individuals feel at some extent the necessity for the approval of others regarding their clothes, car or even lifestyle choices [6].

However, if our behavioural habits bestow higher status to those who exhibit an exclusive fashion designer clothing like a value perceived good, over those who reuse, repurpose and recycle their goods, a shift towards a more sustainable lifestyle is not easy to attain.

Still, studies show that user behaviour can be influenced and even changed through design with a potentially positive outcome, particularly when human behaviour and product use decisions have a direct impact on the environment [7, 8].

Therefore, if Designers are professionals who “are capable of developing new, interdisciplinary solutions to improve quality of life” [9], it is expected that they partake the responsibility to create solutions that bridge collective and individual concerns, which embodies a key role skill on the creation of a sustainable behavioural shift of unwanted societal habits.
Projects like Desis [10] help to validate these statements and show Designers’ commitment and responsibility acknowledgement, towards a more sustainable future. Other entities like OpenIdeo, Ellen Macarthur Foundation and Sitra are also employing strategic Design approaches that help bridge governments with designers, practitioners, researchers, and common citizens, so that co-created sustainable solutions can be achieved [11–13].

Measuring the results of these initiatives should be the next step to take, in order to accurately assess if their activities (by Design), truly generate a positive impact on the planet’s ecosystems.

1.2 Sustainability and Overconsumption

Sustainability was first addressed on a Global scale at the UN Conference of the Human Environment, held in Stockholm in 1972. The outcome - a Declaration of Intent, already pointed out major concerns that are still presently raised by public and private stakeholders, as for example the need to shape our actions throughout the world with a more prudent care for their environmental consequences [14]. In 1987, the Bruntland Report identified sustainable development as “the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [15].

Recently, the 2030 Agenda for Sustainable Development, endorsed the 17 Sustainable Development Goals, which are an urgent call for action by all countries for a global partnership towards a healthier planet. Along with other important measures, it is recognized that tackling climate change and working to preserve our oceans and forests are utmost priorities [16].

However, we live in a moment in time where consumption provides meaning, or at least legitimizes the lack of meaning. Through consumption people meet their individual needs, construct their identities, and confirm their status in society. [3] The linear economy system created a take - make - dispose flow of raw materials that led to massive production, guiding society to an overconsumption pattern of goods and services with a huge lack of knowledge and consciousness for the Planet and the preservation of its resources.

COVID-19 is the infectious disease caused by the most recently discovered coronavirus. This new virus was unknown before the outbreak began in Wuhan, China, in December 2019 and is now a pandemic affecting many countries globally [17]. This pandemic evidences the absence of respect and awareness concerning the environment [18], raising the problem of the emergence of new and unprecedent zoonotic diseases. Still, a study on the Covid-19 forced confinement, showed a 17% worldwide decrease of CO2 emissions during lockdown [19], suggesting societies can reverse their negative impacts on nature if they are willing to adopt different behaviour patterns.

1.3 Oceans and Plastics

Oceans cover 71% of the earth’s surface and embody 97% of all the water that exists on the Planet. They produce 50% of the oxygen we breathe and encompass the health and
livelihoods of many people through its resources and the important aesthetic, cultural, and religious benefits they provide [20, 21].

However, human activities can adversely impact the Oceans, where the most serious environmental effects are related to climate change, land-based pollution, and overfishing. Still, accurate data regarding these impacts is hard to collect as satellite observations cannot penetrate below surface waters [20, 21].

For the purpose of this study we will emphasize land-based pollution, particularly plastic, a major concern for marine and coastal ecosystems. Marine plastic litter has been found at all ocean depths, being the deepest record, a plastic bag found at 10898 meters in the Mariana Trench [22]. Its amount continues to increase and it is estimated that 8 million tons of plastics enter the oceans each year. Although it is still difficult to collect data and track progress, a recent study shows that 46% of European postconsumer plastic is a pathway for plastic debris to enter the oceans as it is exported to countries that lack waste management policies [23].

