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From trash to cash: the effect of product construal and benefit appeals on consumer evaluations of rescued meals

Product
construal and
benefit appeals

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Abstract

Purpose – Hospitality companies increasingly sell their unsold, or so-called rescued meals, on food waste reduction applications (e.g. Too Good To Go [TGTG]). The purpose of this research is to explore the influence of product construal and benefit appeals on consumer evaluations.

Design/methodology/approach – Study 1 ($N = 277$ participants) is an online experiment with a 2×3 between subject design analyzed using ANOVA and planned contrast analysis. Study 2 is a 2×2 field experiment ($N = 147$ sold rescued food boxes) using chi-square tests for the main analysis.

Findings – This study finds that an abstract product description (e.g. a magic box with an opaque content) matched with an environmental benefit appeal renders significantly higher consumer evaluations in comparison to when the same product is paired with financial benefits. In contrast, a concrete product presentation featuring financial benefits as opposed to environmental benefits increases consumer purchase intentions and willingness to pay.

Research limitations/implications – We empirically show how the interaction and congruency between product construal and benefit appeals affect evaluations in a last-minute purchase context.

Originality/value – To the best of the authors' knowledge, this is the first study to look at the interactive effect between product construal and benefit appeals in a food waste and technology context.

Keywords Consumer behavior, Food waste, Rescued meals, Benefit appeals, Construal level theory, Online platforms, Online applications

Paper type Research paper

1. Introduction

“Save food, help the planet” and “Rescue magic bags of surplus, unsold food” are calls to action from Too Good To Go (TGTG), the world's largest B2C platform working to reduce food waste (Ray, 2020). TGTG and other food waste reduction applications (e.g. Karma, Olio and ResQ Club) offer food service outlets commercial solutions to sell their surplus food (still perfectly fit for human consumption). In an industry responsible for 12% of the global food waste (Filimonau and De Coteau, 2019), such applications currently represent one of the many solutions needed to fight the multifaceted and “wicked” problem of food waste (Närvänen *et al.*, 2020). Food waste reduction applications sell the “rescued meals” for steep



discounts (50%–70%) without interfering with the service quality and running of the daily operation. As high costs are frequently considered a necessary trade-off to deliver great customer experiences (Pirani and Arafat, 2016; Rust and Huang, 2012), food waste reduction applications offer an interesting value proposition for both sellers and buyers. In the case of TGTG, participating food service outlets put together a “Magic Box” depending on the surplus each day. TGTG customers then order a magic box without exactly knowing the content. The idea is that both parties save costs while believing they are “food waste warriors” saving the planet.

While that may sound like a good deal, construal level theory (CLT) shows that the temporal distance to events influences how consumers construe information and in turn their evaluations (Goodman and Malkoc, 2012). For last-minute purchases (i.e. with a short temporal distance) like in the case of food waste reduction applications, consumers are more likely to process and be influenced by concrete and specific information (Trope *et al.*, 2007). Yet, food service outlets often present their last-minute rescued meals in a more general and abstract manner (like the “Magic Box” from TGTG). This offer is commonly promoted with a compelling financial incentive and a call to contribute to a better planet. Such benefits appeals are well-established mechanisms to stimulate pro-social behavior and choice among consumers (White and Peloza, 2009). Some research further shows that consumers’ mental representation and construal level (abstract vs concrete) influence the effectiveness of the benefit appeal (Goldsmith *et al.*, 2016; Reczek *et al.*, 2018). Self-benefits (e.g. financial benefits like price savings) are often immediate and therefore more effective when consumers are in a concrete mindset. In contrast, “other” benefits (e.g. environmental) tend to be more future oriented and thus a better match with an abstract mindset (Goldsmith *et al.*, 2016).

Considering our context of food waste reduction applications, then the question is:

Q. What is the right/optimal match between the products these service providers offer and the benefit appeals they promote?

Our research aims to address this broad research question. More specifically, we investigate how product construal (abstract versus concrete) and benefit appeals (environmental versus financial) interact to influence consumer evaluations of and demand for rescued meals. We find both in a real-world setting as well as in an online experiment that an abstract product description (e.g. a magic box with an opaque content) matched with an environmental benefit appeal renders significantly higher consumer evaluations in comparison to when the same product is paired with financial benefits. In contrast, a concrete product presentation featuring financial benefits as opposed to environmental benefits increase consumer purchase intentions and willingness to pay.

Our research adds substantive new insights to the field of food waste. First, research on rescue-based food (RBF) – also sometimes referred to as upcycled food or even “value added surplus food” – is limited despite the widespread issue of food waste (Bhatt *et al.*, 2018; Bhatt *et al.*, 2020). Importantly, as one of the few papers, De Visser-Amundson *et al.* (2021) show that consumers *do not* have an inherent aversion toward RBF but that marketers’ actions can, unintentionally, have detrimental effects on consumer demand by evoking waste associations. We build on their work not only by using a last-minute context of rescued meals, but also by showing how product construal and benefit appeals interact to influence consumer decision-making. While the effects of construal level (Castagna *et al.*, 2021; White *et al.*, 2011) and benefit appeals (De Visser-Amundson *et al.*, 2021; Wu *et al.*, 2017) have been well documented separately in the pro-social domain, research on their combined effects is scarce and shows inconsistent results. Some studies suggest that consumers who are in an abstract mindset are more likely to be interested in sustainable products when the

environmental (vs financial) benefits are highlighted, while benefit appeals have no impact on consumers who have a concrete mindset (Goldsmith *et al.*, 2016; Yang *et al.*, 2015). Along the same lines, Reczek *et al.* (2018) find that an abstract mindset leads to increased purchase intentions for eco-friendly products (versus traditional products). Yet, in the context of organic foods (which is more related to this research), research finds no interaction between product construal and benefit appeals (Jäger and Weber, 2020).

