Environmental sustainability and food packaging. The role of packing material in purchasing decisions[1]

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Abstract

***Purpose of the paper**: The paper aims to enrich the knowledge on the role of packaging material in influencing the product buying process.*

***Methodology**: A between-subjects experimental design was conducted in order to investigate if the product quality judgment and the purchase intention towards the product differ among different packaging materials.*

***Findings**: Glass is considered better than other materials, especially in terms of lower perceived risk and higher (a) product quality, (b) intention to buy and (c) willingness to pay. By contrast, plastic does not have a good image.*

***Research limits**: Since the perception of the material should be closely related to the product category, caution should be exercised in generalizing the findings to the all food categories.*

***Practical implications**: The study has useful insights for manufacturers and product managers in the packaging management, one of the relevant components of the marketing mix.*

***Originality of the paper**: Most of the evidence regarding packaging cues focuses principally on elements like colour, shape, graphics and nutritional claims. A limited marketing research has been conducted about the crucial role of the packaging material in the consumers' evaluation process.*

Key words: packaging material; attitude; perceived quality; perceived risk; purchase intention; willingness to pay

1. Introduction

The primary function of packaging is to contain and protect the product from agents that can compromise its quality (i.e., dirt, moisture, breakage, shocks, vibrations, compression, changes in temperature, theft). Secondary, and equally important, is the information function relating to the knowledge and use of the product: description, composition, size, place of production, brand, guarantees, instructions for disposal.

In the current market context, characterized by growing competition and important changes in the relationship between companies and consumers, packaging takes on a strategic marketing role (Rundh, 2005;

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Luceri *et al.*, 2020). This is due to its ability to attract the attention of consumers when they are in front of the store shelf, to facilitate brand recognition, and to influence the perception and evaluation of the product quality, personality and uniqueness. Thanks to this ability, the product packaging is fully part of the factors that determine brand positioning and image in terms of brand recognition, brand association (e.g., George, 2005; Keller, 2009; Orth and Malkewitz, 2008; Silayoi and Speece, 2007; Stewart, 2004; Underwood and Ozanne, 1998) and brand choice (e.g., McDaniel and Baker, 1977; Prendergast and Pitt, 1996; Rettie and Brewer, 2000). Therefore, decisions related to the communicative elements of the packaging are of crucial importance. Given the influence on the consumer's evaluation and decision-making process, developing in-depth knowledge on these elements is fundamental for improving product communication and supporting the sales strategy (Vergura and Luceri, 2018). The present study intends to contribute to the scientific debate on the marketing role of the packaging by focusing the attention on the packing material.

The marketing literature has shown that product evaluation and purchase decision are influenced by both the verbal and visual elements of the package (e.g., Andrews *et al.*, 2013; Aschemann-Witzel and Hamm, 2010; Faulkner *et al.*, 2014; Garretson and Burton, 2000; Gorton *et al.*, 2010; Hoegg and Alba, 2011; Hogg *et al.*, 2010; Liaukonyte *et al.*, 2013; Luceri and Zerbini, 2019; Luceri *et al.*, 2020; Raghubir and Greenleaf , 2006; Saba *et al.*, 2010; Schoormans and Robben, 1997; Silayoi and Speece, 2004; Tan and Tan, 2007; Underwood *et al.*, 2001; Underwood and Klein, 2002; Wansink and Chandon, 2006). The first ones include the information provided by the package, namely ingredients, country of origin and nutritional value; the second ones concern colour, shape, material and graphic signs (e.g., brand, logo, product image). Most of the studies have focused on elements such as colour, shape, graphics and nutritional claims (i.e. information regarding the nutritional properties of a product). By contrast, the marketing role of packing material is much less investigated; furthermore, most studies have concentrated on its sustainability characteristics (e.g., Barber, 2010; Magnier and Schoormans, 2015; Magnier *et al.*, 2016; Marthino *et al.*, 2015) rather than its composition (e.g., Adam and Ali, 2014; Holliwood *et al.*, 2013; Kariyawasam *et al.*, 2006; Luceri *et al.*, 2020). To fill the aforementioned gaps in the literature, this article proposes and discusses the results of an experimental study aimed at investigating the consumers' evaluation and purchase intention towards the package materials (plastic, glass, polylaminate, tin) with which the following food categories are mainly marketed: milk, extra virgin olive oil, tomato sauce and fruit juice. The article is structured as follows. The next paragraph is dedicated to the theoretical background and the research objective. Subsequently, the methodology used in the study and the results obtained are described. The work ends with a discussion of the managerial implications and prospects for future research.