Perceived as a major threat to the ecosystem, marine litter prevention must occur in a faster pace, by ensuring the recovery and recycling of used plastic products, encouraging communities to make environmentally conscious decisions, and demanding improvement of governments on waste management. If we cannot prevent litter from reaching the Oceans, cleaning up the oceans will always be an ineffective effort [20].

Initiatives like Seaqual [24], Parley for the Oceans [25] and Circular Ocean [26], amongst others, show the path collaborative Eco Design approaches can follow, in order to proactively prevent and suppress Ocean pollution by plastics. In Portugal specifically, projects like Blue Circular [27] or businesses like Zouri [28] also suggest that Design can have a leading and important role in ocean sustainability.

1.4 Packaging and Circular Economy

Packaging has always been used for the purpose of collecting, transporting and storing goods. The earliest package containers were made from natural materials like leaves, animal skins and gourds. [29]. This suggests that packaging containers have continuously been used for their functionality. However, with the growth of societies and consumption patterns, new, easier to transport and fast-produced materials like plastic were developed. Plastic has many positive attributes that make it the ideal material for packaging, however these same properties pose problems on repurposing, reusing or recycling a significant volume of packaging plastics [30].

In Europe, the largest use of plastics is for packaging, and single use plastics (SUP) are the most common marine litter item found. Measures to prevent the environmental impact urge implementation because “the relationship of producers, retailers and consumers with plastics is unsustainable in both socioeconomic and environmental terms” [31].

One of the most referenced approaches towards a more sustainable plastics policy is Circular Economy (CE). CE “would change economic logic because it replaces production with sufficiency: reuse what you can, recycle what cannot be reused, repair what is broken, remanufacture what cannot be repaired” [32]. For the Ellen Macarthur Foundation, CE is based on three principles: “Design out waste and pollution”; “Keep
products and materials in use” and “Regenerate natural systems”, being that Design is the first and most crucial principle to be developed [33]. Eco-design approaches are consequently elements for CE as they “consider environmental aspects at all stages of the product development process and strive for products which make the lowest possible environmental impact throughout their life cycle” [34].

Aesthetics can be used to compensate for the lack of authenticity that may compromise the consumers perceived value of recycled, repurposed, or reused items [5], and provide them with a high value identity, so they are covetable.

2 Case Studies

The European Plastic Bags Directive 2015/720, led to a 74% decrease on consumption of lightweight plastic carrier bags (<50 μ) in Portugal, with a simultaneously 61% increase of reusable plastic bags, according to a study published in 2017 [35]. This study also acknowledges that the role of hypermarkets and supermarkets in providing alternatives through the distribution of reusable plastic bags was determinant for the adoption of this new behaviour.

On this regard, for the second part of the methodology chosen we conducted an analysis of a set of case studies. This analysis gathers criteria regarding overall sustainability concerns, specific plastic policies, and particularly actions relate to plastic grocery bags. The data was collected through online research where an assessment of the information available in each case study’s official website was made. The case studies were selected considering their market share in Portugal, and therefore, we decided to focus our research analysis scope on the top three retail groups operating in the country: Sonae, SGPS, SA.; Jerónimo Martins, SGPS, S.A and Auchan Holding SA. The relevance of the selected retail groups is evidenced on the Global Powers of Retailing Report, a study conducted and published by Delloite, where they occupy respectively, the 155th, 50th and 18th place on a ranking of the 250 biggest Retail Groups Worldwide [36].

2.1 Sonae, SGPS, SA

*Sonae, SGPS, SA* is a multinational company managing a diversified portfolio of businesses in retail, financial services, technology, shopping centers and telecommunications [37]. The Group’s website homepage displays a “Planet” tab on the main navigation menu, where data for their three main strategic axes regarding the environment is described (see Fig. 1): “Nature and Biodiversity”; “CO2 and Climate Change”; and “Plastics”. Here it is possible to search information regarding the action plans and policies the group develops towards an environmentally sustainable planet. On the “Plastic” strategic axe, the retailer group promotes the urgency to foster a more responsible use of plastic and states that by 2025 intends to have its private label plastic packaging 100% reusable, recyclable or compostable.

