



Short Communication

Increasing the purchase intentions for suboptimal products: Comparing potential marketing strategies

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ABSTRACT

To reduce food waste, motivating consumers to purchase suboptimal (imperfect) products seems a promising strategy. Yet, two recent literature reviews show that it is challenging to motivate consumers to purchase suboptimal products. Moreover, the effects of the most promising marketing strategies thus far – pricing and communication strategies – have hardly been directly compared. Our research addresses these issues by 1) presenting two novel strategies that can increase purchase intentions for suboptimal products, and 2) comparing the effects of pricing strategies, communication strategies, and the two novel strategies. In a survey and an experiment, consumer responses to pricing (discounts or multi-item promotions), communication (concerning products' naturalness or sustainability), and experience strategies (providing tasting or a show) were compared, revealing varying effects on product perceptions and purchase intentions. Consumers' value orientations influenced consumer responses to marketing strategies. These findings provide valuable suggestions for future research on minimizing suboptimal food waste.

1. Introduction

Humans' use of natural resources exceeds the planet's possibilities (UN, 2022). Especially food production requires extensive use of natural resources, and is responsible for about one third of all greenhouse gas emissions (Garnett, 2011). Yet, one third to one half of the produced food is wasted (FAO, 2019). The reduction of food waste, defined as "... any food, and inedible parts of food, removed from the food supply chain to be recovered or disposed" (FUSIONS, 2014, p. 6), is therefore one of the necessary actions for a more sustainable future (UN, 2022).

One prominent preventable source of food waste is the waste of suboptimal products. Suboptimal products, also called abnormally-shaped (Pfeiffer, Sundar, & Deval, 2021), imperfect (De Hooge, 2022), or ugly products (Hartmann, Jahnke, & Hamm, 2021), deviate on the basis of appearance, date-labelling, or packaging. When focusing on appearance deviations only (e.g. bent cucumbers), suboptimal products are products that diverge from perfect products solely on aesthetics such as weight, size, or shape (De Hooge et al., 2017; De Hooge, 2022). The deviation concerns extrinsic product cues, making suboptimal products equal to optimal products on intrinsic product quality and safety (De Hooge et al., 2017). Such products have difficulties moving through the supply chain, and consumers appear unwilling to purchase them

(Hartmann et al., 2021; Varese, Cesarani, & Wojnarowska, 2022). Consequently, retailers are unmotivated to sell suboptimal products (De Hooge, Van Dulm, & Van Trijp, 2018). Motivating consumers to purchase suboptimal products is therefore essential.

Yet, finding marketing strategies that motivate consumers to purchase aesthetic-related suboptimal products appears challenging. Two recent reviews revealed that research has mostly focused on pricing strategies and on communication strategies related to the sustainability or naturalness of suboptimal products (Hartmann et al., 2021; Varese et al., 2022). There are few studies showing the effects of these strategies, and studies have to a limited extent compared the effects of these strategies on perceptions of and purchase intentions for suboptimal products. Therefore, both reviews indicate the necessity for more research on (the comparison between) existing strategies and new strategies.

The current research addresses these issues. Based on a pretest, we present two strategies that may increase perceptions of and purchase intentions for suboptimal products. Moreover, an experiment compares the effects of two pricing strategies, two communication strategies, and the two novel strategies on suboptimal product perceptions of purchase intentions. We include value orientations to examine whether the success of the strategies depend on consumers' values. Together, these

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findings provide valuable insights into the marketing strategies for suboptimal products.