Second, research on food rescue and redistribution via novel technological applications is scarce and primarily focuses on non-commercial food sharing initiatives and motivations (Schanes and Stagl, 2019). In fact, a recent review of 165 articles related to ICT in food services and restaurants makes no reference to papers about online applications fighting food waste (Gonzalez *et al.*, 2022). This is surprising when, for instance, food waste reduction application TGTG had more than 11.6 million downloads in 2020 and saved over 28.6 million meals from going to waste in the same year (Too Good To Go, 2020). Vizzoto *et al.* (2021) particularly call for more experimental studies and consumer interventions to curb hospitality food waste. They find that “managerial, alternative destinations [i.e. last-minute markets like TGTG] and information exchange strategies were clearly in the qualitative phase [with] virtually no quantitative assessments” (p. 8). Eco-innovations (like food waste reduction applications), have also been identified as necessary interventions to bridge the infamous intention–behavioral gap with specific calls for more research on food waste (Sharma *et al.*, 2020) along with an extensive research agenda to change food waste behaviors (Kaur *et al.*, 2021).

Finally, RBF is a novel product category demanding unique marketing strategies (De Visser-Amundson *et al.*, 2021). It is different from both organic and conventional food and most research in this area has been carried out in the context of unprocessed, imperfect or so called “ugly” produce (Grewal *et al.*, 2019; Loebnitz *et al.*, 2015; Mookerjee *et al.*, 2021; Suher *et al.*, 2021; Van Giesen and De Hooge, 2019). Our research extends this line of work by considering rescued meals. Like “ugly foods,” this type of food is threatened to be wasted, yet as a prepared and ready-to-eat RBF, rescued meals have different marketing implications than fresh imperfect produce.

2. Theoretical background

2.1 Hospitality food waste

The enormity of the negative financial, environmental and social consequences of food waste is well-documented with United Nation’s Sustainable Development Goals (UN SDGs). It has been defined as a “wicked” problem (Närvänen *et al.*, 2020) that is engrained within the entire food supply chain (De Visser-Amundson, 2020) requiring both long- and short-term solutions (Murphy *et al.*, 2019; Närvänen *et al.*, 2020). Hospitality food waste is considered as any organic waste generated within the food service outlet that is originally destined for human consumption (Vizzoto *et al.*, 2021). Sharma *et al.* (2022) note that food waste is a pressing issue, particularly from an ethical perspective for the hospitality industry. It is primarily generated due to inadequate food handling (e.g. storage); forecasting; and preparation techniques and quantities (Filimonau and De Coteau, 2019; Heikkilä *et al.*, 2016). Other factors such as cost of logistics, food safety restrictions and legislation may also inhibit hotels from donating food or finding alternative destinations for leftover foods (Demetriou, 2022). The consequence of this is that approximately 75% of hospitality food waste may be avoidable and thus also possible to manage (Filimonau and De Coteau, 2019).

Vizzoto *et al.* (2021) identify seven main categories of strategies to better manage and reduce hospitality food waste: management; supply chain management; preparation

servicing; consumer behavior; information exchange; and alternative destinations including “last minute markets” (like food waste reduction applications; for the full review see [Vizzoto et al., 2021](#)). Other research further shows in that hospitality firms investing in food waste prevention communication (e.g. via the website, social media and training programs); education; and training have a positive effect on employees’ intentions ([Luu, 2020](#)) and behavior ([Kaur et al., 2021](#)) to reduce food waste.

Applications such as TGTG offer a practical solution to the problem of food waste by reducing surplus and managing the discrepancy between the demand and supply over time. Food service professionals generally fear (and initially resist) any interventions and procedural changes which they believe can impact the customer experience ([Demetriou, 2022](#); [De Visser-Amundson and Kleijnen, 2020](#); [Papargyropoulou et al., 2016](#)). Recent research shows indeed that market orientation of restaurant managers influences their behavioral intentions to reduce food waste such that “if managers know that their customers demand less wasteful foodservice provision, then they will engage in food waste” ([Filimonau et al., 2022](#), p. 1191). In a similar vein, [Perrigot et al. \(2021\)](#) find that customers are primary drivers of implementing more sustainable waste management systems in fast food franchise chains. Food waste reduction applications (like TGTG) operate relatively independently from the food service outlet. They therefore represent an attractive and viable solution that is easy to implement to reduce food waste. Notably, they market the meal offer very differently than the food service outlets. At the restaurant, the meal is described in detail and presented with a price covering the contribution margin and other costs. On an application like TGTG, the rescued meal description is often vague if not opaque and offered for a deeply discounted price.

2.2 Message framing

Marketeers can frame product descriptions and promotional appeals in different ways. Framing is a marketing tactic based on the notion that consumers are not only influenced by *what* the message says but also by *how* it is said ([Cheng et al., 2011](#)). One of the most established framing effects is illustrated in prospect theory such that people’s decisions are influenced by the perceived risk of those choices ([Tversky and Kahneman, 1985](#)). It posits that consumers react differently when the outcome of a decision is framed as a gain (e.g. save the food!) versus a loss (e.g. prevent food waste!). Research shows that a gain frame has a more positive impact on consumer conservation behaviors than a loss frame when the appeal for pro-social action is framed in an abstract way. Notably, the opposite occurs when the appeal is framed in a concrete way ([White et al., 2011](#)). Thus, product descriptions can be framed in various levels of detail; from very abstract and general to very concrete and specific. Relevant to this context is research that shows that in some instances informants (chefs and restaurant managers) explain that menu descriptions of unusual foods which are “truthful and descriptive” (i.e. specific) drive sales. Other informants however, reported the opposite that more ambiguous language and foreign words can be more persuasive to convince customers to choose for unfamiliar menu items ([Cai et al., 2021](#)). CLT can help to explain how and when each frame might be effective ([Lieberman et al., 2007](#)). Our conceptualization is grounded on CLT and we specifically zoom in on the product construal (abstract versus concrete) as a framing strategy.

