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Sustainable Water Package: Consumer Perception and Challenges for Designers

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Abstract

Every year, an average of 1000000 litres of mineral water are sold in Portugal. An amount of plastic waste from the bottles, caps and labels arises ecological problems. Sustainability became a reality, and many consumers began with positive attitudes around this, such as environmentally friendly activities and purchasing of green products. But about water packages, how do consumers perceive sustainability? Is package design susceptible to influence the consumer sustainable perception? To find out, a survey was developed, and was applied online to two hundred and sixty-six people. In the first moment, the product stimuli are the shape water package and its label of the 1,5 litres water package of the five most sold water brands. The attributes analysed were the material/form, graphics, and package information. Respondents were invited to rank each package individually. In the second moment, a new stimulus price was introduced. The Material/Form attribute respondents consider Serra da Estrela the most sustainable package. In terms of Graphics and Package Information, Penacova was the brand considered most sustainable. When the prices are showed to respondents, the brand intention to buy, is Penacova. This work brings some theoretical and practical implications. For literature, it brings news contributes about package design attributes and their influence in terms of consumer perception. For brand managers and/or product managers the findings show how graphics attributes can influence the consumer perception and help designers to develop the best labels to communicate to targets.

Keywords

Plastic water bottles, Consumer perception, Sustainability, Labelling, Package design.

1. INTRODUCTION

The consumption of bottled water in Portugal has a sustained growth over the past few years, gaining a prominent place in the beverage sector. This evolution results from consumer choices, marked by growing and relevant concerns, related to a healthier and more balanced diet. The statistics of Portugal Mineral and Source Water show that in the last ten years, a positive evolution of sales of natural mineral water and spring water (national market and exports), in volume of litres is about 26%. The sales volume in this period, in number of packages, also shows a positive evolution of about 12% (APIAM, 2021).

The latest statistical data from the Portuguese Association of Natural and Spring Mineral Water Industrialists, Portuguese consume more smooth spring waters (APIAMNN, 2020). From January to September 2019, the sales statistics by brands indicate that the most sold bottles in the national market correspond to those of PET with the capacity of 1.5 litres from the following five brands: Luso, Penacova, Serra da Estrela, São Martinho and Vitalis.

According to Kotler, Kartajaya, & Setiwan (2011), firms that offer and encourage sustainable consumption can earn long-term profits. Indeed, sustainability became a reality, and many consumers began with positive attitudes around this, such as environmentally friendly activities (e.g. recycling and resource saving, check if the product is wrapped in recycled components and produced with green methods (Grunert, 2011; Laroche, Bergeron, & Barbaro-Forleo, 2001) and purchasing green products (Joshi & Rahman, 2015). But many consumers think that the effectiveness of green products is lower. These consumers should be informed, so, firms must communicate the quality and sustainable issues of their products (Grunert, 2011; Nia et al., 2018). The eco-labelling could be a way to communicate the environmental information and help to develop consumer awareness and influence their behaviour (Jerzyk, 2016).

Thus, this paper addresses the question of sustainable water package and examines the consumer perception related with the brand. It considers packaging as a communication object based on the following questions: Is package design susceptible to influence the consumer sustainable perception? Is the bottle label susceptive to influence the consumer sustainable perception? What is the main challenges to designers to communicate sustainable bottle waters to improve consumer sustainable perception? This paper is structured as follows: first is presented the theoretical background of this research which draws on literature on sustainability and consumer behaviour and sustainable package design and, then we introduce the method. Next, a further discussion on findings and finally are outlined the challenges for designers.

2. LITERATURE REVIEW

In this section is presented a review of the literature regarding sustainability and consumer behaviour and outlines the sustainable package design considerations.

2.1. SUSTAINABILITY AND CONSUMER BEHAVIOUR

Consumer consumption has increased leading to exhaustion of natural resources and damaging the environment (Chen & Chai, 2010). The sustainability concept becomes a reality and therefore consumer behaviour starts to change ((Antunes, Vitorino, & Lisboa, 2019)). Many consumers think sustainability is a good thing (Grunert, 2011) and may have positive attitudes like environmentally friendly activities (e.g. recycling and resource saving, check if the product is wrapped in recycled components and produced with green methods (Grunert, 2011; Laroche, Bergeron, & Barbaro-Forleo, 2001) and purchasing green products (Joshi & Rahman, 2015). The sustainable consumer behaviour is conceptualized as *actions that result in decreases in adverse environmental impacts as well as decreased utilization of natural resources across the lifecycle of the product, behaviour, or service* (White, Habib, & Hardisty, 2019, p. 3) and Green Purchase Intention is defined *as the probability and willingness of a person to give preference to products having eco-friendly features over other traditional products in their purchase considerations* (Ali & Ahmad, 2016, p.88).