2. Conceptual background

Even though suboptimal products are similar to optimal products in terms of intrinsic quality and taste, consumers perceive these products as being of lesser quality and taste, and are unwilling to buy suboptimal products (De Hooge et al., 2017; De Hooge, 2022; Elimelech, Eyal, Parag, & Hochman, 2024). They use aesthetic cues to infer important product attributes (Pfeiffer et al., 2021). Aesthetic cues typically relate to the ‘what is beautiful is good’ notion, motivating consumers to infer that suboptimal products are ‘not good’ and are, therefore, of lower quality. Contextual cues, such as marketing strategies, may mitigate the influence of aesthetics on consumer responses. Indeed, two literature reviews revealed that especially price discounts, communication strategies presenting suboptimal product purchases as ways to avoid food waste (sustainability communication), and strategies emphasizing the naturalness or authenticity of suboptimal products (naturalness or authenticity communication) can positively affect consumer responses to suboptimal products (Hartmann et al., 2021; Varese et al., 2022). As these strategies mostly originate from separate studies, it is, however, difficult to directly compare the effectiveness of these strategies. Moreover, it is doubtful whether pricing or sustainability strategies address consumers’ quality concerns. Therefore, both reviews raise the need for new strategies.

To develop novel strategies, we conducted semi-structured interviews with thirty-three managers of open-field farms or greenhouse production companies, managers of producer organizations, and retail managers ($n_{Dutch} = 14$ and $n_{German} = 19$). Respondents were daily involved in the production, buying, and/or selling of fresh fruits and/or vegetables, and bought/sold their products within Dutch or German regular supply chains. After questions concerning cosmetic specifications for fresh produce (De Hooge et al., 2018), the interview focused on perceptions concerning consumer responses to and marketing strategies for suboptimal products. Interviewees indicated whether consumers could be motivated to purchase fruits/vegetables that did not fulfil the cosmetic specifications, and specified how consumers could be motivated.

The majority perceived it possible to motivate consumers to purchase suboptimal products. Replicating existing literature, the mentioned marketing strategies involved pricing strategies (‘A good way to motivate consumers is changing the price’, producer), and communication strategies focused on sustainability (‘Buy ugly vegetables and improve the world. This would motivate consumers’, producer) or on the product naturalness (‘Raising awareness through clever communication. Transparency about the origins of the products’, retailer). They also mentioned tasting and providing an experience as two novel strategies. The tasting strategy focuses on providing tasting experiences with or taste information concerning suboptimal products (‘Let consumers taste the products’, retailer; ‘Just have a try, it’s easy. The tasting experience will change something in consumers’, producer). This would provide consumers with a positive experience with suboptimal products, and inform consumers (‘Teach consumers that a crooked cucumber tastes the same as a straight one’, producer). The strategy relates to consumers’ taste concerns when encountering suboptimal products, and to the recommendation to encourage consumers to “re-discover the taste” of suboptimal products (Louis & Lombart, 2018, p. 264). Three studies have previously examined a tasting strategy, resulting in positive effects on consumer responses to suboptimal foods half of the time (Elimelech et al., 2024; Helmert, Symmank, Pannasch, & Rohm, 2017; Rohm et al., 2017).

Finally, interviewees suggested providing a show as a strategy. This concerns creating an experience with or a show surrounding the product (‘When consumers visit our production company and I tell them my story, they all become very excited. They all buy a box and have a good feeling when consuming the vegetables at home.’, producer). The show strategy centers

on the producer’s emotions, behaviors, and actions related to the creation and development of the product, and aims to present this information attractively to consumers. The strategy would generate positive consumer emotions, thereby motivating consumers to buy suboptimal products (‘Consumers buy based on an initial spark. So the product has to be self-explanatory and generate an initial spark that makes the consumer look up and buy it’, producer). This strategy relates to the idea of creating a brand story and positive emotions (Chiu, Hsieh, & Kuo, 2012; Varese et al., 2022).

