The Effects of Material Appearance, Eco-label, and Brand Ethicality on Consumers' Perceived Packaging Sustainability

Abstract

Under the topic of sustainable packaging, this research looks into the effects of material appearance (ecological vs. conventional), eco-label, and brand ethicality on consumers' perceived sustainability as well as the subsequent product quality evaluation and purchase intention. A 2 × 2 × 2 between-subject experiment was designed and conducted to test the hypotheses among Dutch consumers based on two product categories: chocolate paste and cereal bars. First, in both food categories, eco-labels and ecological-looking materials both trigger higher sustainability perception. Meanwhile, an interaction effect was found in the cereal bar category when these two sustainable design cues co-exist in one package. Specifically, the eco-label has a more positive impact on consumers' sustainability perception when it's applied to conventional-looking packaging rather than ecological-looking packaging. Second, in the chocolate paste category, higher brand ethicality brings higher quality evaluation and purchase intention but has no effect on sustainability perception. Third, in the chocolate paste category, contrary to the increased sustainability perception, quality evaluation and purchase intention get lower when ecological-looking material is applied. Fourth, in the chocolate paste category, when consumers sense a higher fit between the product and the brand, their perceived packaging sustainability, quality evaluation, and purchase intention all increase accordingly.

Research question and hypotheses

Research question: **How and why do brand ethicality and eco-label affect consumers' sustainability perception toward sustainable packaging made of conventional-looking (vs. ecological-looking) material?**

The research model can be concluded as shown in Figure 1. The independent variable is material appearance (ecological vs. conventional). The moderating variables are eco-label and brand ethicality. The mediating variable is sustainability perception. The dependent variables are quality evaluation and purchase intention.

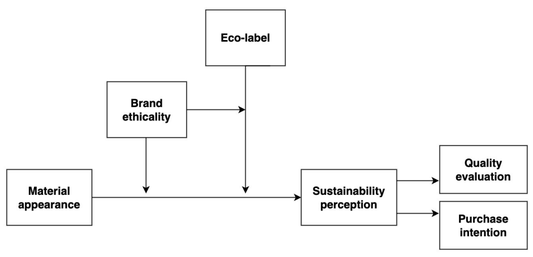

Figure 1. Research model.

H1: Packaging sustainability will be perceived as higher when the package is from a brand of higher ethicality.
H2: Packaging sustainability will be perceived as higher when an eco-label appears on the package.
H3: Eco-label will moderate the relationship between material appearance and sustainability perception. The impact of eco-label on sustainability perception is more positive for conventional-looking materials than for ecological-looking materials.
H4: Brand ethicality will moderate the relationship between eco-label and sustainability perception. The impact of eco-label on sustainability perception is more positive for ethical brands than for unethical brands.
H5: Brand ethicality will moderate the relationship between material appearance and sustainability perception. The impact of ecological-looking material on sustainability perception is more positive for ethical brands than for unethical brands.
H6: Sustainability perception mediates the effect of material appearance on quality evaluation.
H7: Sustainability perception mediates the effect of material appearance on purchase intention.

Method

A 2*2*2 between-subject experiment was conducted in this research. The independent variable and moderating variables all have two levels in the experiment, which are conventional-looking & ecological-looking materials, with & without eco-label, and high & low brand ethicality. Bioplastic is chosen to represent the conventional-looking sustainable material while paper-based material represents the ecological-looking sustainable material. For the chocolate paste category, Tony's Chocolonely and Nestle are chosen to represent brands with higher and lower ethicality. For the cereal bar category, Zonnatura and Hero b'tween represent brands with higher and lower ethicality respectively. The questionnaire was distributed via the online platform Prolific among Dutch consumers. The participants were asked to fill in the English questionnaire. Finally, we had 260 valid responses with an average age of 27 ranging from 18 years to 63 years old. Of the participants, 59% were male, 40% were female, and 1% were other. The result of one-way ANOVA indicated that participants under different experimental conditions (8 per category) don't have a significant difference in age, gender, education level, environmental concern, or brand sensitivity. Each participant was first asked about the purchase frequency of chocolate paste and presented with one of the eight chocolate paste stimuli with questions regarding it (by order: product evaluation, brand evaluation, brand sensitivity), then asked about the purchase frequency of cereal bars and presented with one of the eight cereal bar stimuli with questions regarding it (by order: product evaluation, brand evaluation, brand sensitivity), finally tested on the overall environmental concern and asked several demographic questions. At the end of the questionnaire, we gave participants a chance to comment on this research. Both the eight chocolate paste stimuli and the eight cereal bar stimuli were evenly distributed among participants.