Some studies concluded that green purchase intention is a predictor of green purchase behaviour, which means that purchase intention can affect the probability of a customer decision to buy green products (Akehurst, Afonso, & Gonçalves, 2012; Chan & Lau, 2002; Witek & Kuźniar, 2021).

Despite, positive attitudes toward sustainable products, consumers do not always translate into actual purchasing behaviour (Morwitz, Steckel, & Gupta, 2007; Thøgersen & Ölander, 2003). This suggests that environmental considerations have a minor role in consumer purchase intentions (Mohr, Webb, & Harris, 2001) This is known as the "attitude-behaviour gap" (Park & Lin, 2020). Some authors try to explain this gap and some findings consider that it could be related with factors such as price and willingness to pay (Bray, Johns, & Kilburn, 2011; Sudbury Riley, Kohlbacher, & Hofmeister, 2012), quality and performance perception (Bray et al., 2011; Johnstone & Hooper, 2016), lack of information on environmental impact (Bray et al., 2011; Martinho, Pires, Portela, & Fonseca, 2015) and cynicism (Bray et al., 2011). There also are other reasons to explain the discrepancy of the gap like individual characteristics (e.g. demographics (Bray et al., 2011), lifestyle (Connolly & Prothero, 2003), environmental knowledge and attitude (Nguyen, Lobo, & Nguyen, 2017; Suki, 2016; Uddin & Khan, 2018)), situational factors (e.g. promotions (Minteer, Corley, & Manning, 2004) and benefits of products to meet their needs or self-interest(Kollmuss & Agyeman, 2002).

The study of sustainable behaviour for marketeers are important because the consumption mindset that traditional marketing encourages, is a key driver of negative impact on environment. Thus, businesses should able to adapt the demands of our changing world, namely sustainability issues (Peattie & Peattie, 2009). Kotler, Kartajaya, & Setiwan (2011) refers that firms that offer and encourage sustainable consumption can earn long-term profits. White et al. (2019) argue that marketing and behavioural science can help to explain how consumption is influenced and how to be more sustainable. Consumers should be socially responsible for their private consumption and their consequences on our natural environment (Moisander, 2007).

In this sense, it will be important to educate consumers to purchase products adapted to environmental issues (e.g. green products) (Nia, Dyah, Hery, & Bayu, 2018). A green product has the smallest possible impact on environment; it is an effort to minimize waste in its production process as well as meet environmentally requirements (e.g. it does not contain toxins, it is made from material that can be recycled and it has a minimalistic packaging) and its durable quality is assured simultaneously (Nia et al., 2018). Many consumers think that the effectiveness of green products decreased. As the sustainability cannot be seen or tasted, the green product quality and its sustainable issues associated should be communicated correctly (Grunert, 2011; Nia et al., 2018). Even more, most consumers will only be willing pay more for a green products if they perceived the added value of the product (Nalluri, Reddy, & Kumar, 2020; Nia et al., 2018). Thus, as Erskine & Collins (1997) suggested, a product produced in a more sustainable way, should be communicated on its label – eco-labelling. The package and its environmental information has an important role for developing consumer awareness and influencing their behaviour (Jerzyk, 2016).

2.2. SUSTAINABLE PACKAGE DESIGN

According to Boz et al. (2020) sustainability has become one of the packaging functions as the ensuring food quality, safety, transport facility, logistics and communication. "Sustainability in the packaging value chain can be improved by facilitating collection and sorting for recycling, composting, reuse, and waste-to-energy processing, and other proper disposal and then processing of sorted packaging as well as more sustainable material sourcing and reducing material and resource use, while preserving essential functions of packaging" (Boz et al.,2020, p.2) The packaging functions can be grouped into two categories the logistical, functional or technical; and the marketing and communication. The first packaging function protects the product during its movement through distribution channels, from production to disposal and the conservation and safe product (Gomes et al., 2017, p.5); the second one concerns about "packaging has become a key vehicle in marketing communication and managing food brands, particularly at points of sale" (Estiri et al., 2010) and it is a tool to differentiate products from others.

The sustainable packaging can be defined according to eight criteria: i) benefits, safe & healthy for individuals and communities throughout its life cycle; ii) meets market criteria for performance and cost; iii) it is sourced, manufactured, transported, and recycled using renewable energy; iv) optimizes the use of renewable or recycled source materials; v) it is manufactured using clean production technologies and best practices; vi) it is made from healthy materials throughout the life cycle; vii) it is physically designed to optimize materials and energy; viii) is effectively recovered and utilized in biological and/or industrial closed loop cycles (Sustainable Packaging Coalition, 2011).