We next compare the effects of six marketing strategies (price discount, multi-item promotion, sustainability communication, naturalness communication, tasting experience and show experience) on consumer responses (Study 1), and on product perceptions of and purchase intentions for suboptimal products (Study 2). Two most frequently used pricing strategies for (food) products in general are price discounts and multi-item promotions (Gedenk, Neslin, & Ailawadi, 2010). Multi-item promotions offer a product for free when buying one or multiple similar products (e.g., “buy one, get one for free”). When applied to suboptimal products, it can entail offering suboptimal or optimal products for free upon buying one or more suboptimal products. Even though one can discuss whether this strategy provides a viable solution for supply chain actors, including this strategy enables us to disentangle the effects of strategies (e.g., multi-item promotion) from the type of strategy (e.g., pricing strategy). As there are some indications that consumers’ value orientations may influence responses to suboptimal products (De Hooge et al., 2017), we include value orientations as potential moderators. Values differentiate consumers based on the degree to which consumers value the importance of costs and benefits for themselves (egoistic orientation), for other people (social-altruistic orientation), and for the ecosystem and biosphere as a whole (biospheric orientation) (De Groot & Steg, 2008).

3. Study 1: survey

3.1. Method

412 Dutch inhabitants ($M_{age} = 44.39$, $SD_{age} = 14.17$, 46 % males) participated in an online study on food in 2016. They were recruited by an international agency maintaining representative consumer panels and participated for agency points. The respondents answered the Value Orientation Scale (De Groot & Steg, 2008), on which they indicated for 12 values to what degree it is a guiding principle in their lives (−1 (opposed to my values), 0 (not at all important), to 7 (extremely important)). For every value, the four items reflecting the value were averaged into one score, resulting in three value scores: egoistic, altruistic, and biospheric. The respondents then imagined doing their weekly grocery shopping and needing to buy a cucumber. They saw a picture of a suboptimal cucumber (Appendix A) and six slogans: ‘50 % off’ (Price discount), ‘Buy this product, get a standard one for free’ (Multi-item promotion), ‘Don’t make me go to food waste’ (sustainability communication), ‘As intended by nature’ (naturalness communication), ‘The looks might not be perfect, the taste is’ (tasting experience), and ‘regional farmer’s product’ (show experience). They selected all the slogans that would motivate them to buy the cucumber.

3.2. Results

Chi-square analyses showed that consumers preferred some strategies above others (Table 1). They were most motivated by tasting ($\chi^2(1) > 4.40$, $ps < .04$), followed by a price discount ($\chi^2(1) > 9.07$, $ps < .01$) and by the naturalness slogan ($\chi^2(1) > 32.89$, $ps < .001$). The price discount and naturalness slogans did not differ ($\chi^2(1) = .29$, $p = .59$). Logistic regressions on choice for every strategy with value orientations as independent variables revealed that biospheric orientations increased choice for naturalness (Wald(1) = 1.73, $p = .02$). Egoistic orientations decreased choice for tasting (Wald(1) = 3.78, $p = .05$), and altruistic

Table 1
Consumer Responses to the Marketing Strategies in Study 1.

Variable	Marketing strategy					
	Price Discount	Multi-item Promotion	Naturalness Communication	Sustainability Communication	Tasting Experience	Show Experience
Slogan choice (% selected)	37 % ^a	22 % ^b	42 % ^a	33 % ^c	56 % ^d	26 % ^e
	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>	<i>B (SE)</i>
Egoistic orientation	.05 (.06)	-.03 (.07)	-.08 (.06)	-.07 (.6)	-.12 (.06)*	-.09 (.07)
Altruistic orientation	.05 (.12)	.04 (.14)	.10 (.12)	.23 (.13) †	.26 (.12)*	.10 (.14)
Biospheric orientation	-.08 (.11)	.06 (.13)	.25 (.11)*	.09 (.11)	-.01(.11)	.20 (.12) †

Note. Percentages with different superscript differ significantly from each other, all $\chi^2(1) > 9.07$, $ps < .01$. Regression coefficients: † $p < .10$; * $p < .05$.

orientations increased choice for the tasting strategy (Wald(1) = 4.72, $p = .03$).