The “Sustainability Report of 2018” is also made available in the “Publications” link and can be downloaded by the general public. With specific regards to plastic bags
use, the report indicates that 1,295 tones of virgin plastic was avoided through the inclusion of 80% of recycled material in reusable bags (see Fig. 2).

One of the group’s main areas of business is Sonae MC, a leading company in the food retail sector in Portugal, represented under the following signs: Continente (urban hypermarkets); Continente Modelo (large supermarkets); Continente Bom Dia (proximity supermarkets); Continente Online (e-commerce platform); and Meu Super (proximity stores franchise) [38]. Sonae MC has its own sustainability strategy with five main areas of action: Energy and climate change; Circular Economy; Responsible Sourcing; Responsible Offer; and Communication (see Fig. 3).

Because of its business nature, Sonae MC is a major consumer of plastics, therefore the subsidiary developed the Responsible Plastic Movement (see Fig. 4), their own programme for a sustainable approach towards plastics. This movement has seven main commitments that are aligned with the United Nations SDG’s for 2030 [39].
Jerónimo Martins, SGPS, SA

Jerónimo Martins, SGPS, SA is an international group based in Portugal with more than 225 years of accumulated know-how in the food distribution business, which accounts for more than 95% of the Group’s consolidated sales. In Portugal it operates in the food retail market under the sign Pingo Doce, with a universe of 440 shops spread across 300 locations [40]. In the group’s website homepage there is a “Responsibility” tab on
the main navigation bar. Here we find the “Respecting the Environment” menu, which presents the four main sustainability focus areas of the group: “Climate Change”; “Biodiversity”; “Materials and Packaging”; and “Waste Management” (see Fig. 5).

Although the company has not issued a specific Sustainability Report, data regarding their action plans and environmental impacts can be found in the “Corporate Responsibility Publications” tab [41]. It is possible to assess a wide range of the retailer’s environmentally related processes like Carbon Footprint, Single use Plastics consumption, and the Raising Employees Consumers Awareness of 2019, among other indicators. The 2019 Annual Report also has a chapter dedicated to the environment. The “Amar o Mar” (Love the Sea) programme (see Fig. 6), launched in 2019 includes a set of twelve commitments the retailer is complying with for Oceans conservation. The first six refer to marine life and biodiversity protection with sustainable fishery policies and actions. The seventh commitment specifies the use of alternative check-out grocery bags and the intent of using 80% of post-consumer recycled plastic for the single use grocery bags [42].
The commitments also describe implemented processes such as packaging eco-design and a rigorous criteria in the development of all new packaging for Pingo Doce brand products, so that a lower environmental impact can be assured (see Fig. 7) [42].

2.3 Auschan Holding, SA

Auchan Holding SA is an unlisted company, combining family and employee shareholders, structured as two independent companies: Auchan Retail and Ceetrus [43]. In the holding’s website homepage main navigation bar (see Fig. 8), the tab for “Our responsible commitments” directs the user to the company’s Corporate Social Responsibility Report (CSR), referred as a major driver of its sustainable actions [44].
The brands’ subsidiary in Portugal is *Auchan Retail Portugal*, the third major food retail company in the country, previously known under the signs of *Pão de Açúcar* and *Jumbo*. The subsidiary has its own Sustainability Report, where the initiatives and actions implemented towards environmentally friendly business processes within Portugal are detailed. It can be retrieved in the “Newsroom” tab, under the link “Publications”. Concerning the environment there are three main identified themes: “Climate Change”; “Single Plastics and Circular Economy”; and the “Preservation of Natural Resources”. The report has a specific Plastics section where the main strategies developed by the retailer are identified. A good example is the creation of the bulk section of the retailer’s stores that have reduced the use of plastic by twenty-five tons, according to the report. Eco design is also a referred subject, where their implemented initiatives are also thoroughly described (see Fig. 9).

When addressing specifically grocery bags, *Auchan Retail Portugal* has developed several initiatives to reuse and reduce their consumption. The company offers three main check-out bags: the reusable grocery bags (woven polypropylene bags), the paper grocery bags for non-food and light weight groceries, and the simple plastic bag, made of 80% recycled plastic and 100% recyclable (see Fig. 10).