There are two main categories of packaging: visual elements and informational (Underwood et al., 2001; Silayoi & Speece, 2004, Gomes et al., 2017). In consumers' opinion, the eco-friendliness in packaging is related with three attributes: structure/form, graphics and package information (Magnier & Crie, 2015; Borgman et al., 2019). The first one concerns about the quantity of material use, material type (recycled/recyclable) and reusable package. The second includes the layout, colour combination, typography and photography and the last one, is related about the written information on packaging (Borgman et al., 2019).

More specifically, the structure/form larger packages are perceived as less expensive and encourage greater use (Wansink,1996) and, consumers usually perceive the larger forms as more sustainable, even when they buy the product and know its exact volume (Gomes et al.,2017). The Graphic attributes influence the consumer`s perception as the health characteristics of the product (Gomes et al.,2017) and some colours are perceived as more sustainable than others like green, brown, blue and natural (Chu & Rahman, 2010). The package information attributes, that are related with the written information on packaging can help consumers to make their decisions on the basis of product characteristics, for example the environmental claims and logos, and labels from environmental organizations (Borgman et al., 2019).

Not only the manufacturing companies have to create a framework with specific actions to be more environmentally friendly in packaging (Magnier & Crie, 2015), but also designers have responsibility on society and in the environment (Papanek, 1971) as the sustainability design strategies can reduce lifecycle impacts (Lewis et al., 2001). Designers are able to reduce the impacts of use by intentionally shaping behaviour towards more sustainable practices (Bhamra et al., 2008; Elias et al., 2008; Lockton et al., 2008; Wever et al., 2008). Consumers need also to perceive the sustainable food products and to enter their decision-making, where the label information may be traded off against other criteria (Grunert, 2011) and also to clarify the consumer misconception usually due to packaging industry to assert their material as the most sustainable one (Boz et al. ,2020).

3. METHODOLOGY

The main goal of the study is to understand how consumer perceived sustainability on water package in terms of shape (considering design attributes). It was selected this product because is a product of a routine response behaviour, a kind of product involving the regular purchase of low-cost items that require little decision-making effort. We developed an online survey with two kinds of stimulus. In the first moment, the product stimuli are the shape water package and its label of the five most sold water brands in Portugal. Respondents were invited to rank each package individually with their perception about attributes of packaging namely: material/from, graphics and package information in a 5-point Likert Scale (1- Nothing Sustainable, 5 – Very Sustainable). Then, the subjects also should rank the brands from the 1st more sustainable to 5th more sustainable. For this question, it was used an image containing all five water brands. In the second stimulus, the price was introduced. A question about purchase intention with the same image (all packages) but with the price of bottles/brand were included. The last part of survey is about inquiry profile. The images are illustrated in table 1 and figure 1. The last one was showed with price and without price.

Table 1 – Product Stimuli to Evaluate Consumer Perception about Package Sustainability.

Brand	Bottle Shape	Label
Luso		
Penacova		
Serra da Estrela		
São Martinho		
Vitalis		

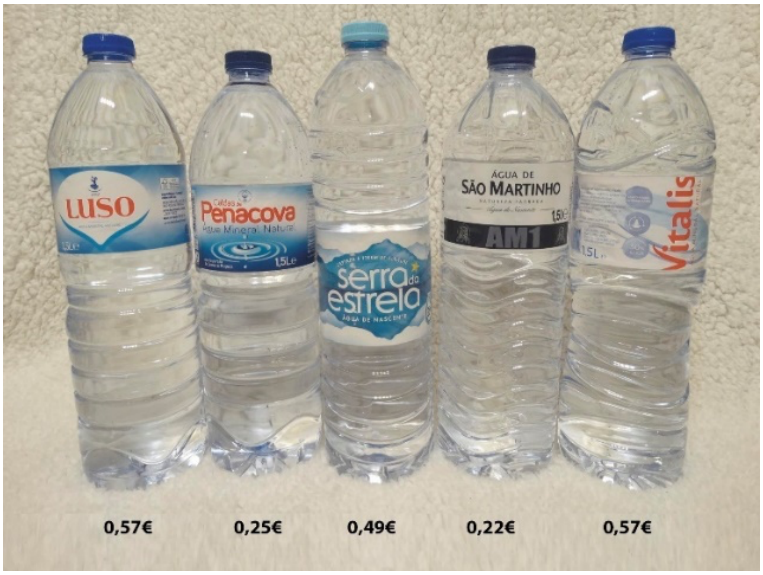

Figure 1 – The five brands illustrating their prices and packaging attributes.