2. Literature review

Today the product packaging takes a role similar to that of other marketing levers, being a vehicle for communication and branding (Rettie and Brewer, 2000). Several factors explain its importance in the purchasing decision-making process. First, the packaging is the last element that consumers see before making the final purchase choice when they are in front of the store shelf (whether physical or virtual). In this circumstance, its characteristics - such as colour, graphics and information provided - have a decisive impact on the identification of the product (i.e., on being noticed or ignored) and on its attractiveness. This is true for impulse goods, namely products with unplanned purchase (Herrington and Capella, 1995), as well as for goods about which the consumer does not have preliminary information and/or has not developed expectations. These are all cases in which the likelihood that the purchase intention and decision are developed according to what is communicated in the store increases. Second, today consumers are often forced to buy quickly due to the reduction in the time available for carrying out daily activities. This is a situational influence that can lead to buying fewer products than actual needs and/or what is planned (Herrington and Capella, 1995). A package capable of attracting attention in the store fulfils the important function of helping the consumer to fill the shopping cart quickly (Silayoi and Speece, 2004; 2007). These evidences have led some authors to define packaging as an intrinsic characteristic of the product or brand that informs consumers about its personality and quality, influences the brand recognition and creates positive or negative associations with the brand (e.g., Keller, 2009; Orth and Malkewitz, 2008; Silayoi and Speece, 2007).

Given the importance of the communicative role of the product package, marketing literature has been interested in studying the impact of its verbal (e.g., ingredients, nutritional value, country of production and nutritional claims) and visual signs (colour, size, shape, material and graphics) on consumer behaviour. Many scholars have highlighted that both types of elements are able to attract the consumer attention, create expectations about the contents of the packing and, therefore, to influence the product evaluation and the purchase decision (e.g., Andrews *et al.*, 2013; Aschemann-Witzel and Hamm, 2010; Barber, 2010 Faulkner *et al.*, 2014; Garretson and Burton, 2000; Gorton *et al.*, 2010; Hoegg and Alba, 2011; Hogg *et al.*, 2010; Liaukonyte *et al.*, 2013; Luceri *et al.*, 2020; Luceri and Zerbini, 2019; Magnier and Schoormans, 2015; Magnier *et al.*, 2016; Marthino *et al.*, 2015; Raghubir and Greenleaf, 2006; Saba *et al.*, 2010; Schoormans and Robben, 1997; Silayoi and Speece, 2004; 2007; Tan and Tan, 2007; Underwood *et al.*, 2001; Underwood and Klein, 2002; Wansink and Chandon, 2006). However, despite the strong interest in this topic, the impact of packaging material on the consumers' evaluation and perception is still poorly explored. Most of the studies have investigated the communicative power and the ability to attribute value to the product of verbal and visual elements like colour, shape, graphics and claims. The opportunities of improving the package performance (healthiness and safety of the content, practicality, sustainability) thanks to new solutions or