2.3 Construal level theory and product construal

CLT proposes that the psychological distance of events and objects influences how consumers construe them ([Goodman and Malkoc, 2012](#)). For example, when the temporal distance is short, consumers are more likely construe events at a low level in terms of

concrete and specific information. Future and more distant events, on the other hand, trigger higher levels construal with increased attention for more abstract information (Trope *et al.*, 2007). This is because the psychological distance of an event (e.g. purchasing now or later) influences how objects are represented in the human mind and how they are experienced as either far away or close from the present time or individual person (Jäger and Weber, 2020). Beyond time, the psychological distance to an object or event can also be social, spatial or likelihood of occurrence (Liberman *et al.*, 2007). All four dimensions have a similar effect on how consumers construe information. Distant (close) objects and events are more likely to have a high and abstract (low and concrete) construal level (Goodman and Malkoc, 2012). Similarly, promotional “messages can be formulated either rather abstract on a high construal level or concrete on a low level” (Jäger and Weber, 2020, p. 3).

Related to the context in this paper, rescued meals offered on food waste reduction applications are last-minute purchases. Despite this short temporal distance, rescued meals are typically presented in an abstract manner (e.g. as a magic box) both semantically and visually on most food waste reduction applications (see e.g. Too Good To Go.com). The actual offer is in fact opaque, and the consumer does not know the specific contents of the e.g. magic box. In the current research, we compare the effectiveness of this abstract product construal to a concrete product construal and argue that the effect of the product construal is likely to be contingent on other marketing appeals such as the benefits of the purchase.

2.4 Influence of benefit appeals

Consumers do not buy products but the service or benefits they render (Vargo and Lusch, 2008). Benefits thereby help consumers to achieve their consumption goals (Woodruff, 1997). Marketing appeals in the form of benefits appeals (self versus “other”) are well established mechanisms to stimulate pro-social behavior and choice (Green and Peloza, 2014; White and Peloza, 2009; Wu *et al.*, 2017). Indeed, consumers are motivated by either (1) self-benefits whereby the individual self-benefits from the purchase or/and (2) “other” benefits which are self-transcendent and where other people or society are the main beneficiaries (White and Peloza, 2009). Self-benefits of purchasing rescued meals could be, for example, quality, healthiness, tastiness and financial. For “other” benefits, this study focuses on environmental benefits like reduced landfill use, water wastage and lower carbon dioxide emissions.

Extant research is not clear in terms of which benefit drives consumers’ pro-social and pro-environmental behaviors. One stream of research shows that consumers primarily choose pro-social products like organic food for self-benefitting reasons such as health and taste (see e.g. Gundala and Singh, 2021). Yet, other research argues that environmentally friendly behavior is a tribute to consumers’ altruistic considerations and pro-social values (see e.g. Thøgersen, 2011). For example, research shows that consumers’ attitude and visiting intentions increase significantly when an advertising message emphasizes the environmental benefits (in comparison to stating facts/attributes of a restaurant’s green food practices; Xu and Jeong, 2019).

A possible explanation for these divergent findings could be that the effectiveness of self-versus “other” benefits on pro-social behavior is context dependent. They can vary depending on, for example, the product type (e.g. environmental benefits can trigger waste associations for RBF; De Visser-Amundson *et al.*, 2021) and the congruency between the benefit appeal and the consumption goal such that health appeals (versus social appeals) are more effective on “to-go dining intentions” when participants are induced with a health mindset (versus a social mindset; Kim *et al.*, 2021).

More specific to the current research are studies that examine how the effectiveness of self- versus “other” benefit appeals is influenced by consumer’s mental representation and level of construal (Goldsmith *et al.*, 2016; Reczek *et al.*, 2018). In a green consumption context, more abstract (vs concrete) information about the product improves consumer evaluations and choice of green products (Reczek *et al.*, 2018; Xu and Jeong, 2019; Yang *et al.*, 2015) but has no effect on the choice of conventional products (Reczek *et al.*, 2018). This occurs presumably because “benefit-based messages emphasizing the ultimate merits or benefits of green practices are more likely to be construed at the abstract level” (Xu and Jeong, 2019, p. 2289). Reczek *et al.* (2018) argue that a higher construal level is a better match with the longer-term environmental benefits of green products. Indeed, the immediate benefits of green products are usually less salient and thus less congruent with an abstract and future oriented mindset. In addition, Goldsmith *et al.* (2016) show that when consumers are in a lower-level construal mindset (and thus construe concrete and specific information), economic (i.e. self) and self-transcendent (i.e. benefits “others”) benefits of the environmentally friendly purchase equally influence consumer evaluations. Importantly, they also find that when consumers are in a higher-level construal mindset (and thus construe abstract and general information), the economic benefits have a negative effect on consumer evaluations. Taking these prior research findings together, we predict that product construal and benefit appeals interact to influence consumer evaluations. Specifically, an abstract rescued meal description (i.e. the consumer does not know what (s) he gets) will have a positive effect on consumer evaluations when it is coupled with environmental benefits (versus financial benefits). Conversely, a concrete description of the rescued meal (i.e. the consumer knows exactly what (s)he gets) will positively influence consumer evaluations when it is coupled with financial benefits (versus environmental benefits). The moderation hypothesis is formalized in the following way:

- H1a.* Promoting an abstract rescued meal with environmental (versus financial) benefits increases consumer evaluations (purchase intentions, willingness to pay and product sales).
- H1b.* Promoting a concrete rescued meal with financial (versus environmental) benefits increases consumer evaluations (purchase intentions, willingness to pay and product sales).

Figure 1 outlines the conceptual framework. Table 1 further describes the main results of the hypotheses testing.