The total time for collecting data was four months from January to April of 2021, using the LimeSurvey (online survey platform). The sample is non-probability by convenience. A total of 266 structured questionnaires were answered through researchers' network, but 66 respondents did not finish the survey. Therefore, it was validated and completed 200 responses (but it was considered the maximum answers possible). This sample is constituted by 141 females and 59 males, the average age is 31,3 years old (minimum=17, maximum=70), and 55,2% of them have graduation degree qualifications. Data statistics were performed using IBM SPSS version 27 software and it was used descriptive statistics for responses analysis.

4. Data Analysis and Discussion

The first analysis is about Material/Form (table 2) that is related to material type and used and packaging reusable. Thus, respondents consider Serra da Estrela more sustainable (higher average), followed by Penacova. Apparently, all the water bottles are from plastic material with some form/design variations. The consumer perception could be focused on terms of form/material quantity (indeed are very similar) or by seeing the label details about the material. The Serra da Estrela label has the following information written: "bottle with 25% of recycled plastic – rPET" and the Penacova label has a circular economy diagram graphic with the planet at its centre (table 1).

All the plastic bottles are made of colourless plastic, so the Graphics attributes were analysed according to the label contents (table 2). The colour combination was analysed in terms of hue, the different types of saturation or brightness was not considered, and the white colour was seen as a background (not as a colour). All the sample bottles have a white background label, the São Martinho has one additional colour (dark blue), the Luso, Vitalis and Penacova have two additional colours on the label (red and blue) and Serra da Estrela has also two, blue and a hint of yellow. Almost all brands include graphics that communicate the water message; however, São Martinho does not have any pictograms to communicate the visual concept. The findings showed that Penacova was considered the most sustainable brand with a higher average (3.42) but also with the highest standard deviation (1.108). Serra da Estrela is the second brand with a higher average value (3.33) and with the lowest standard deviation (0.949). This choice might not be because of the colour used, but in terms of the image composition that explains the whole brand – yellow star with a mountain (table 1).

In terms of Package Information, this attribute was analysed considering the label (table 2). Thus, the written information about environmental claims and logos of environmental organizations were analysed. Some of

the brands have more information about this topic and others less, and we believe that the respondents perceptions attended to this factor, so they consider that Penacova is the most sustainable (higher average=3.84), followed by Serra da Estrela (that presented the lowest standard deviation=0.88). The reasons discussed here are similar with Material/Form attribute.

Table 2 – Attributes of Packaging of five brands most sold.

Attributes	Brand	N	Average	Standard Deviation
Material/Form	Luso	266	2.92	0.968
	Penacova	265	3.38	1.078
	Serra da Estrela	265	3.43	1.005
	Vitalis	265	2.66	1.014
	São Martinho	264	2.62	0.975
Graphics	Luso	233	2.96	1.008
	Penacova	233	3.42	1.108
	Serra da Estrela	231	3.33	0.949
	Vitalis	231	2.85	1.019
	São Martinho	231	2.79	1.093
Package Information	Luso	211	2.93	1.067
	Penacova	211	3.84	0.977
	Serra da Estrela	211	3.72	0.88
	Vitalis	211	2.63	1.050
	São Martinho	211	2.54	1.066

The five brands were showed to respondents to decide which brand they considered more sustainable. Table 3 reflects the main results. Serra da Estrela brand was considered the most sustainable (75 answers) but Penacova brand had 72 answers. The answers are consistent with the results of individual attributes of table 2 because Serra da Estrela has the highest values in terms of perception of Material/Form and the second of Graphics and Package Information. On the other hand, Penacova is stated as the second brand with highest value attributes, namely second choice in Material/Form but first in terms of Graphics and Package Information. The less sustainable brand perception considered was São Martinho.

Table 3 – Sustainable Brand Ranking from Consumer Perception

	Luso	Penacova	Serra da Estrela	São Martinho	Vitalis
1st Brand more sustainable	39	72	**75**	12	7
2nd Brand more sustainable	47	**65**	57	15	21
3rd Brand more sustainable	**63**	37	44	17	44
4th Brand more sustainable	36	19	27	50	**73**
5th Brand more sustainable	23	11	14	**109**	48

Table 4 shows the consumer choice considering the retail prices. When the prices are showed to respondents, the brand intention to buy, is Penacova (in Portugal is considered as a retail brand). This finding reflects the "attitude-behaviour gap" (Park & Lin, 2020) mentioned above. It seems that environmental considerations have a minor role in consumer purchase intentions (Mohr, Webb, & Harris, 2001). When analysed the sample income, the results showed that this sample has an aggregated income lower than 1500€ (59,3%), that according to some authors, the price can explain the gap referred and justify this choice here (Bray, Johns, & Kilburn, 2011; Sudbury Riley, Kohlbacher, & Hofmeister, 2012). However, the results are not extremely different from the others considering that Penacova was the second most sustainable bottle and the contextual environment attributes have higher levels.