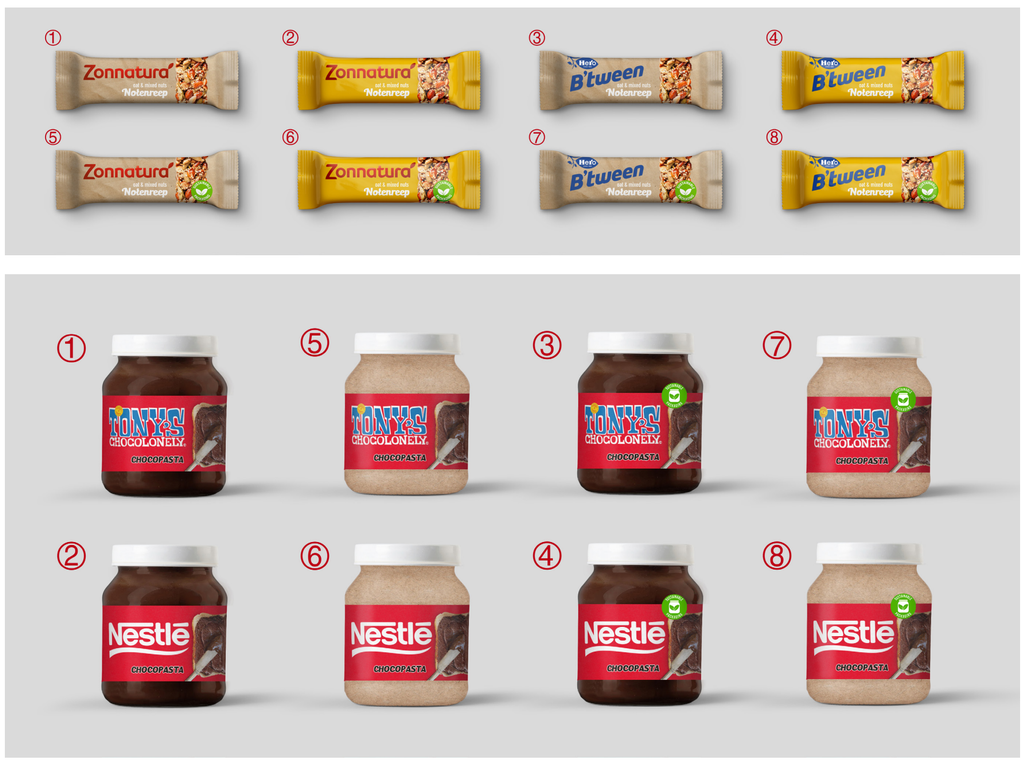

Figure 2. Stimuli.

Result of the cereal bar category

Since the manipulation of brand ethicality didn't succeed in the cereal bar category, brand ethicality was removed from the research model of cereal bars. Thus, hypotheses related to brand ethicality (H1, H4, H5) could not be tested in the cereal bar category. After removing the brand ethicality, the regression analysis was performed under model 7 in the PROCESS macro of SPSS developed by Andrew F. Hayes. The overall regression was statistically significant ($R^2 = .35$, $F(3, 209) = 45.98$, $p < .001$). It was found that presence of an eco-label significantly increased sustainability perception ($b=1.33$, $p<.001$), supporting H2. Meanwhile, as indicated in Figure 3, a significant interaction effect was found ($p<.01$) that the eco-label has a more positive impact on consumers' sustainability perception when it's applied to conventional-looking (bioplastic) packaging rather than ecological-looking (paper-based) packaging. Thus, H3 is supported. There is no significant effect of material appearance on purchase intention or quality evaluation indicated. The effects of eco-label on purchase intention and quality evaluation are not statistically significant either. Since material appearance doesn't have a significant effect on quality evaluation and purchase intention, which doesn't meet the premise of mediation effects, thus H6 and H7 are not supported.

Material	Eco-label	Mean	N	SD
Conventional	No eco-label	2.57	47	1.15
	With eco-label	4.58	55	1.62
	Total	3.66	102	1.74
Ecological	No eco-label	4.57	54	1.25
	With eco-label	5.28	57	1.31
	Total	4.94	111	1.32
Total	No eco-label	3.64	101	1.56
	With eco-label	4.94	112	1.51
	Total	4.32	213	1.66

Table 1. Means table: sustainability perception.

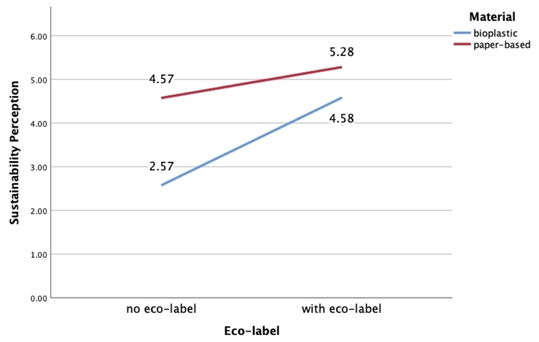

Figure 3. Interaction graph.