Under the campaign “Less plastic, less Use”, *Auchan Retail Portugal* launched the 100% Portuguese made cotton bags (see Fig. 11) [45]. The latest bag development undertaken by the food retailer is the CE grocery bag, made from recycled plastic film, collected in the retailer’s own shops (see Fig. 12) [46].
3 Main Findings and Discussion

Findings indicate that all case studies show overall sustainability concerns. Sonae, SDGR, SA and Auchan Holding SA have published Sustainability Reports in 2018. Jerónimo Martins, SDGR, SA does not have a specific Sustainability Report but has a chapter on its 2019 Annual Report dedicated to the Environment.

With specific regards to Plastic policies, Sonae MC developed a program called “Responsible Plastic Movement” where the company emphasizes their commitment for a sustainable approach towards plastics. Jerónimo Martins SDGR, SA launched the “Amar o Mar” (Love the Sea) program, which includes a set of 12 commitments the retailer is complying with for Oceans conservation. Auchan Retail Portugal has endured several smaller initiatives regarding plastics, being the latest the launch of a new CE grocery bag that is produced from the out waste of plastic film of its own shops, a pilot project only available for the online grocery purchases.

All companies mention Eco design: (i) as a way to reduce the environmental impact of their private-brand products (see Figs. 4, 7, 9); (ii) as an important feature that partners/suppliers should attain.

Results also show that these food retailers seem aware of the plastic problematic consequences on the environment and have taken action to reduce, reuse and redesign their plastic packaging, although these actions are mainly focused on primary packaging (single use plastics of self-brand products). Plastic grocery bags are part of the environmental strategy chosen by all retailers, although through the use of different approaches and none of these represented a priority to be addressed. Overall, plastic grocery bags are foreseen as articles to be reduced or redesigned with, what suggests to be, a greater conscious materials flow decision. Other options as paper or cotton bags are stated to be more environmentally sustainable, however, no scientific evidence was found to support this statement.

Regarding aesthetics, minor differences can be found in each retailer’s products, in terms of labelling and printing, however the bag options offered have similar designs (See Table 1).
4 Conclusions

Humankind is living unprecedented times that show the need to respect and preserve earth’s natural ecosystems, and although consumers are more informed and wish to care for the Planet and its sustainability, their behaviour patterns are highly associated to a linear economy development of our society, where we take, make and dispose natural resources without realizing the negative effects for the environment.

The current Covid-19 pandemic reinforces the need and also the opportunity societies have to change the course of action towards an eco-friendly pathway.

Due to the nature and volume of their business, the food retail companies might contribute to this change, because their design-related activities have a relevant impact on the environment, especially regarding the relationship between packaging and plastic marine litter that derives from land-based activities. The case studies suggest that some progress is being achieved towards a more sustainable use of raw plastic materials, however, it is not clear if the policies undertaken derive from a conscious concern for the Planet’s resources or from the need to adapt to laws and policies that have been and will be imposed by the government, such as European Plastic Bags Directive 2015/702 and European SUP Directive 2019/904. Regardless, the outcome of these actions seems to have a positive impact on the environment, through the reduction of the use of raw materials and the recycle of “in store” plastics, described in the case studies reports, amongst others.

Our research also revealed that the information provided by the case studies concerning their actions and sustainability goals although existent, could be better

Table 1. Grocery bags aesthetics

| Food Retail Company      | Grocery Bags |
|--------------------------|--------------|
| Sonae MC                 | ![Sonae MC Grocery Bags](image) |
| Jerónimo Martins         | ![Jerónimo Martins Grocery Bags](image) |
| Auchan Retail Portugal   | ![Auchan Retail Portugal Grocery Bags](image) |
clustered. Science-based resources were not found, and therefore, we believe that improvement could be done on this regard in order to present more trustworthy information for the customers, especially those who are more concerned with the environment.

Although further data research and accurate impact assessment on marine litter need to be made, the case studies’ eco design initiatives preliminary findings, support the reviewed literature concepts, in which Design is suggested to be a main driver for behavioural change and a catalyst for innovative and sustainable solutions that can contribute for healthier and cleaner Oceans.

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