combinations of materials offered by modern technologies have not yet fully attracted the interest of the marketing literature. Only the sustainability characteristics of the packaging have been further investigated. Specifically, the researchers focused on the comparison between sustainable and non-sustainable packages. This is justified by the growing concern for the environmental impact of products' production and consumption by both consumers and companies (Marthino, 2015). The first have become more careful in purchasing choices as a result of the increased awareness that individual behaviours generate collective negative consequences on the planet health (Kilbourne and Pickett, 2008; Shaw and Newholm, 2002). For their part, companies have integrated sustainability into their marketing strategy to reassure stakeholders, in particular the consumers. Among the actions undertaken, the adoption of sustainable packaging to preserve and protect the products stands out in importance. In light of this market interest in environmental friendly packaging, some authors have analysed the impact of sustainable packaging on consumers' (a) evaluation process, (b) attitude and (c) behaviour during both the purchase phase and the disposal/recycling phase (e.g., Barber, 2010; Magnier and Schoormans, 2015; Magnier *et al.*, 2016; Marthino *et al.*, 2015). For example, it has been shown that the product quality perception increases when it is protected by a sustainable package (Magnier *et al.*, 2016). Other studies have focused on the effect of the transparency of the material - namely, the possibility of seeing or not the product - on the product perception and purchase intention (Billeter *et al.*, 2012; Chandran *et al.*, 2019; Simmonds *et al.*, 2018; Vilnai-Yavetz and Koren, 2013). Few contributions in literature have investigated the relationship between packaging material and consumer behaviour. The majority focused on the fresh milk category and found consumer preference for glass and polylaminate (more commonly known as Tetrapak, the trademark of the company that made up tetrahedron-shaped plastic-coated paper carton) over carton and plastic (Adam and Ali, 2014; Holliwood *et al.*, 2013; Kariyawasam *et al.*, 2006). Polylaminate is considered safe, capable of guaranteeing the purity of the content and easy to handle (Kariyawasam *et al.*, 2006). Despite showing the highest purchase intention (Adam and Ali, 2014), glass has some undoubted disadvantages: the heaviness and the need for washing before disposal (Kariyawasam *et al.*, 2006). More recently, Luceri *et al.* (2020) investigated the quality judgment and the consumer purchase intention with respect to two packaging materials for extra virgin olive oil: polylaminate and glass. Results showed that the attitude towards the product and its assessment in terms of perceived quality and risk are worse in the case of polylaminate and translate into a lower purchase intention and a lower willingness to pay.

In light of what emerged from the literature, this study intends to enrich the knowledge on the role of packaging material in order to provide useful insights for the marketing policies of food companies. The goal is to investigate if and how the consumer's perception and evaluation, as well as the purchase intention, differ when products are packaged in different materials. Therefore, the following research question is formulated:

RQ: Does the packaging material influence the consumer's product perception, evaluation, and purchase intention?

In order to answer the research question, several constructs which are relevant in the consumers' decision-making process and allow to measure their assessments, perceptions, and behavioural intention were investigated: attitude towards the product, perceived risk, perceived quality, purchase intention, and willingness to pay.

Attitude is defined as the degree to which an individual has a favourable or unfavourable evaluation or appraisal towards an object that can be a subject, an event, or a behaviour (Ajzen and Fishbein, 2005). Attitude creation is a process that arises from learning, experience and exposure to environmental stimuli. In the context of purchasing and consumption choices, these stimuli derive from the marketing environment (Bagozzi, 1986; Wang and Heitmeyer, 2006). Since packaging represents a marketing lever, no wonder that packaging cues - and, among these, packaging material - are able to influence the creation of the consumer's attitude towards the product. Perceived risk is defined as the degree to which individuals feel the uncertainty and consequences associated with their actions, on a rational and objective level as well as on an emotional and subjective level (Bauer, 1960). It is a cognitive process that has received great attention in literature due to the crucial role it plays in different contexts, including purchasing decision making (e.g., Hunter-Jones *et al.*, 2008; Kwun and Oh, 2004; Liao *et al.*, 2010; Pavlou, 2003; Stone and Grønhaug, 1993). Potential risk choices can, indeed, negatively influence the behaviour of individuals (e.g., Keil *et al.*, 2000; Nicolaou and McKnight, 2006). Perceived product quality represents the consumer judgment of the overall excellence or superiority of a product (Anselmsson *et al.*, 2007). As such, quality expectation is able to influence the consumer choice among different product alternatives (e.g., Narasimhan and Sen, 1992; Steenkamp, 1989; Steenkamp and Van Trijp, 1996). Moreover, marketing literature highlighted that when information regarding the product quality is difficult to pre-obtain, packaging attributes are used as proxy of quality (Ampuero and Vila, 2006; Insch and Florek, 2009; Honea and Horsky, 2012; Venter *et al.*, 2011). Considering this evidence, if a high-risk perception associated to the use of a product packaged in a particular material can decrease the purchase intention, a high perceived quality can act in the opposite direction favouring the choice. The last measured dimension is the behavioural intention, operationalized as buying intention and willingness to pay.