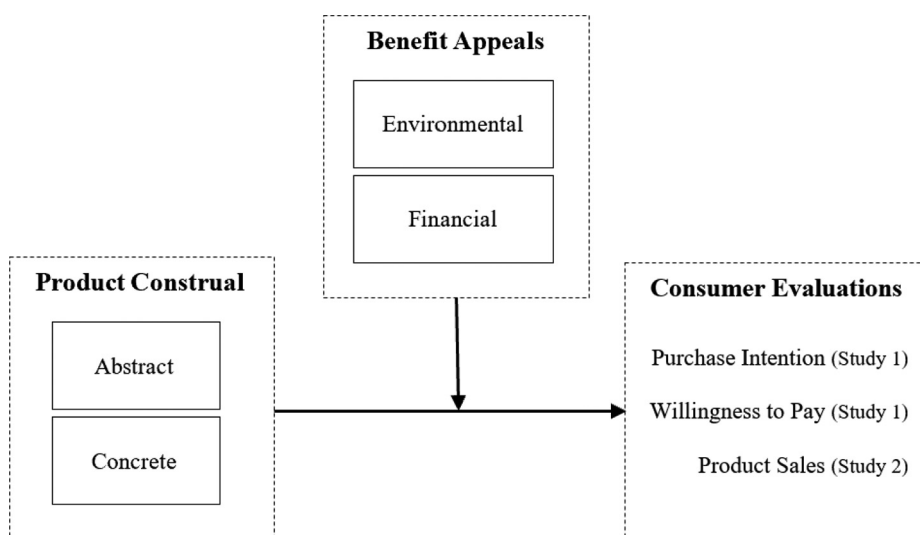
3. Study 1

3.1 Method

3.1.1 Participants and design. Participants were randomly assigned to one of the conditions of a 2 (Product Construal: Abstract versus Concrete) \times 3 (benefits: financial versus environmental versus control) between-subjects design. A sample of 277 participants (63% female; $M_{AGE} = 27.8$, geography = The Netherlands, Belgium) completed the study online. The sample was recruited through a convenience sampling strategy using professional and personal networks. The majority of the study participants (52%) reported that they order take-out food at least once a month and 13% of the participants order take-out about once per week. The rest of the respondents (35%) order take out a few times a year or less.

3.1.2 Procedure. Participants were told that they were ordering dinner that evening on the “Too Good To Go” application and viewed screenshots of the application of different

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Figure 1.
Conceptual model

Study 1 (Online experiment, product construal x benefits appeals using TGTG screenshots, rescued meals)

Manipulations	H1a			H1b		
	Abstract/ Environmental (n = 46)	Abstract/ Financial (n = 45)	Abstract/ Control (n = 48)	Concrete/ Environmental (n = 47)	Concrete/ Financial (n = 47)	Concrete/ Control (n = 44)
Purchase intention	$p = 0.077$ 5.43 4.99		4.89	$p = 0.007$ 4.74 5.55		4.61
Willingness to pay	$p = 0.040$ 60.07 5.44		6.06	$p = 0.041$ 5.62 6.64		6.20

Main finding: Consumer evaluations are higher when the rescued meal offer is abstract (concrete) and coupled with environmental (financial) benefits

Study 2 (Field study, product construal x benefits appeals, e-mail flyers, rescued food boxes)

Manipulations	H1a		H1b	
	Abstract/ Environmental (n = 46)	Abstract/ Financial (n = 45)	Concrete/ Environmental (n = 47)	Concrete/ Financial (n = 47)
Product sales	$p = 0.004$ 47 23		$n.s.$ 37 40	

Main findings: Product sales increase (decrease) when the rescued food box is abstract and paired with environmental (financial) benefits. When the rescued food box description is concrete, product sales increase to that of an abstract rescued food box promoted with environmental benefits. However, there is no difference between the benefits in this case

Source: Created by author

Table 1.
Summary of findings

meal options. The stimuli were developed using screenshots from the TG TG application. They were photoshopped and adapted to tease out the constructs under investigation. In the abstract condition the product description of the rescued meal was general both in text and visual. It showed a generic picture of different dishes and was described as a “meal with a side dish and dessert.” In contrast, in the concrete condition the product description was much more specific showing the specific meal which was described as a “curry with a side salad and chocolate mousse dessert.” The environmental condition featured the environmental benefit of the purchase: “when buying this meal, you save the CO₂ equivalent to a 5 km drive, happy planet!” The financial condition had a financial cue: “when buying this meal, you save the cash equivalent to a 2 km drive, happy wallet!” The environmental benefit was copied from the TG TG application. We designed a matching one for the financial benefit condition to ensure orthogonality of our experimental design. The control condition did not feature any benefits. We conducted a pretest ($N = 101$) on the product construal manipulation prior to conducting the main study, which was successful (see supplementary materials for details).

3.1.3 Measures. The study uses two dependent variables purchase intentions; measured with a three-item, seven-point scale (White and Peloza, 2009; how unlikely/likely, unwilling/willing, not inclined/inclined; $\alpha = 0.93$); and willingness to pay using a single-item (how much would you be willing to pay?) as an open-ended question. Afterwards, manipulation checks were incorporated to test that the manipulations worked as intended. For the product construal manipulation, participants were asked to indicate to what extent they agreed the scenario presented to them was a general rescued meal offer and specific rescued meal offer on a 7-point Likert scale (1 = strongly disagree, 7 = strongly agree). For the benefit appeals manipulation, participants were asked to indicate to what extent they agreed the rescued meal offer was promoted to save CO₂ emissions and save money on a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree).

3.2 Results

3.2.1 Manipulation check. A one-way ANOVA on the manipulation check for product construal showed that the participants in the abstract condition ($M_{\text{ABSTRACT}} = 5.65$, $SD = 1.50$) perceived the rescued meal offer significantly more general than the participants in the concrete condition [$M_{\text{CONCRETE}} = 3.79$, $SD = 1.85$, $F(1, 275) = 84.651$, $p < 0.001$]. Similarly, in the concrete condition participants found the meal offer more specific ($M_{\text{CONCRETE}} = 5.58$, $SD = 1.40$) in comparison to participants in the abstract condition [$M_{\text{ABSTRACT}} = 3.40$, $SD = 1.93$; $F(1, 275) = 116.032$, $p < 0.001$]. Thus, the product construal manipulation was successful. A similar one-way ANOVA on the benefit appeal manipulation check showed that participants in the environmental appeal condition considered the appeal to reflect more environmental benefits ($M_{\text{ENVIRON}} = 4.66$, $SD = 1.15$) than did participants in the financial appeal ($M_{\text{FINANCE}} = 3.20$, $SD = 1.75$) and control conditions [$M_{\text{CONTROL}} = 3.38$, $SD = 1.49$; $F(1, 274) = 26.484$, $p < 0.001$]. In contrast, in the financial appeal condition ($M_{\text{FINANCE}} = 4.53$, $SD = 1.28$) the respondents found the appeal to reflect more financial benefits than did respondents in the environmental appeal ($M_{\text{ENVIRON}} = 3.44$, $SD = 1.70$) and control conditions [$M_{\text{CONTROL}} = 3.51$, $SD = 1.51$; $F(1, 274) = 16.856$, $p < 0.001$]. This means that also the benefit appeal manipulation was successful.