The second consumer choice is Serra da Estrela, but it does not have so many variations between Luso and São Martinho. Vitalis is the less frequent, but in terms of price is similar to Luso, considering that they are both the most expensive waters. One explanation could be related to the brand awareness of Luso towards Vitalis.

Table 4 – Consumer Choice when Price is known.

Brands	Absolute Frequency	Relative Frequency (%)
Luso	28	13.7
Penacova	108	52.7
Serra da Estrela	36	17.6
São Martinho	29	14.1
Vitalis	4	2
Total	**205**	**100.0**

5. Conclusions and Implications

This paper addresses the question of sustainable water packages and examines a consumer perception related with the brands. It considers packaging as a communication object based on the following questions: Is package design susceptible to influence the consumer sustainable perception? Is the bottle label susceptive to influence the consumer sustainable perception? What is the main challenges to designers to communicate sustainable bottle waters to improve consumer sustainable perception?

First, the conceptual framework examines the water package consumers' perception to sustainability and the authors considered that the isolated package does not influence itself. Indeed the 1,5L water bottles design from all brands does not have significative variations in terms of size, shape, or transparent plastic. Considering the shape design, all the water bottles have different textures.

This relief is good to grab when transporting the bottle, to serve the liquid or grab when drinking directly from the bottle. All bottles have a cap to unscrew when open. But when the consumer is aware of sustainable issues, he reads the label and the data shows that Serra da Estrela and Penacova brands are the choice. The first one has a partial recycled package (rPET) and the second has a planet diagram that could be considered as "wrong references" (Grunert, 2011) because the consumers when see the label, this image transmits an ecological feeling and apparently the plastic of Penacova bottle is the same as the other study brands - PET. Therefore, in this case, the packaging of the bottle does not demonstrate sustainability by itself, all bottles seem the same family shape design, the perceived sustainability is in the information contained on the label.

Second, the label analysis includes simultaneously the graphics and package information because it is seen by the consumer at the exposure time (Grunert, 2011). The most sustainable colours are considered the brown, green and white (Borgman and al., 2019). The study of Rahman & Chu (2010) also confirms that consumers perceive the colour green as eco-friendly but also the findings show that other colours such as earthy brown and sky blue were frequently identified for such reason, as the blue colour could be associated to the water (some colours are address to products category). Graphics attributes, such as the typography used, that should be easier to read and about package information attribute, all brands should have environmental claims, logos, and labels of environmental organizations. However, only Serra da Estrela and Penacova have the FSC mix logo (paper from responsible sources); the first one with two distinguish logo/information about rPET and the second with plastic logic cycle planet and environmental suggestions. The results show that bottle label influence the consumer sustainable perception. Consumers recognize the sustainable issues (table 3) and this fact cannot influence the purchase, however the price bottle (table 4) influences the final decision.

Third, for designers the main challenges can be divided into three parts: material/form, graphics and package information. Designers have a great potential to decrease environmental and social impacts (Bhamra et al., 2008), but to show sustainability in terms of form (shape, material) of the water package, it could be considered one global communication, and it is a challenge do it.

The other challenge is the label. The graphics issues cannot be included only in the label, and it can be presented using more sustainable colours as brown, yellow or green that could make difference in terms of sustainable perception eco-friendly products (Rahman & Chum, 2010; Borgman et al., 2019) as well as the use of pictograms and background images. The quantity of colours used is one environmental issue to the label production as well as the material is also a big challenge.

And package information attribute, the use of logos and environmental claims and ecological organizations are essential to reduce the lack of the credibility barrier (Grunert, 2011). The main challenge is how to design this valuable communication.

This work brings some theoretical and practical implications. For literature, it brings news contributes about package design attributes and their influence in terms of consumer perception. For brand managers and/or product managers the findings show how graphics attributes can influence the consumer perception and help designers to develop the best labels to communicate to targets.

The study presents some limitations such as: the sample size, the lack of time to strengthen the study and other types of statistical analysis that could be made.

For future research we suggest analysing i) the consumer perception of water package made of other material like glass, ii) consider the brand awareness, iii) extend to other products, iv) the consumer perception of water package in different targets-age.

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