Result of the chocolate paste category

The regression analysis was performed under model 11 in the PROCESS macro of SPSS. The overall regression was statistically significant ($R^2 = .19$, $F(7, 230) = 8.61$, $p < .001$). It was found that the effect of brand ethicality on sustainability perception was not statistically significant, not supporting H1. Presence of an eco-label significantly increased sustainability perception ($b=0.92$, $p<.001$), supporting H2. Meanwhile, the result indicated no significant interaction between material appearance and eco-label ($p=.75$), not supporting H3. No significant interaction was found between eco-label and brand ethicality ($p=.18$), not supporting H4. No significant interaction was found between material appearance and brand ethicality either ($p=.44$), not supporting H5. In addition, ecological-looking material was found to decrease both quality evaluation ($F(1, 236) = 10.33$, $p < .01$) and purchase intention ($F(1, 236) = 4.88$, $p < .05$). A more ethical brand was found to heighten both quality evaluation ($F(1, 236) = 37.36$, $p < .001$) and purchase intention ($F(1, 236) = 28.60$, $p < .001$). The indirect effect via sustainability perception on quality evaluation was not significant (95%CI = (-.59, .19)), which indicated that sustainability perception doesn't mediate the effect of material appearance on quality evaluation, not supporting H6. Similarly, the indirect effect via sustainability perception on purchase intention was not significant (95%CI = (-.40, .13)). Thus, sustainability perception doesn't mediate the effect of material appearance on purchase intention, not supporting H7. In addition, an interesting finding is that when consumers sense a higher fit between a product and a brand, their perceived packaging sustainability increases accordingly ($F(1, 236) = 5.42$, $p <.05$). Meanwhile, higher brand fit triggers higher quality evaluation ($F(1, 236) = 50.24$, $p <.001$) and purchase intention ($F(1, 236) = 55.21$, $p <.001$).

	Mean	N	SD
Material			
Conventional	4.31	119	1.40
Ecological	5.06	119	1.38
Eco-label			
No eco-label	4.22	123	1.38
With eco-label	5.17	115	1.33
Brand ethicality			
Ethical	4.77	115	1.31
Unethical	4.60	123	1.55
Total	4.68	238	1.44

Table 2. Means table: sustainability perception.

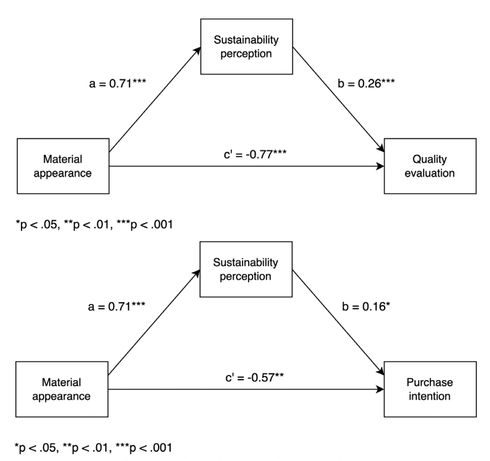

Figure 4. Mediation analysis.

Implications

1. Material appearance: In the chocolate paste category, ecological-looking material has a positive impact on sustainability perception but a negative impact on consumers' product quality evaluation. Therefore, companies need to find a balance between increased sustainability perception and decreased product quality perception since they both influence the overall evaluation of a product.
2. Eco-label: The misuse of eco-labels to serve the purpose of "greenwashing" may not achieve the intended goals to promote sales since eco-labels don't significantly increase consumers' purchase intention.
3. Brand ethicality: Consumers tend to judge packaging sustainability more by relying on the elements explicitly indicating packaging physical attributes (eg, material) instead of the established image of the brand. Meanwhile, the positive effect that brand ethicality has on quality evaluation and purchase intention indicates that a business return regarding sales can be expected from a higher brand ethicality, which further strengthens the necessity for companies to put the establishment of brand ethicality in a more important position.
4. Interaction between material appearance and eco-label: For companies, more in-depth thinking and testing are needed when trying to simultaneously use multiple eco-elements for better communicating sustainable traits since the added values of the second and subsequent elements are limited as indicated in this research.
5. Effect of brand fit: When conducting a line extension, companies should be aware that if the new product deviates from the existing product portfolio too much, there might be a decrease in consumers' evaluation of both packaging sustainability and product quality, thus resulting in lower purchase intention.

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