3.2.2 Purchase intention. A 2×3 ANOVA with product construal and benefits as the independent variables and purchase intentions as the dependent variable revealed no main effect of product construal [$F(1, 276) = 0.40$, $p = 0.526$]. There was a marginally significant main effect of benefits [$F(2, 276) = 2.81$, $p = 0.062$]. A post hoc test using Tukey HSD shows that the environmental benefit condition ($M_{\text{ENVIRON}} = 5.09$, $SD = 1.42$) does not significantly

differ from the other two conditions ($M_{\text{FINANCIAL}} = 5.24$, $SD = 1.43$; $p = 0.742$; $M_{\text{CONTROL}} = 4.76$, $SD = 1.44$; $p = 0.255$). There is a marginally significant difference between the financial benefit condition and the control condition ($M_{\text{FINANCIAL}} = 5.24$, $SD = 1.43$; $M_{\text{CONTROL}} = 4.76$, $SD = 1.44$; $p = 0.056$).

Importantly, we find a significant interaction between the product construal and benefit appeals [$F(2, 276) = 5.38$, $p = 0.005$; Figure 2] on purchase intention.

A planned contrast analysis using ANOVA shows that an abstract product construal increases purchase intentions significantly when the offer features environmental benefits ($M_{\text{ENVIRON}} = 5.43$, $SD = 1.16$) in comparison to the combined effect the financial benefits ($M_{\text{FINANCIAL}} = 4.91$, $SD = 1.79$) and control conditions [$M_{\text{CONTROL}} = 4.76$, $SD = 1.44$; $t(136) = 2.114$, $p = 0.036$]. The simple effects further show that purchase intentions are marginally higher in the environmental benefit condition than in the financial benefit [$t(136) = 1.780$; $p = 0.077$] and control conditions [$M_{\text{CONTROL}} = 4.89$, $SD = 1.44$; $t(136) = 1.885$, $p = 0.062$]. There is no significant difference between the financial benefits and the control conditions [$t(136) = 0.076$, $p = 0.939$]. This result indicates that the fit between an abstract meal offer (i.e. a Magic Box) and environmental benefits (i.e. “Happy Planet”) improves consumers intentions to purchase rescued meals as stipulated in *H1a*.

In contrast, when participants are exposed to a concrete product construal, they report higher purchase intentions in the financial benefits condition ($M_{\text{FINANCIAL}} = 5.55$, $SD = 0.89$) than in the environmental benefits ($M_{\text{ENVIRON}} = 4.74$, $SD = 1.59$) and control conditions [$M_{\text{CONTROL}} = 4.61$, $SD = 1.67$; $t(135) = 3.423$, $p = 0.001$] together. Further analysis of the simple effects shows that purchase intentions increase significantly more in the financial benefit condition than in the environmental benefit [$t(135) = 2.758$, $p = 0.007$] and control conditions [$M_{\text{CONTROL}} = 4.89$, $SD = 1.44$; $t(135) = 3.151$, $p = 0.002$]. As expected, there is no significant difference in purchase intention between the environmental benefits and the control conditions [$t(135) = 0.439$, $p = 0.661$]. This result supports *H1b* such that when consumers are presented with a concrete meal offer, their purchase intention increase

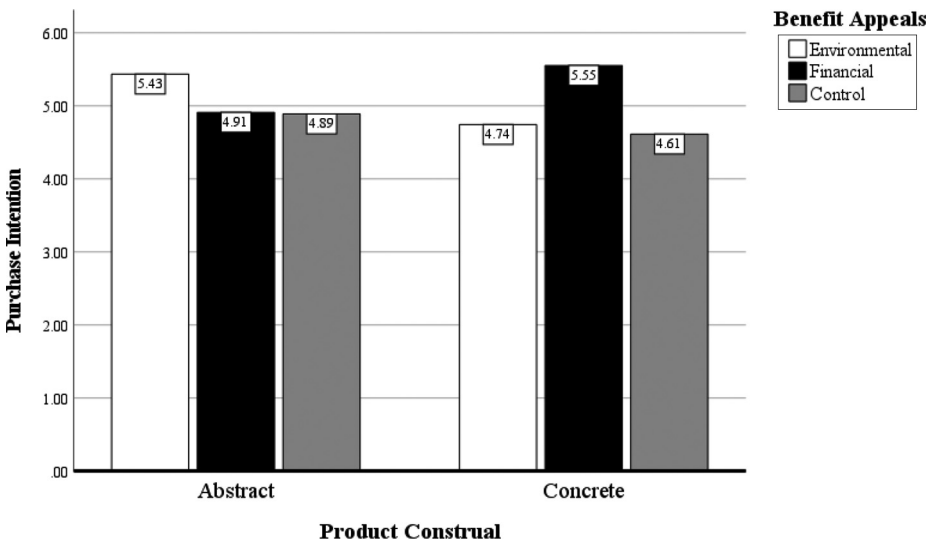


Figure 2.
Study 1: effect of
product construal and
benefit appeals on
purchase intentions

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significantly more when it is matched with financial benefits than with environmental benefits.

3.2.3 Willingness to pay. A similar pattern of results emerges using willingness to pay (WTP) as the dependent variable. We first log transformed the values of WTP [1]. A 2×3 ANOVA of WTP shows no main effect of product construal [$F(1, 276) = 1.234, p = 0.268$] nor of benefits [$F(2, 276) = 0.069, p = 0.934$] but a significant interaction effect [$F(2, 276) = 4.619, p = 0.011$; Figure 3].

Using a planned contrast analysis in a one-way ANOVA, we find that when the product construal is abstract, WTP in the environmental benefit condition ($M_{\text{ENVIRON}} = 6.07, SD = 1.72$) is significantly higher in than the financial condition [$M_{\text{FINANCIAL}} = 5.44, SD = 2.43; t(136) = 2.073, p = 0.040$]. It does not increase in comparison to the control condition [$M_{\text{CONTROL}} = 6.06, SD = 2.44; t(136) = 0.372, p = 0.710$] and also not against the financial and control conditions together [$t(136) = 1.419, p = 0.158$]. As expected, there is no significant difference between the financial benefits and the control conditions [$t(136) = -1.725, p = 0.087$].