3. Methodology

A 4 x 3 between subject factorial design was conducted to manipulate the product category (milk, extra virgin olive oil, tomato sauce and fruit juice) and the packaging material (glass, polylaminate, plastic/tin). For each product category, in order to control the potential bias due to brand familiarity, a fictional brand was identified, and three versions of the pack

were created, one for each material identified. Specifically, plastic, glass and polylaminate were used for fruit juice and milk, while tin instead of plastic was used for tomato sauce and extra virgin olive oil. Combining the product category and the pack material, twelve experimental stimuli (Figure 1) were created using a packaging design software. Each stimulus was shown to a single experimental group.

Fig. 1: Experimental stimuli

Source: own elaboration

In total, 270 subjects took part in the study. The participants' average age was 30.9 years old, ranging from 20 to 68 (SD = 12.56), while 70 per cent were female and 30 per cent male. The respondents were equally and randomly distributed among the twelve experimental conditions and balanced by gender and age. The average age was 30.43 years old for milk (n=70), 32.47 years old for extra virgin olive oil (n=68), 30.54 years old for tomato sauce (n=66) and 30.14 for fruit juice (n=64).

During the recruitment phase, the socio-demographic characteristics and the frequency of purchase of the categories under study were identified; this information allowed to select, for each group, only buyers of the category. In addition, in order to control for the expected bias generated by the predisposition towards sustainability and environmental protection, the attitude towards the environment was measured using the five-item scale developed by De Magistris and Gracia (2008) (Alpha=0.908). The Mann-Whitney U non-parametric test showed no significant differences among experimental groups for each product category ($p>0.05$).

The experiment was conducted in a laboratory. Each participant was welcomed into the room and informed about the procedures for carrying out the study. They were seated in front of a computer for the video

administration of the experimental stimuli. Subsequently, each subject filled in a structured questionnaire aimed at measuring the variables of interest through scales that have been well validated in the literature. Attitude towards the product was assessed through three sets of seven-point bipolar adjectives (Mueling *et al.*, 1991). The five-item scale proposed by Jo (2007) was used to measure the perceived product quality, while the four-item scale developed by Keh and Pang (2010) was used to measure the perceived risk. Finally, purchase intention and willingness to pay were assessed using, respectively, Putrevo (2008) and Konuk (2019) scales, each one composed of three items. All the items, except those related to the attitude towards the product, were detected on a self-anchored scale at 7 points (1=completely disagree; 7=completely agree). Table 1 shows the scales used and the relative internal reliability indices (Cronbach's α).

Data analysis was performed using the IBM SPSS statistical software (release 25.0).