3.3. Discussion

Consumers favored a tasting strategy, followed by a price discount and naturalness strategy. Study 2 examined the effects on product perceptions and purchase intentions. Moreover, we wanted to examine whether the effects of Study 1 would translate to other products and other slogan formulations. Therefore, Study 2 applied a different product (apples), different wordings of the slogans (for communication and experience strategies), and different price promotions (from 50 % discount or second product for free, to 30 % discount or third product for free).

4. Study 2: experiment

4.1. Method

4.1.1. Respondents and design

1099 Dutch inhabitants ($M_{age} = 41.63$, $SD_{age} = 18.54$, 55 % males), representative of Dutch inhabitants and gathered via the Qualtrics agency, participated in our online study in 2023. They had to have bought apples at least once to participate. They were randomly assigned to the Control, Price discount, Multi-item promotion, Naturalness, Sustainability, Tasting, or Show condition.

4.1.2. Procedure and variables

The respondents fulfilled an online experiment (see Van Giesen & De Hooge, 2019). They imagined doing grocery shopping and buying apples. They saw one shelf with optimal apples and one with suboptimal (oddly-shaped) apples, both costing €2 per kilogram. The Control condition presented no additional information. In the Price discount condition, the price of the suboptimal products was crossed through with a red line, and “Now with a 30 % discount!” was added. The Multi-item promotion condition read “Now with third apple for free!”. Whereas in Study 1 consumers received one free optimal product for free, the multi-item promotion strategy in Study 2 offered one free suboptimal product when purchasing two suboptimal products. This better fits the goal to promote the sales of suboptimal products, and fits the 30 % discount in the Price discount condition. The Naturalness condition read “Made by the trees: Naturally shaped apples!”. The Sustainability condition read “Join the fight against food waste!”, and the Tasting and Show conditions read “Don’t mind the looks: the taste is perfect!” and “Experience the local farmer’s passion in your own home!”, respectively.

A pre-test on 284 Dutch inhabitants ($M_{age} = 45.09$, $SD_{age} = 17.51$, 77 % females) showed that Naturalness informed more about the apples’ background ($M=4.78$, $ts > 1.86$, $ps < .05$) and whether the apples came from nature than the other conditions ($M=4.39$, $ts > 2.93$, $ps < .01$). Sustainability informed more about sustainability than the other conditions ($M=3.55$, $ts > 3.24$, $ps < .001$), but not more than the

Naturalness or Experience conditions ($ts < 1.50$, $ps > .13$). Therefore, the Sustainability slogan was changed to “Help to avoid wasting these apples!”. Tasting informed more about the taste than the other conditions ($M=3.62$, $ts > 5.12$, $ps < .001$), and Show informed more about the producers than the other conditions ($M=3.75$, $ts > 3.94$, $ps < .001$).

To measure product choice, respondents clicked on the products (optimal or suboptimal) that they would buy. They indicated how likely they were to buy the suboptimal products (*Purchase intention*, 1 = not at all likely, to 9 = very likely) and their perceptions of the suboptimal products (Van Giesen & De Hooge, 2019, Appendix B) (*Product perception*, Eigenvalue = 8.15, $R^2 = 58\%$, $\alpha = .94$). Respondents ended with the Value Orientation measure.

4.2. Results

4.2.1. Product choice

A chi-square analysis with Strategy as the independent variable and Product choice as the dependent variable showed an association ($\chi^2(6, n = 1099) = 92.52$, $p < .001$, Table 2). All strategies increased suboptimal product choice compared to the Control condition, except for Tasting (16 %, $\chi^2 < 1$). Price discounts increased suboptimal product choice most (53 %, $\chi^2s > 6.79$, $ps < .01$), followed by Multi-item promotion (38 %, $\chi^2s > 13.01$, $ps < .001$), Naturalness (29 %, $\chi^2s > 3.40$, $ps < .06$) and Sustainability (30 %, $\chi^2s > 4.37$, $ps < .04$).