On the other hand, when the product construal is concrete, we observe that the financial benefits ($M_{\text{FINANCIAL}} = 6.64, SD = 2.49$) increase WTP significantly more than the environmental benefits [$M_{\text{ENVIRON}} = 5.62, SD = 1.79; t(135) = 2.062, p = 0.041$]. There is no difference between the financial benefits and the control condition [$M_{\text{CONTROL}} = 6.20, SD = 2.86; t(135) = 1.366, p = 0.174$] and no difference between the environmental and control conditions [$t(135) = -0.662, p = 0.509$].

Overall, Study 1 provides initial support for both *H1a* and *H1b*. We find that an abstract product construal, like a “Magic Box” positively influences consumer evaluations when the environmental benefits are highlighted (versus financial). In contrast, when the product construal is concrete and specific consumers are more likely to purchase and to pay more for the product when it is featured with financial benefits than with environmental benefits.

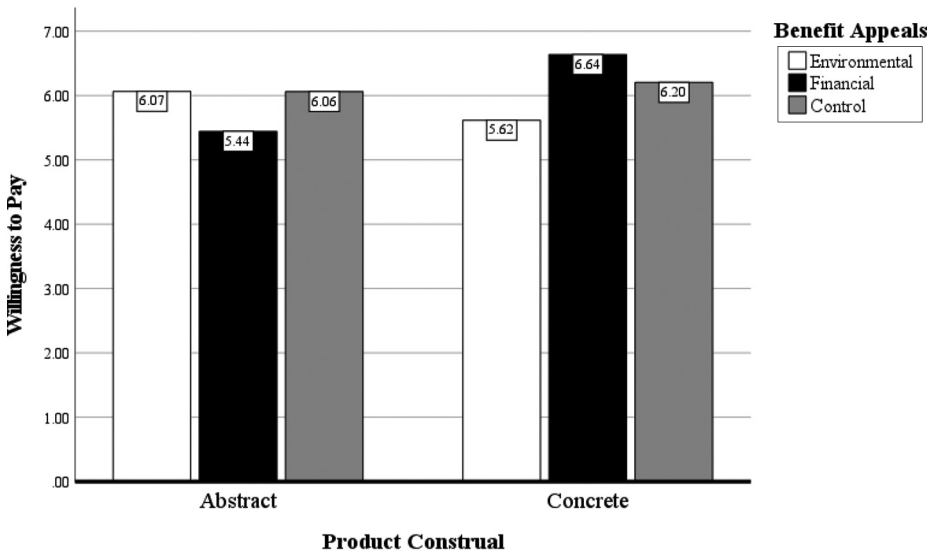


Figure 3.
Study 1: effect of product construal and benefit appeals on willingness to pay

Source: Created by author

4. Study 2

The objectives of Study 2 are twofold. First, to find additional support for our hypothesis in a field setting using real world data. Second, to generalize our findings to a different rescued meal context by using rescued food boxes as a growing market phenomenon to fight food waste (see e.g. [Imperfect Foods, 2022](#) and [Hungry Harvest, 2022](#)). They present a different consumption moment as the box consists of otherwise wasted ingredients and the meal is has to be prepared at home.

4.1 Method

4.1.1 Sample. Study 2 is a field study which was carried out at a university campus in The Netherlands. We set up and sold “rescued food boxes” in the lobby once a week for eight consecutive weeks. Customers included university staff (20%) and students (80%). The sample profile was approximately 65% women and the average ages were between 45 and 55 years for staff and around 19–23 years for students. The campus hosts about 500 to 600 staff and students per day, and the final sample denotes sales of 147 rescued food boxes. Staff members bought 60 (40.80%) of the rescued food boxes and the rest of the 87 boxes were bought by students (59.20%). The campus features several different food service outlets. Thus, both students and staff are used to purchase food to either be consumed at the restaurant or at home.

4.1.2 Procedure. Study 2 used a 2 (product construal: abstract versus concrete) \times 2 (benefits: financial versus environmental) between-subjects design. We set up a campaign where we sold “rescued food boxes” every Thursday for eight weeks. The “rescued food boxes” contained otherwise wasted ingredients (imperfect and surplus, within expiration dates) to make a healthy and delicious meal at home. We created four, randomly assigned, e-mail groups where each e-mail group was assigned to one condition. The e-mail featured a promotional flyer reflecting the specific condition that the recipient had been assigned to. In the abstract (concrete) condition the recipient received a product description of the rescued food box which was general (specific) both in text and visual. The abstract (concrete) message featured either the environmental or the financial benefits of the purchase. E-mail recipients received the e-mail two days in advance to sign-up for a rescued food box. Again, we conducted a pretest for this study which showed that our manipulations were successful (see supplementary materials for details).

4.1.3 Measure. The dependent variable is the number of rescued food boxes sold ($N = 147$). We treated every sale as a discrete transaction. This means that every time a rescued food box was sold, it was counted as one. Measuring actual sales and “real behaviour” (rather than intentions) adds ecological validity to our findings of Study 1 ([Gneezy, 2017](#); [Van Heerde et al., 2021](#)).

4.2 Results

To test our hypotheses and compare the number of boxes sold in the four different conditions, we ran chi-square tests. This method is commonly used for field studies. For example, [Goldstein et al. \(2008\)](#) use chi-square in their seminal paper “A room with a view” to compare guests’s towel hanging behavior. The chi-square test reveals that the product construal level has no significant effect on consumer sales [abstract 48%; concrete 52%; $\chi^2(1, N = 147) = 0.333, p = 0.564$]. Similar to Study 1, there is only a marginally significant effect of benefit appeals on sales of the rescued food boxes [financial 43%; environmental 57%; $\chi^2(1, N = 147) = 3.00, p = 0.083$]. As in Study 1, we find a significant two-way interaction $\chi^2(3, N = 147) = 8.293, p = 0.040$ ([Figure 4](#)).