Tab. 1: Scales' items and Cronbach's alphas

Variables	Items	Cronbach's α
Attitude towards the product (Mueling, Laczniak and Stoltman, 1991)	Bad - Good Unfavorable - Favorable Negative - Positive	0.938
Perceived quality (Jo, 2007)	The "*name of the product*" packed in the "*name of the material*" has an excellent quality The "*name of the product*" packed in the "*name of the material*" seems reliable The "*name of the product*" packed in the "*name of the material*" is safe The "*name of the product*" packed in the "*name of the material*" has excellent characteristics The "*name of the product*" packed in the "*name of the material*" can give me an excellent consumer experience	0.939
Perceived risk (Keh and Pang, 2010)	The thought of buying "*name of the product*" packed in the "*name of the material*" makes me feel uncomfortable The thought of buying "*name of the product*" packed in the "*name of the material*" gives me a feeling of anxiety The thought of buying "*name of the product*" packed in the "*name of the material*" makes me feel tension The thought of buying "*name of the product*" packed in the "*name of the material*" worries me a lot	0.935
Purchase intention (Putrevu, 2008)	The next time I buy "*name of the product*", I will consider "*name of the product*" packed in the "*name of the material*" The next time I consider purchasing "*name of the product*", I will collect information on "*name of the product*" packed in the "*name of the material*" The next time I buy "*name of the product*", I will buy "*name of the product*" packed in the "*name of the material*"	0.724
Willingness to pay (Konuk, 2019)	I am willing to spend extra in order to buy "*name of the product*" packed in the "*name of the material*" It is acceptable to pay a premium to purchase "*name of the product*" packed in the "*name of the material*" I am willing to pay more for "*name of the product*" packed in the "*name of the material*"	0.961

Source: own elaboration

4. Results

To answer the research question, the Mann-Whitney U non-parametric test was used. The means of the variables of interest for each material in the four product categories investigated are shown in Table 2.

Tab. 2: Means for categories and materials

Variables	Material	Milk	Fruit juice	Extra virgin olive oil	Tomato sauce
Perceived quality	Glass	22.70	23.15*	21.41*	24.17*
	Polylaminate	20.83	20.05	16.17*	19.96
	Plastic	20.16	18.63*	-	-
	Tin	-	-	19.32	16.62*
Attitude towards the product	Glass	14.44	28.90	13.32*	14.65
	Polylaminate	15.04	24.00	9.46*	12.90
	Plastic	14.12	26.46	-	-
	Tin	-	-	12.18*	12.86
Perceived risk	Glass	7.13	4.50	4.59*	4.57*
	Polylaminate	5.52	4.81	10.17*	7.00*
	Plastic	8.04	4.17	-	-
	Tin	-	-	8.82*	7.52*
Purchase intention	Glass	12.09	13.85*	17.09*	16.26*
	Polylaminate	13.78	14.19*	8.75*	11.96*
	Plastic	12.40	11.13*	-	-
	Tin	-	-	11.50*	11.62*
Willingness to pay	Glass	12.87*	12.90*	14.00*	13.87*
	Polylaminate	9.65*	8.38*	6.38*	7.68*
	Plastic	6.80*	6.38*	-	-
	Tin	-	-	6.95*	5.10*

* Significant difference compared to at least one of the other materials in the category

Source: own elaboration

Starting from the milk category, the willingness to pay is the only variable that is influenced by the type of material. Specifically, consumers are willing to spend more for the product packaged in glass, then in polylaminate (U=166.50, p<0.05) and in plastic (U=97.5, p<0.05); at the same time, the willingness is higher for milk in polylaminate than for milk in plastic (U=188.50, p<0.05).

Even fruit juice is characterized by a greater willingness to spend if proposed in a glass bottle compared to polylaminate (U=108.50, p<0.05) and to plastic (U=82.00, p<0.05). Plastic is the material for which the lowest purchase intention is recorded (vs glass U=148.00, p<0.05; vs polylaminate U=145.00, p<0.05). Finally, glass has better judgments than plastic also with regard to the product quality perception (U=150.5, p<0.05).

Extra virgin olive oil and tomato sauce categories are those in which the packaging material plays a more decisive role. Regarding tomato sauce, glass is the most successful material, with a positive effect on the purchase intention (vs tin U=92.50, p<0.05; vs polylaminate U=108.00, p<0.05)

and on the willingness to pay (vs tin U=43.00, p<0.05; vs polylaminate U=93.50, p<0.05). Simultaneously, the perceived risk is also lower than other materials (vs tin U=143.00, p<0.05; vs polylaminate U=174.50, p<0.05), as well as perceived quality which is higher for glass than for tin (U=102.00, p<0.05). Finally, respondents stated they were more willing to pay for tomato sauce packed in polylaminate than in tin (U=148.50, p<0.05).