4.2.2. Purchase intention

A one-way ANOVA on Purchase intention showed an effect of Strategy ($F(6, 1098) = 3.62$, $p = .001$). All strategies increased purchase intentions compared to the Control condition, except for Sustainability ($t(1092) = 1.34$, $p = .18$). Price discounts increased purchase intentions most ($ts > 4.46$, $ps < .01$), followed by Multi-item promotion ($ts > 2.53$, $ps \leq .01$), Naturalness ($ts > 2.25$, $ps < .02$), Show ($ts > 2.15$, $ps < .04$), and Tasting ($ts > 1.97$, $ps \leq .05$).

4.2.3. Product perception

A one-way ANOVA on Product perceptions showed no effect of Strategy ($F(6, 1098) = 1.50$, $p = .17$). Only Naturalness ($t(1092) = 2.45$, $p = .01$), and Show ($t(1092) = 1.88$, $p = .06$, marginally) increased product perceptions compared to Control (all other strategies $ts < 1.52$, $ps > .13$). Process mediation analyses (Model 4, 95 %CI; 5,000 resamples) were run to examine whether Product perceptions mediated between Strategies and Product choice/Purchase intentions. The analyses on *Product choice* showed that Product perceptions only mediated the effects of Naturalness (.29; CI_{95%} [.05, .55]) and Show (.22; CI_{95%} [.01, .45], all others $-.20 < CI_{95\%} < .41$). The analyses on *Purchase intention* also showed mediation of only the effects of Naturalness (.36; CI_{95%} [.06, .65]) and Show (.27; CI_{95%} [.01, .55], all others $-.24 < CI_{95\%} < .50$).

4.2.4. Value orientations

Moderation regression analyses were run on Product choice/Purchase intention with main effects of Strategy and Value orientations

Table 2
Consumer Responses to the Marketing Strategies in Study 2.

Variable	Marketing strategy						
	Control (no strategy)	Price Discount	Multi-item Promotion	Naturalness Communication	Sustainability Communication	Tasting Experience	Show Experience
Product choice (% suboptimal selected)	12 % ^a	53 % ^b	38 % ^c	29 % ^c	30 % ^c	16 % ^a	20 % ^d
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Purchase intention	4.36 (2.22) ^a	5.50 (2.45) ^b	5.01 (2.26) ^c	4.93 (2.30) ^c	4.70 (2.36) ^{ac}	4.82 (2.23) ^c	4.91 (2.10) ^c
Product perception	5.67 (1.56) ^a	5.95 (1.70) ^{acd}	5.72 (1.69) ^{ac}	6.13 (1.79) ^{bd}	5.86 (1.68) ^{acd}	5.87 (1.58) ^{acd}	6.02 (1.56) ^{bcd}

Note. Product choice ranged from 0 % to 100 %. Purchase intention ranged from 1 (not at all likely) to 9 (very likely). Product perception ranged from 1 to 9 (see appendix B). Percentages with different superscripts differ significantly from each other, all $\chi^2(1) > 4.37$, $ps < .04$. The Naturalness communication differed marginally significantly from the Show experience, $\chi^2(1) = 3.40$, $p = .06$. Means with different superscripts differ significantly from each other, all $t(1092) > 1.94$, $ps < .05$. The Show experience differed marginally significantly from the Control condition, $t(1092) = 1.88$, $p = .06$.

(Block 1), and interaction terms (Block 2). In Block 1, next to the strategies, egoistic orientation decreased ($B = -.15$, $p = .001$, and $\beta = -.12$, $p = .006$) and biospheric orientation increased suboptimal product choice/intentions ($B = -.28$, $p < .001$, and $\beta = .40$, $p < .001$). In Block 2, biospheric orientation influenced the effect of Naturalness ($B = -.46$, $p = .09$, marginally), and of Multi-item promotion on product choice ($B = -.63$, $p = .02$), and of Discounts on purchase intentions ($\beta = .38$, $p = .06$, marginally).