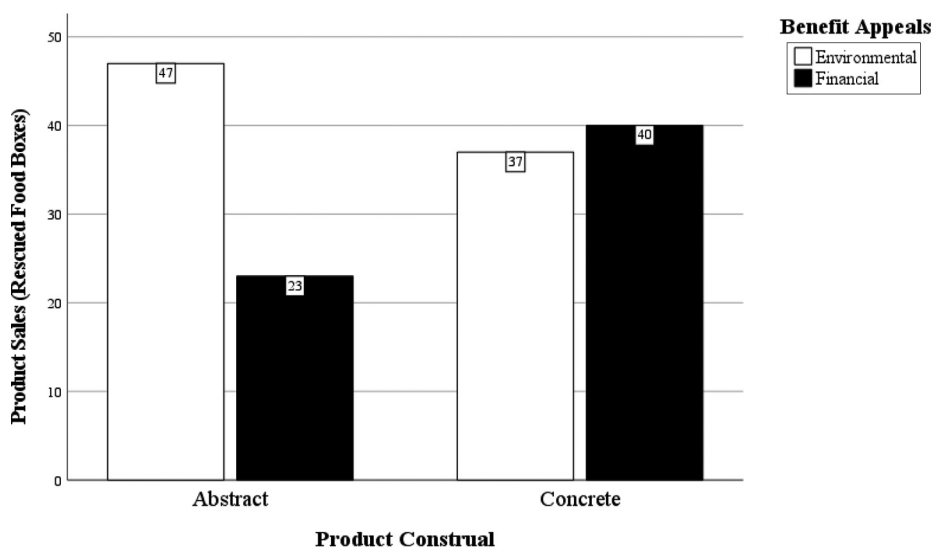


Figure 4.
Study 2: effect of product construal and benefit appeals on product sales

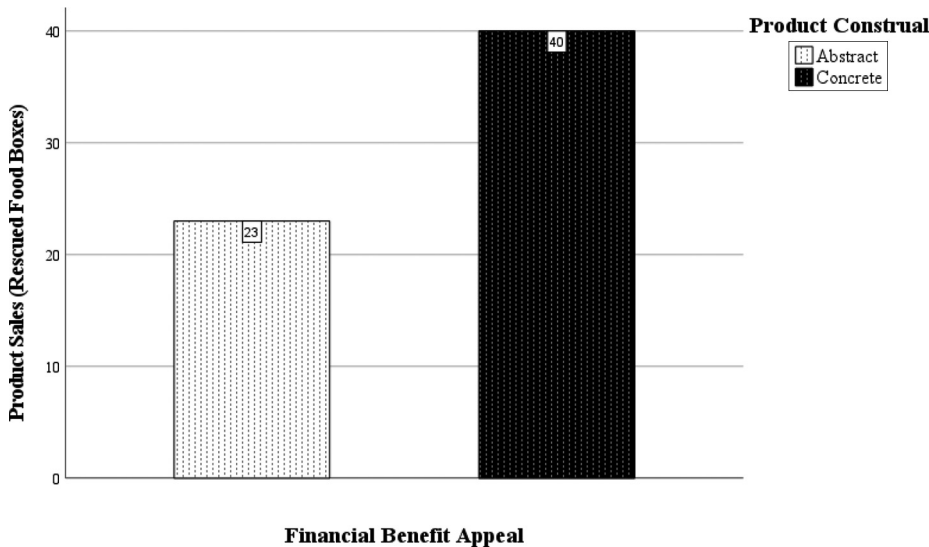
Source: Created by author

Specifically and as expected (*H1a*), we find that an abstract description paired with environmental benefits sell significantly more rescued food boxes (67%, 47 pcs) than an abstract description paired with financial benefits [33%, 23 pcs; $\chi^2(1, N = 70) = 8.229, p = 0.004$; Figure 4]. However, there is no difference in sales for the concrete condition between the two benefit appeals [environmental 48%, 37 pcs; financial 52%, 40 pcs; $\chi^2(1, N = 77) = 0.117, p = 0.732$]. Hence, we do not find support for *H1b* in this study. However, it can be noted that emphasizing the financial benefits significantly increases sales when the product is described in a concrete manner (63%, 40 pcs) than in an abstract manner [37%, 23 pcs; $\chi^2(1, N = 63) = 4.587, p = 0.032$; Figure 5]. In contrast, product construal has no effect on sales when environmental benefits are emphasized [abstract 55%; concrete 45%, $\chi^2(1, N = 84) = 1.190, p = 0.275$].

The results of Study 2 help us to further understand the differential effect of product construal and benefit appeals in a field setting. We find additional support that an abstract and general product construal is better paired with environmental benefits (versus financial benefits) to influence product sales. However, Study 2 shows that when the product construal is concrete and specifically describes the offer, there is no difference between the benefit appeals. We explain this inconsistency to Study 1 as a result of the target market. The university staff and student community are generally very high on environmental values. A concrete offer of left-over foods is therefore likely to appeal to them regardless of the benefit emphasized. For an abstract food box this is less likely to be the case as the target market would be less informed about the contents of the box.

5. Conclusions

The “wicked problem” of food waste requires a combination of short-term and long-term solutions to reach the UN SDG # 12, which aims to reduce household and retail waste by 50% by 2030 (United Nations, 2022). One potential short-term and commercial solution is the use of food waste reduction applications, which allow food service operators to sell their



Product
construal and
benefit appeals

Figure 5.
Study 2: effect of
financial benefit
appeal and product
construal on product
sales

Source: Created by author

surplus food instead of discarding it. Although this can help reduce food waste, it may also result in value destruction as the food is of the same quality as the meals sold earlier in the day for full price. More fundamentally, to move to a more sustainable food system, retaining and restoring people's perceptions of the value of food is key (Mookerjee *et al.*, 2021). In this research, we demonstrate how more value can be retained by changing the framing and the appeals of these last-minute offers.