Glass is also the preferred material for extra virgin olive oil. Glass is associated, on the one hand, with a lower perceived risk than tin (U=128.00, p<0.05) and polylaminate (U=101.00, p<0.05) and, on the other hand, a greater purchase propensity both in terms of intention and willingness to pay (vs tin U=97.50, p<0.05; U=84.00, p<0.05; vs polylaminate U=46.50, p<0.05; U=86.50, p<0.05). When the oil is offered in polylaminate the perceived quality and the attitude towards the product worsen. With regard to perceived quality, the difference seems significant only with reference to glass (U=148.50, p<0.05), while for the attitude towards the product Mann-Whitney U test shows a difference towards both the glass (U=128.50, p<0.05) and the tin (U=168.00, p<0.05).

5. Discussion and conclusion

The literature on the role of packaging has provided empirical evidence of the informative and persuasive power of this marketing lever. Various studies have shown how visual and verbal elements of the package are able to influence the product quality judgment and, consequently, to guide the purchasing behaviour. For example, the presence of the product image draws the consumer's attention, communicates information about the brand and helps to build its image (e.g., Underwood and Klein, 2002; Underwood *et al.*, 2001). The colour of the pack affects the consumers' emotional response and purchase intentions (e.g., Luceri and Zerbini, 2019), while nutritional claims can have a negative impact on the experience of some product attributes, such as taste (e.g., Lähteenmäki *et al.*, 2010; Raghunathan *et al.*, 2006).

Among the visual elements of packaging, the material is the least investigated. While most of the literature has focused on aspects related to sustainability, only a few studies have compared the different packaging materials in order to understand their impact on the purchasing behaviour. This research draws its inspiration from this gap in the literature. In particular, consumers' perception and behavioural intention with respect to the different materials with which food categories are currently marketed (i.e., milk, extra virgin olive oil, tomato sauce and fruit juice) have been investigated. Results showed that glass receives the most favourable cognitive response in terms of lower perceived risk and higher product quality, purchase intention and willingness to pay. The latter variable is more than double compared to the other materials considered: tin, polylaminate and plastic. Extra virgin olive oil is the category with the strongest preference for glass. Instead, in the case of milk, the evaluation of glass is quite equivalent to that of the other materials. In general,

traditional plastic does not have a good image. Probably due to the very current problems of environmental pollution, consumers attribute a low quality to milk and fruit juices packaged in plastic and declare themselves less willing to purchase and to recognize a premium price.

The research has both theoretical and managerial implications. From the theoretical point of view, the results enrich the literature on the role of packaging as a communication tool by showing how the material - like the other elements (i.e., shape, text and images) - influences the process of evaluation and choice of the product.

From a practical and managerial point of view, some useful indications emerge for companies and product managers in order to support the strategic marketing decisions with particular reference to the package lever. Consumers judge materials differently and, consequently, attribute a different value to identical products depending on the material used for packaging. The quality and risk perception and the purchase intention change even if the materials are equivalent in terms of product protection and maintenance of the organoleptic characteristics. For example, the literature has shown that consumers appreciate the possibility of seeing a food product inside the package and are willing to pay more to buy it (Sommonds *et al.*, 2018). As a result, the material becomes a core element in the product development process.

However, the evidence of a different experience with different materials must not lead to the error of excluding, a priori, the use of materials that suffer a disadvantage in perceptual terms. Marketing objectives must also be pursued through information and education. When consumers consider only certain types of materials as the standard for a given category, they value them better than the less-used ones. The challenge for companies is to help consumers overcome the resistance to change by understanding the reason why. Simple familiarity with the material? Prejudice on the product storage capacity? Misinformation on disposal methods? The answer to these questions paves the way for different marketing policies.

The results of this study offer insights for future research. Firstly, since the perception of the packaging material appears closely related to the product category, it is appropriate to replicate the study also with reference to other food and non-food categories. Secondly, the use of other research techniques - such as the focus group or the taste test - would allow to measure more in depth the consumers' perception towards the various materials, involving other senses besides the visual one (specifically, touch and taste).

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