4.3. Discussion

Study 2 reveals that multiple strategies can motivate consumers to purchase suboptimal products, especially pricing strategies. Naturalness and show strategies positively affect consumer perceptions of suboptimal products, which mediate the relationships between these strategies and purchase intentions.

5. General discussion

The present findings provide useful additions to the research on suboptimal food waste reduction strategies. When deciding which strategy to apply, comparisons between different strategies is useful, especially when strategies affect multiple responses simultaneously. For instance, we reveal that pricing strategies are most promising to increase purchase intentions for suboptimal products, but they reduce the perceived value of products in general (Grewal, Krishnan, Baker, & Borin, 1998), and have no positive effect consumers' suboptimal product perceptions. Consequently, such strategies may transfer food waste from supply chains to consumer households, as consumers may be less tempted to consume 'lower-valued' suboptimal products (although Giordano, Alboni, Cicatiello, and Falasconi (2019) did not find an effect of discounts on household food waste). Naturalness and show strategies instead increase both purchase intentions and product perceptions. This may positively affect suboptimal product consumption. Indeed, some studies have found naturalness (authenticity) communication to increase consumers' consumption intentions (De Hooge, Van Giesen, Leijsten, & Van Herwaarden, 2022; Van Giesen & De Hooge, 2019). Thus, comparing different marketing strategies on multiple relevant responses is valuable for future research.

The present findings show relevance of consumer characteristics in the effects of marketing strategies on consumer responses to suboptimal products. The current findings suggest that mostly biospheric values may affect consumer responses to (pricing and naturalness) strategies. Biospheric values reflect concerns for the welfare of nature and the environment, and positively affect pro-environmental behaviors (De Groot & Steg, 2008). We show that they also influence consumer responses to (strategies for) suboptimal products. This may help to develop an understanding of consumer responses to marketing strategies

for suboptimal products, and inspire new research on other relevant consumer characteristics.

It is important to mention that our research has multiple limitations. Our research is based on consumers' self-reported buying intentions, which may not align with actual behavior. Although for some strategies behavioral effects have been found in line with behavioral intentions (e.g., De Hooge et al., 2022; Van Giesen & De Hooge, 2019), future research is needed to examine purchase behavior (in real life settings) following every strategy. Moreover, whereas tasting and show experiences concern developing an experience surrounding suboptimal products, the slogans used in the current research do not do justice to these experiences. Hence, future research can examine the full potential of these strategies. Also, the slogans used in Studies 1 and 2 were not pilot tested on semantic fluency, and the revised sustainability slogan of Study 2 was not re-examined on its manipulation effect. Unintended effects of the slogans' fluency may therefore affect the findings. Finally, Studies 1 and 2 differ on multiple aspects, including the type of product, the slogans, and the dependent measures. Although these differences add to the generalizability of our findings, any of these differences can explain differences in findings between Study 1 and 2, and may explain divergences from previous studies on the comparison of strategies (Rohm et al., 2017). Hence, future research should examine the generalizability of the strategies across products, slogans, and consumer behaviors. Nevertheless, we hope the current research has provided novel insights that inspire scholars to move closer to a suboptimal-free future.

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Declaration of competing interest

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Data availability

Data will be made available on request.

Appendix A



Appendix B

The Product perception scale of Study 2.

Item	Factor loading
1. Of very bad taste – of very good taste	.80
2. Very untasty – very tasty	.81
3. Completely unnatural – completely natural	.75
4. Completely made by humans – completely made by nature	.71
5. Not at all made with love – made with a lot of love	.81
6. Not at all authentic – very authentic	.77
7. Not at all sustainable – very sustainable	.77
8. Very bad for the environment – very good for the environment	.74
9. Very cheap – very expensive	.20
10. Bad value for money – good value for money	.75
11. Completely unreliable – completely reliable	.85
12. Very unsafe – very safe	.83
13. Very unattractive – very attractive	.54
14. Of very low quality – of very high quality	.83
Reliability (α)	.94

Note. All items were measured on a 1–9 scale.

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