Across one online experiment and one field study, we first find that abstract and general offers (e.g. a magic box on TGTG) are best matched with the environmental (versus financial) benefits of the purchase. This is consistent with previous research showing that an abstract construal level work better with future oriented values like saving the environment (Goldsmith *et al.*, 2016; Reczek *et al.*, 2018). We thereby show that an abstract construal can still appeal to consumers despite a short temporal distance (i.e. ordering a rescued meal last minute) when matched with congruent benefits (Yang *et al.*, 2015). Second, in line with our expectations, we find in Study 1 that a concrete offer paired with the financial (versus environmental) benefits of purchasing the rescued meal increases consumers purchase intention and WTP significantly. Focusing on benefit appeals in more detail, we also find in line with previous research that when the financial benefits were paired (in a real-world setting) with a more abstract and higher-level product construal, sales dropped dramatically (Goldsmith *et al.*, 2016).

5.1 Theoretical implications

Our findings contribute to prior research by clarifying the interaction between product construal and benefit appeals. While previous studies show independently of each other that an abstract construal fits best with an environmental benefit appeal (Reczek *et al.*, 2018; Yang *et al.*, 2015) and that an economic appeal are not well matched with a high-level, abstract construal (Goldsmith *et al.*, 2016), we consolidate these findings and find support for a significant interaction between product construal and benefit appeals across two

studies including real world data. We therefore provide important insight into the differential effect of abstract (versus concrete) offer descriptions coupled with either environmental or financial benefits on consumer evaluations in a last-minute purchase context.

Another important theoretical contribution of this research is the departure from “ugly produce” focus which have received ample attention in recent years (see e.g. [Grewal et al., 2019](#); [Mookerjee et al., 2021](#); [Suher et al., 2021](#)) to RBF as a new category food with distinctive marketing implications ([De Visser-Amundson et al., 2021](#)). RBF offers otherwise wasted food a pathway to re-enter the human food chain as high value. In this context, rescued meals can find a “belly rather than a bin.” We thereby answer to calls for more research on food waste solutions beyond fresh produce ([Bhatt et al., 2018](#); [Bhatt et al., 2020](#)) and, more broadly, for more comprehensive knowledge of consumer evaluations of social innovations (like food waste reduction applications) in hospitality and tourism ([Molina-Collado et al., 2022](#)). We also add to the literature on the use of technological innovations to address food waste as a commercial opportunity, rather than just as a philanthropic venture ([Filimonau and De Coteau, 2019](#); [Kaur et al., 2021](#)).

5.2 Practical implications

Although the longer-term and structural impact is still uncertain, the shorter-term business implications of food waste reduction applications on decreasing food waste in the food service industry are clear and certainly positive. It is a win-win-win as the consumer receives a rescued meal for a discount, the food service outlet recuperates some of the costs and the environment, assuming that the rescued meal is consumed, is saved from landfill and wasted resources. This research shows practitioners that rescued meals that are described in less (more) detail and with more generic (specific) information along with the environmental (financial) gains of the purchase, not only drive sales but can also demand a higher price.

As a result, the current practice of offering discounts up to 70% may in that case not be necessary and the food would retain more value. This is critical, as the more food is discounted and treated as a commodity, the harder it gets to battle food waste in a structural manner ([Bhatt et al., 2018](#)). We also show managers that, despite the last-minute context, an abstract offer like a magic box can still work if it is matched with environmental benefits. The advantages of this combination are that it allows flexibility by the food service provider to put whatever is left-over in the magic box; and allows the consumer to feel like a “waste warrior saving the planet” which in turn can have positive spillover effects.

5.3 Limitations and future research

Although the context of our studies was to order a rescued food online, the study participants did not actually use a food waste reduction application (e.g. TGTG). This could have impacted our results. Research shows that the actual usage of green products (like e.g. a food waste reduction application) can generate a “green consumption effect” which is in essence positive feelings and evaluations consumers may experience from using green products ([Tezer and Bodur, 2020](#)). Thus, the actual usage of the mobile application may influence how the information is construed and should therefore be taken along in future research. Relatedly, this research also found a few disparate results which may be explained by fluency of information processing (see e.g. [Labroo and Pocheptsova, 2016](#)) or individual or collective values (e.g. pro-environmental mindset; [Chwialkowska et al., 2020](#)). Future research can explore such factors and other mediating effects in more detail.

It may also be worthwhile to replicate our findings across different geographical/cultural samples for greater generalization and representativeness. Our data collection is limited to The Netherlands and Belgium. Although research using Chinese samples aligns with our results in that abstract product descriptions of green products are more effective when emphasizing the environmental benefits (versus self-benefits; Yang *et al.*, 2015), we recognize that different cultures may react differently not only to product construal but also to benefit appeals. Indeed, recent research about the scientific merit of context specific studies explains that certain constructs might not “travel well” and may be less applicable in other contexts (Stremersch *et al.*, 2022).

Final important avenue for future research is to understand the extent to which rescued meals are consumed at home. Van Herpen *et al.* (2021) found in one of their studies on influence strategies of doggy bags that participants reported either consuming or storing 87.2% of the doggy bag contents. Thus, only a small portion was wasted in the case of doggy bags. However, it is unclear if the same applies to rescued meals as it does to left-over food. Relatedly, we call for more research on how food waste reduction applications help food service providers to reduce food waste on a structural and longer-term basis. A pressing question is if these commercial solutions actually help solving the food waste problem or are they rather sustaining the problem by *not* enforcing food service outlets to make systematic changes to reduce waste? Or even worse, promote food waste as part of their business model? Future research should explore if and how food service outlets use the data from food waste reduction applications to make better predictions and on that basis make more fundamental changes in, for example, purchase, storage and preparation procedures to reduce food waste.

Note

1. Willingness to pay was asked as an open-ended question. To stabilize for nonnormality in the distribution, we carried out a log transformation (Manning and Mullahy, 2001). The procedure is regularly used to normalize the distribution of willingness to pay measures (see e.g. Roosens *et al.*, 2019; Etkin *et al.*, 2015; Zhu *et al.*, 2008). We used the log-transformed values of WTP across all analyses. However, similar to other research, we report means and standard deviation in the original values for ease of interpretation (see e.g. Bertini and Aydinli, 2020).

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Supplementary material

The supplementary material for this article can be found online.

About the authors

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